2019 ANNUAL REPORT

NATIONAL MAGLAB

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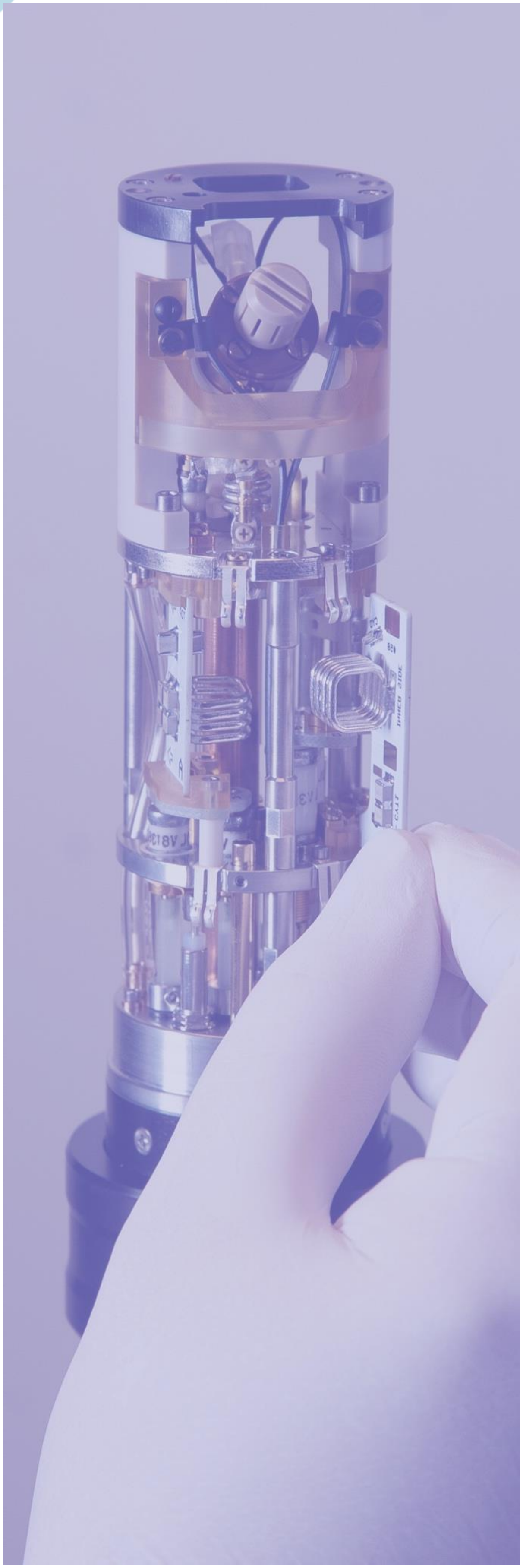
TALLAHASSEE, FL 32310
NATIONALMAGLAB.ORG

NATIONAL MAGLAB



2019 Annual Report

Produced by

National High Magnetic Field Laboratory

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DIRECTOR'S EXECUTIVE SUMMARY

THE USER PROGRAM

The National High Magnetic Field Laboratory continued to serve scientists from across the globe in 2019, advancing our understanding of new materials, energy solutions, and the science that underlies life. More than 2,090 researchers, students and technicians conducted experiments across the lab in 2019 – another record year for the MagLab's user program!

The National MagLab's user community continued to grow with new researchers using the facility and its high magnetic fields to investigate interdisciplinary scientific questions that span the spectrum – from physics to biology, chemistry to engineering. Of the 667 principal investigators in 2019, 21 percent are new to the MagLab user facility that they accessed to conduct their research. More than one thousand, about half of the lab's total user community, were students and postdocs. More than 27 percent of the National MagLab's users who chose to identify were females and 8.3 percent identified as a minority.

National MagLab users are profoundly positive about their experience. A user survey conducted in June continues to show overwhelming satisfaction:

- 91% external users are satisfied with the performance of the facilities and equipment
- 94% external users are satisfied with the availability of the equipment and facilities
- 97% external users are satisfied with the assistance provided by technical staff
- 91% external users are satisfied with the proposal process

Across the National MagLab's seven user facilities, enhancements and upgrades were made in 2019 that improved the user experience and experimental environment. These enhancements included:

- The Pulsed Field Facility's next generation duplex magnets were successfully tested up to 75 tesla (T). Cryogenics, electronics, and data acquisition systems were completed for the system in preparation for the first user-based commissioning experiments in early 2020.
- Wire fabrication has been completed for coils 3 and 4 of the 60T controlled waveform magnet for the Pulsed Field Facility. This fabrication is now performed at the MagLab to address quality control issues that had arisen with outside vendors.
- The MagLab High B/T Facility received a large, high bay research space that will become the MagLab's High Bay Convergence Lab, a new space for superconducting magnet systems, probe development and expanded scientific opportunities connecting the UF-based AMRIS and High B/T facilities. This space was cleared by the end of 2019 and is presently being configured for future user operations.
- A new director, Mark Meisel, UF Professor of Physics, was named to lead High B/T.
- The "Project 11" magnet, the 41.5T world record resistive magnet, began hosting users in 2019, providing DC Field users with a second 40T+ instrument for their research.
- The DC Field Facility's magnet cooling water treatment system was completely replaced with a new system that doubles the number of resin beds used to remove metal ions that are shed as the magnets operate. This addition of a second resin bed enables the cleaning of one bed while still operating the water-cooled magnets, allowing greater operational flexibility for our DC magnets. All of the original 1990s electronic controls and sensors were also replaced and are now integrated into the distributed control system that monitors and controls plant operations.
- New 12.5kV - 480V Electrical Switchgear was installed in 2019, improving both the protection of critical equipment and the safety of personnel.
- A 600MHz wide bore (89mm) magnet with a Bruker AVIIIHD console and an 800MHz narrow bore (54mm) magnet and a three channel Bruker AVIII console were all added to the AMRIS Facility in 2019. User operations have begun on both of these systems, and a 5mm cryoprobe is being installed on the 800 system, ensuring that these high field NMR systems offer the latest in sensitivity and pulse sequence capabilities.

- Working directly with Bruker, the AMRIS Facility has successfully tested a new shielded gradient setup on the 750MHz system which will significantly increase SNR during imaging experiments.
- The installation of a 13C-optimized 10 mm cryoprobe at 600MHz in combination with the Hypersense DNP polarizer previously installed in the AMRIS Facility now enables real-time metabolic measurements.
- Arbitrary waveform generation and DNP/ENDOR capabilities were integrated into the EMR facility, enabling wideband excitation and implementation of state-of-the-art pulse schemes akin to what is possible in NMR.
- An in-situ NMR spectrometer was integrated with HiPER such that NMR experiments can be performed by themselves, or in combination with the high-power pulsed microwave capabilities.
- The 600MHz solid state DNP system has been assembled around a wide bore field swept 600MHz magnet, a demo gyrotron, a used spectrometer from Bruker, and a home-built quasi-optic table. This enhancement of our NMR user facility at FSU is now the DNP instrument with the highest operational uptime in the country, thanks to superb scientific and engineering staff.
- A field stabilization unit is being refined and enhanced for the MagLab's unique 36T Series Connected Hybrid magnet. It will reduce drift to 0.3ppm and suppress short term fluctuations and noise by a factor of 100.
- The NMR facility at FSU has developed two Magic Angle Spinning probes (1.3mm and a 0.70mm) for 800MHz systems during the past year. These probes have the potential to revolutionize biological solid state NMR.

USER RESEARCH

In 2019, users published 420 peer-reviewed papers, many in significant journals like *Science, Nature, Physical Review Letters, Energy Fuels, Analytical Chemistry, and the Proceedings of the National Academy of Sciences*. A complete database of user publications can be found at https://nationalmaglab.org/research/publications-all/peer-reviewed-publications. Important discoveries include:

- Reenterant "Lazarus" superconductivity at fields above 35T in UTe_2 was discovered using the 45T hybrid magnet, a 35T resistive magnet in the DC Field Facility and a 65T pulsed magnet in the Pulsed Field Facility.
- The magnetization of single crystals of BiPd were measured using torque magnetometry up to 35T at temperatures down to 350mK in DC Field Facility, providing further experimental support that BiPd is a topologically-nontrivial superconductor.
- In a hydrogen-packed "superhydride" compound squeezed to ultra-high pressures, scientists observed superconductivity at record-warm temperatures nearing room temperature.
- By using pressure, researchers developed a new method to reversibly and *in-situ* induce superconductivity in bilayers of graphene, providing new insights into the physics underlying this two-dimensional material's intriguing characteristics.
- Using a mouse model of Alzheimer's disease, AMRIS users demonstrated that high-field diffusion MRI measurements can detect early changes in white matter that may help to monitor and predict disease progression, as well as potentially suggest new treatment methods.
- With the power of high resolution MRI, AMRIS users who are trying to understand how the brain clears waste products have identified the perivascular space (PVS) network in a rat brain to elucidate both PVS uptake and clearance pathways.
- Researchers in the EMR Facility determined the molecular details of the structure of the T-cell receptor and its dynamic movements during T-cell activation, providing insight into new drugs development to fine tune T-cells that combat cancers or other non-malignant diseases.
- Studying a system with a chiral staggered spin environment, EMR users found a different behavior than for non-chiral staggered systems, work that opens the quest for finding other materials where anisotropic interactions and particular crystal symmetries conspire to enable entirely novel magnetic states.

- ICR users performed the first application of top/middle-down MS/MS sequencing of endogenous human monoclonal immunoglobulins in a polyclonal immunoglobulin background using the 21T FT-ICR instrument.
- NMR users achieved remarkable spectral sensitivity and resolution for characterizing cell wall components of three agricultural crops (maize, rice and switchgrass) through DNP.
- 17O spectroscopy in the Series Connected Hybrid Magnet at 35.2T has continued with unique resolution of all four water molecules and high resolution characterization of the quadrupolar coupling constants and asymmetry parameters of the four unique waters bound in crystals of Lanthanum Magnesium Nitrate Hydrate. This led to unique insights of the electronic environment in the crystal.
- NMR researchers found a link between migraines and how sodium is distributed through the brain.
- NMR research on the most economically important agricultural plant in the U.S. — corn — has revealed a different internal structure of the plant than previously thought.
- Researchers studied the superconductor H_3S at the Pulsed Field Facility, which required the application of extreme temperatures (Tc = 203K), pressures (160GPa), and magnetic fields (65T). The results of this study, which mapped out the temperature dependence of the upper critical field Hc2 as a function of temperature using a diamond anvil cell (DAC), provides evidence that H_3S behaves as a strong-coupled, orbital-limited superconductor over the temperature and fields studied.
- By probing optical absorption as a function of magnetic field, Pulsed Field Facility users identified the particular intra- and inter-chain lattice modes that evolve with magnetic field, knowledge that takes us an important step closer to a full understanding of coercivity in Sr_3NiIrO_6.

More user research highlights are featured on our website https://nationalmaglab.org/research/publications-all/science-highlights-all and in our news articles https://nationalmaglab.org/news-events/news.

ADVANCEMENTS IN MAGNET-MAKING

This year, technology development work continued toward the MagLab's next world-record instrument – a 40T all superconducting magnet. The team has selected REBCO, a tape conductor, as the magnet's high-temperature superconducting material and submitted a conceptual design proposal in June which was funded by the National Science Foundation in December 2019.

Installation of the 32T all-superconducting magnet was completed in 2019 and commissioning is underway. This world-unique superconducting magnet will begin routine operation in 2020 to provide users with sustained high field environments with lower field ripple and electronic noise than our resistive and hybrid magnets.

Two new 75T duplex magnets were built and tested at the Pulsed Field Facility in 2019, including one that was successfully tested to 76.8T in September. The Pulsed Field's four 65T workhorse magnets delivered about 8,200 shots this year, a new record for the number of shots provided to users in a calendar year. While the generator powering the 100T magnet is undergoing repair, magnet designers developed a path to provide magnetic fields up to 85T using a capacitor bank.

Advancements in both high- and low-temperature superconductors continued in the Magnet Science and Technology department and Applied Superconductivity Center in 2019. Industry collaborations with Cryomagnetics Inc., Oxford Instruments – Nanoscience, Bruker-OST, Engi-Mat, and MetaMeteria helped grow our understanding of Bi-2212 round wire, a technology that could be used to build magnets for high energy physics and nuclear magnetic resonance. In 2019, the first paper worldwide with preliminary results on the mechanical strains due to REBCO screening current was published by a MagLab-led collaboration. And finally, MagLab research found that adding Hafnium (Hf) boosts current-carrying capability by 60 percent in Nb_3Sn, a technologically-important low-temperature superconductor.

BROADENING PARTICIPATION & BUILDING THE STEM PIPELINE

In 2019, the National MagLab provided outreach to over 7,500 students from school districts in Florida and Georgia. More than 120 middle-school aged students participated in a summer camp and 21 students were middle school mentors in 2019, nearly half of whom were female and 33 percent of whom were African-American. Ten teachers and 19 undergraduates from 14 different universities spent the summer conducting research through the lab's Research Experiences programs (RET and REU). AMRIS and High B/T staff worked with local schools from Alachua County and several Pulsed Field Facility scientists participated in "Scientist in the Spotlight" programs at the Bradbury Science Museum in Los Alamos.

More than 10,800 visitors – the largest crowd in MagLab history - came from across the southeast to sample the 100 hands-on demonstrations on the science smorgasbord of Open House 2019. We wrote a recipe for science featuring 30+ community partners including the FSU Nutrition Department, FAMU Vitaculture, Keiser University's Culinary Arts, and the Florida Department of Agriculture's Food Safety Division who helped visitors learned about the science of food. Visitors enjoyed a taste test of science with 30+ food-themed demonstrations including Molecular Cuisine, Glowing Pickles, Easy Bike Ovens, Einstein's Ice Cream, Pitch Perfect Marshmallows & a special live performance of music from the Moire video at the world's strongest magnet – the 45T.

In 2019, MagLab staff gave 317 lectures, talks and presentations across 23 countries and 33 states. The MagLab hosted an RF Coil building workshop, DNP-enhanced Magic Angle Spinning ssNMR workshop and the North American Fourier Transform Mass Spectrometry Conference in 2019. The 2019, User Summer School attracted more than two dozen graduate students and postdoc attendees and Winter Theory School continued to be a success with a focus on strongly correlated and quantum spin liquid physics, Weyl and topological physics and new computational techniques and machine learning.

CULTIVATING A SAFE LAB ENVIRONMENT

With strong support from our host institutions, the National MagLab continues to focus on safety improvements for our users, staff, contractors and visitors. The lab makes key investments in safety and in 2019, over $120,000 was allocated for safety-related equipment, supplies, training, and processes. Safety was at the forefront of the 2019 annual maintenance shutdown which included a week-long power outage, lab space decommissioning and the Open House event. This year, there were also a number of special safety initiatives, trainings and reviews conducted that offer opportunities to continuously improve the lab's safety toolkit –

- A situational awareness training to train staff who interface with the public on how to identify potential threats or dangerous situations and how to respond.
- An onsite security assessment of the MagLab provided by Florida State University's Crime Prevention Division. A report was provided that detailed recommendations to improve lighting and security at the MagLab and the lab is working to implement the recommendations.

LOOKING AHEAD

The 32T magnet system will begin user operations in DC Field in 2020. An addition of a sixth magnet cooling water pump in DC Field this coming year will provide a larger operational envelope of pressure and flow for future magnet designs. Ongoing upgrades will continue to be made to the HiPER spectrometer in the coming year to optimize the wideband pulsed EPR capabilities. A new Bruker Neo Console and cryo platform will be coming to AMRIS in 2020 and final development of a cryostat and probe assembly for the Series Connected Hybrid (SCH) magnet should lead to the first high-resolution EPR measurements in the SCH by the end of 2020.

The Pulsed Field Facility will open the 75T duplex to users in mid 2020 and continue work on a second duplex magnet that will provide users with fields up to 88T with a 10mm bore size. The 65T short pulse magnet cells will be re-designed to have a more standardized experimental set-up that will increase the efficiency of experiments and provide for a more productive user experience.

Work on a conceptual design for the 40T all-superconducting magnet will continue in 2020. The 40T magnet team will work to develop a variety of controlled contact resistances suitable for the various sections of a 40T SC magnet based on NI-REBCO technology and continue to explore the potential benefits of operating the magnet at a higher fraction of critical current. Additional coil testing is planned for 2020 to better predict the performance of the final 40T magnet.

An exciting new High Bay Convergence Lab at the University of Florida will continue to take shape in 2020, merging the unique capabilities of High B/T and AMRIS into one 3,400 square foot space. Three NMR quality superconducting magnet systems will advance research in probe development for DNP NMR imaging, new refrigeration with enhanced magneto-caloric effect, and materials growth far from equilibrium. An 18.8T system is expected to arrive in spring 2020 and to be operational by fall. Systems featuring 9.4T and 14T magnets are expected to arrive by the end of summer 2020.

All MagLab user facilities and in-house research groups continue to advance the development of new instrumentation to serve our growing user community. Please explore the detailed information available in the individual chapters that follow and across our website at https://nationalmaglab.org/

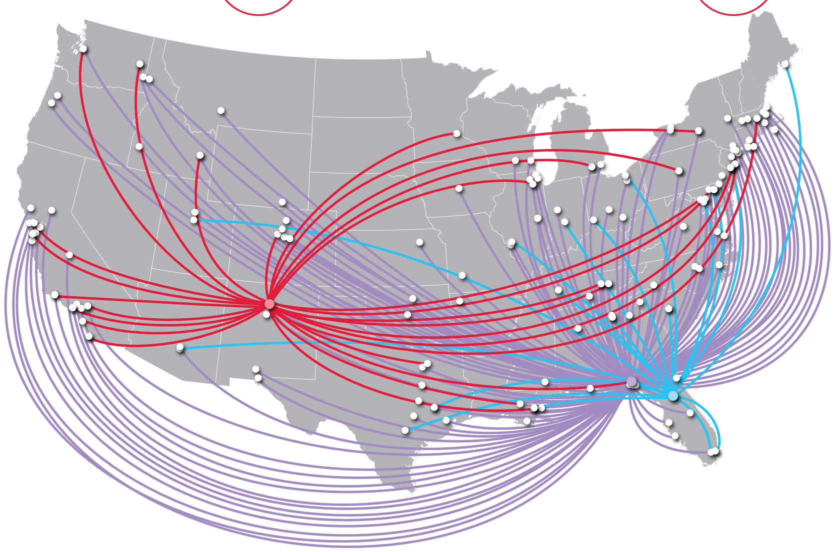
2019

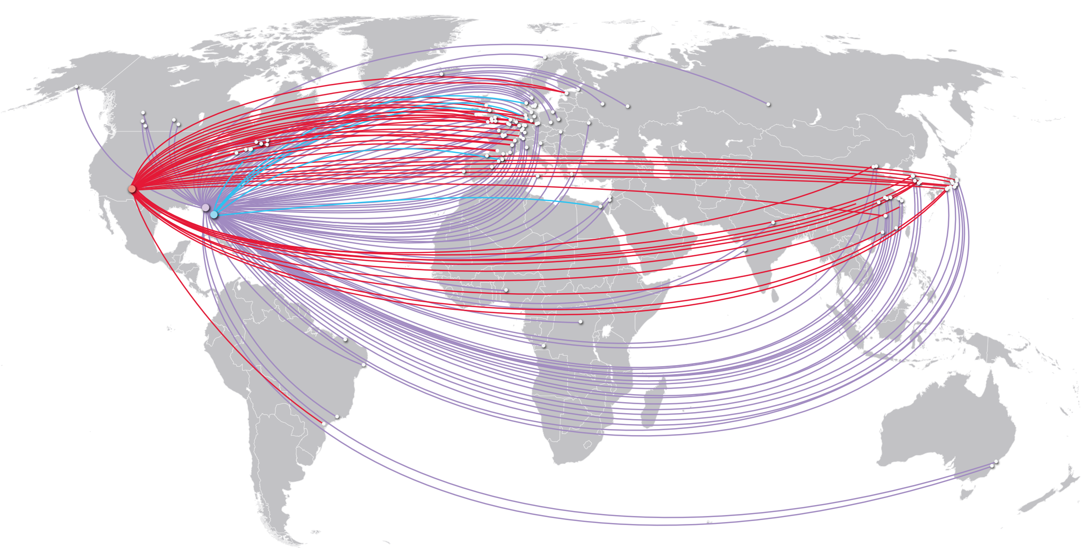
AT A GLANCE

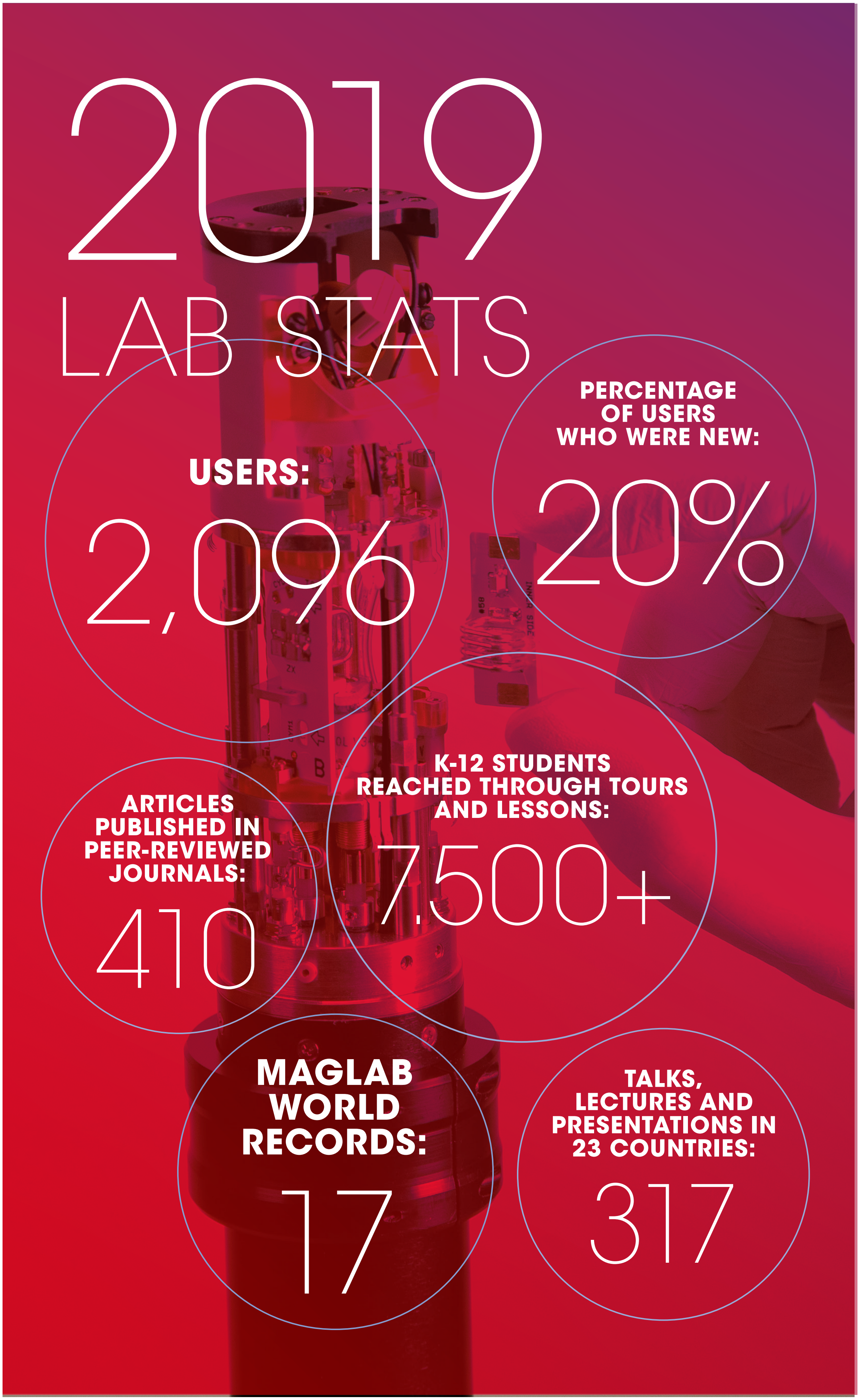
SCIENCE KNOWS NO BOUNDARIES

Seeking the most powerful magnetic fields on Earth, scientists and engineers from around the world conduct their experiments at the National MagLab. In 2019, our **2,096** users represented **298** universities, government labs and private companies worldwide.

76% UNIVERSITIES **18%** GOVERNMENT LABS **6%** INDUSTRY



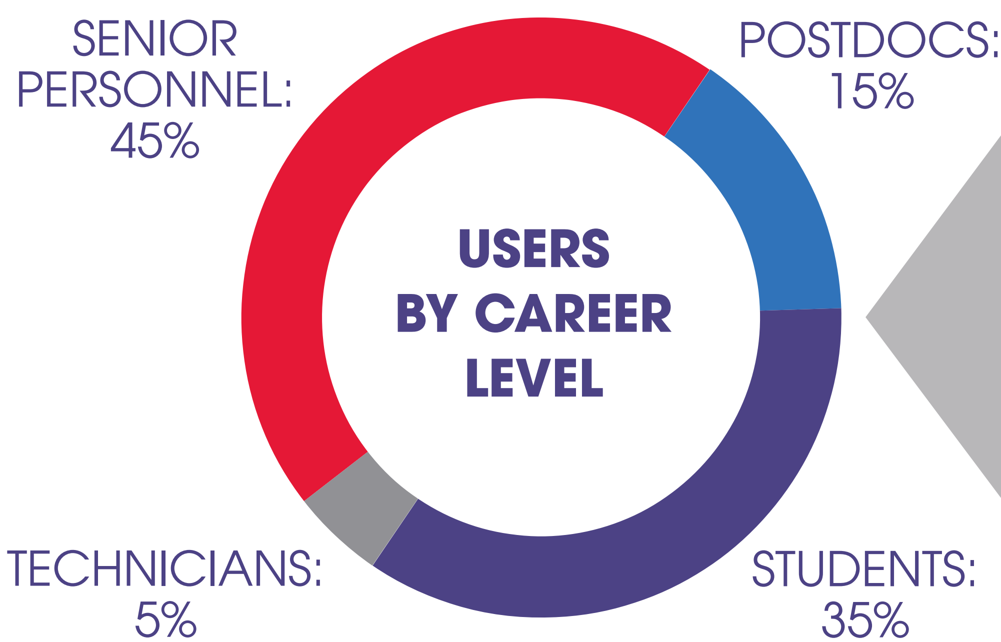



2019
LAB STATS
USERS:
2,096
PERCENTAGE OF USERS WHO WERE NEW:
20%
ARTICLES PUBLISHED IN PEER-REVIEWED JOURNALS:
410
K-12 STUDENTS REACHED THROUGH TOURS AND LESSONS:
7,500+
MAGLAB WORLD RECORDS:
17
TALKS, LECTURES AND PRESENTATIONS IN 23 COUNTRIES:
317

WHO OUR USERS ARE

High magnetic fields are a powerful research tool across many disciplines leading to groundbreaking discoveries that impact your life. The lab comprises 7 distinct user facilities that offer our researchers a wide range of research capabilities:

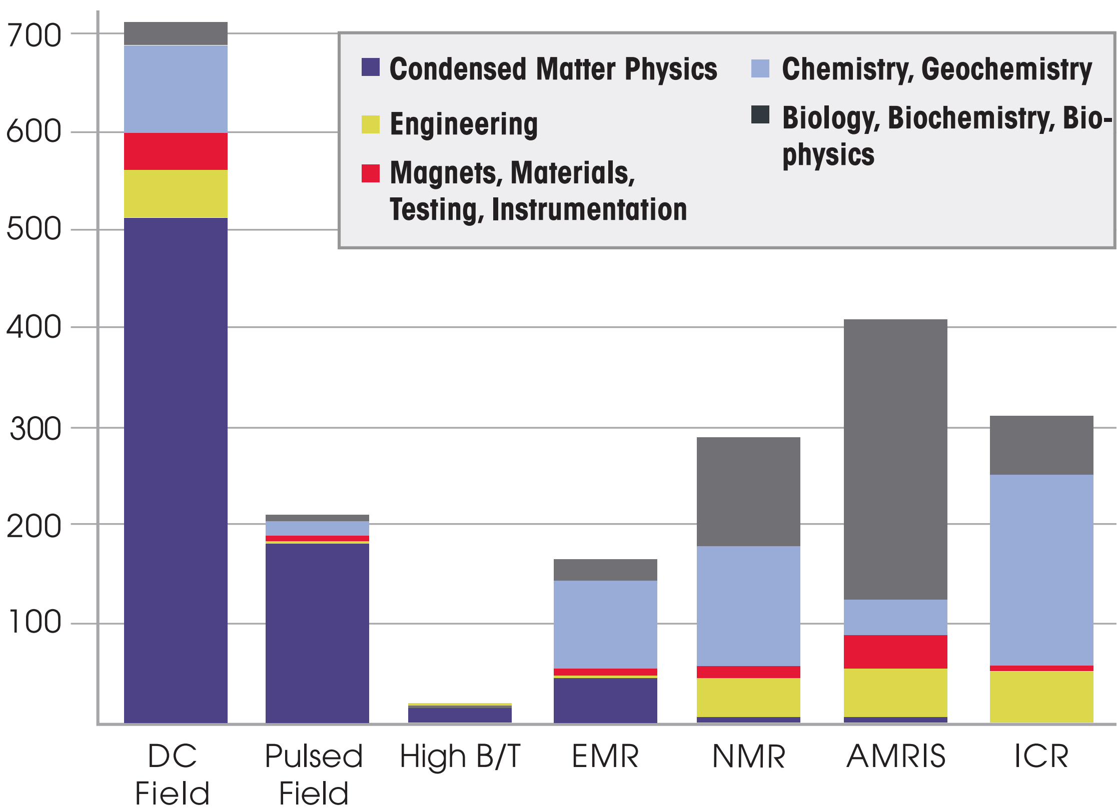
- **DC Field**
  Steady, continuous magnetic fields up to 45 T
- **Pulsed Field**
  Short, ultra-powerful magnetic fields up to 100 T
- **High B/T**
  Magnetic fields up to 15 T combined with ultra-cold temperatures of 0.4 mK
- **Electron Magnetic Resonance (EMR)**
  Magnetic resonance techniques associated with the electron
- **Nuclear Magnetic Resonance (NMR)**
  Solid & solution state NMR & animal imaging
- **Advanced Magnetic Resonance Imaging & Spectroscopy (AMRIS)**
  High-resolution solution and solid-state, NMR, animal imaging & human imaging
- **Ion Cyclotron Resonance (ICR)**
  Ultra-high resolution and high mass accuracy Fourier transform ion cyclotron resonance (FT-ICR) mass spectrometry



USERS BY FACILITY	
DC FIELD	**708**
PULSED FIELD	**207**
HIGH B/T	**17**
EMR	**162**
NMR	**287**
AMRIS	**407**
ICR	**308**

32% OF STUDENT USERS ARE FEMALE. & **29%** OF POSTDOC USERS ARE FEMALE.

2019 USERS BY DISCIPLINE



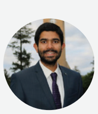
WHAT OUR USERS SAY

91% of users were satisfied with performance of the facilities and equipment.

97% of users were satisfied with the assistance provided by MagLab technical staff.

91% of users were satisfied with the proposal process.

Effie Kisgeropoulos Miller @effiechristina
Goodbye TLH ❤️ goodbye @NationalMagLab ❤️ I have learned so much about myself and science through all these visits as a graduate student. So many different versions of Effie have come and left here. I hope to come back with the next one #nextchapter #adventureofme



Amrit Venkatesh @amrit_venkatesh
Productive and fun week working with @SchurkoFSU group at the @NationalMagLab with high field and fast MAS solid-state NMR experiments!

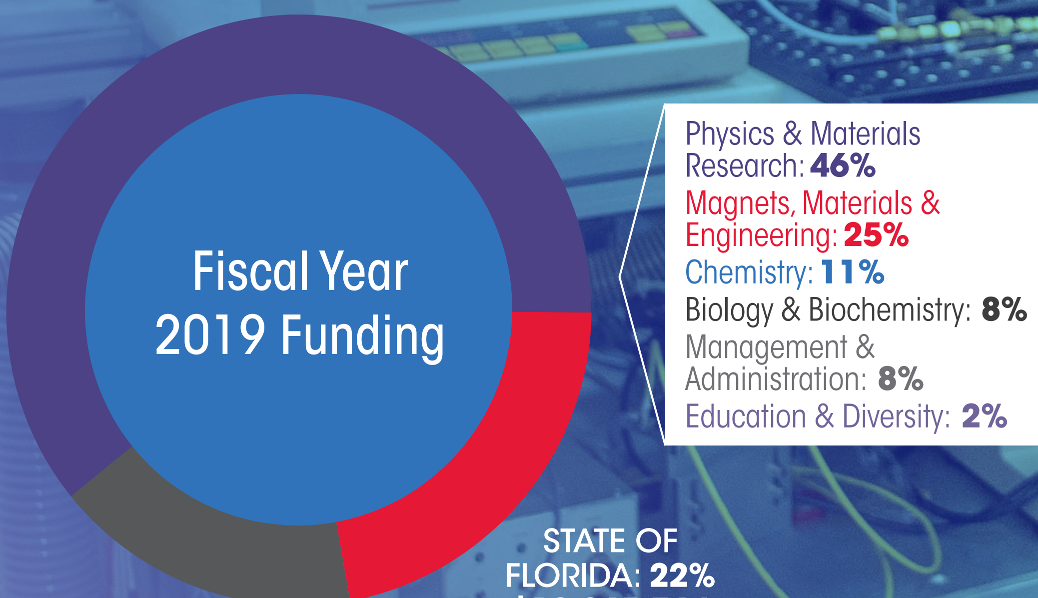
INVESTING IN THE FUTURE

The National MagLab is funded by the National Science Foundation and the state of Florida, making you a stakeholder in our science. In return for your investment, we are positively impacting the nation's economy and making critical discoveries that will lead to the technologies of tomorrow.

BUDGET

TOTAL BUDGET: $ 58,813,194

NSF CORE GRANT: **61%**
$35,760,000



STATE OF FLORIDA: **22%**
$12,965,764

AFFILIATED INDIVIDUAL INVESTIGATOR AWARDS*: **17%**
$10,087,430

*New 2019 awards from funding other than the NSF core grant and state of Florida.

ECONOMIC IMPACT

RETURN ON INVESTMENT

IN THE U.S., THE MAGLAB
ANNUALLY GENERATES
$708 million
in economic output

more than
4,550 jobs

OVER THE NEXT 20 YEARS,
PROJECTED TO GENERATE
$14.2 billion
in economic output

more than
91,000 jobs

$1 = **$6.44**

INVESTED BY THE STATE = ECONOMIC ACTIVITY IN FLORIDA

Source: The Center for Economic Forecasting, Florida State University, 2019

CROSS-SECTOR PARTNERS

Our researchers and staff develop partnerships and collaborations with private sector industries, universities, national labs and international organizations to help bring new technologies closer to the marketplace.

100+ PATENTS over the lab's lifetime

High magnetic field research can impact dozens of industrial sectors including **computer & electronic product manufacturing, clean energy,** and **pharmaceuticals.**

MAGLAB STAFF

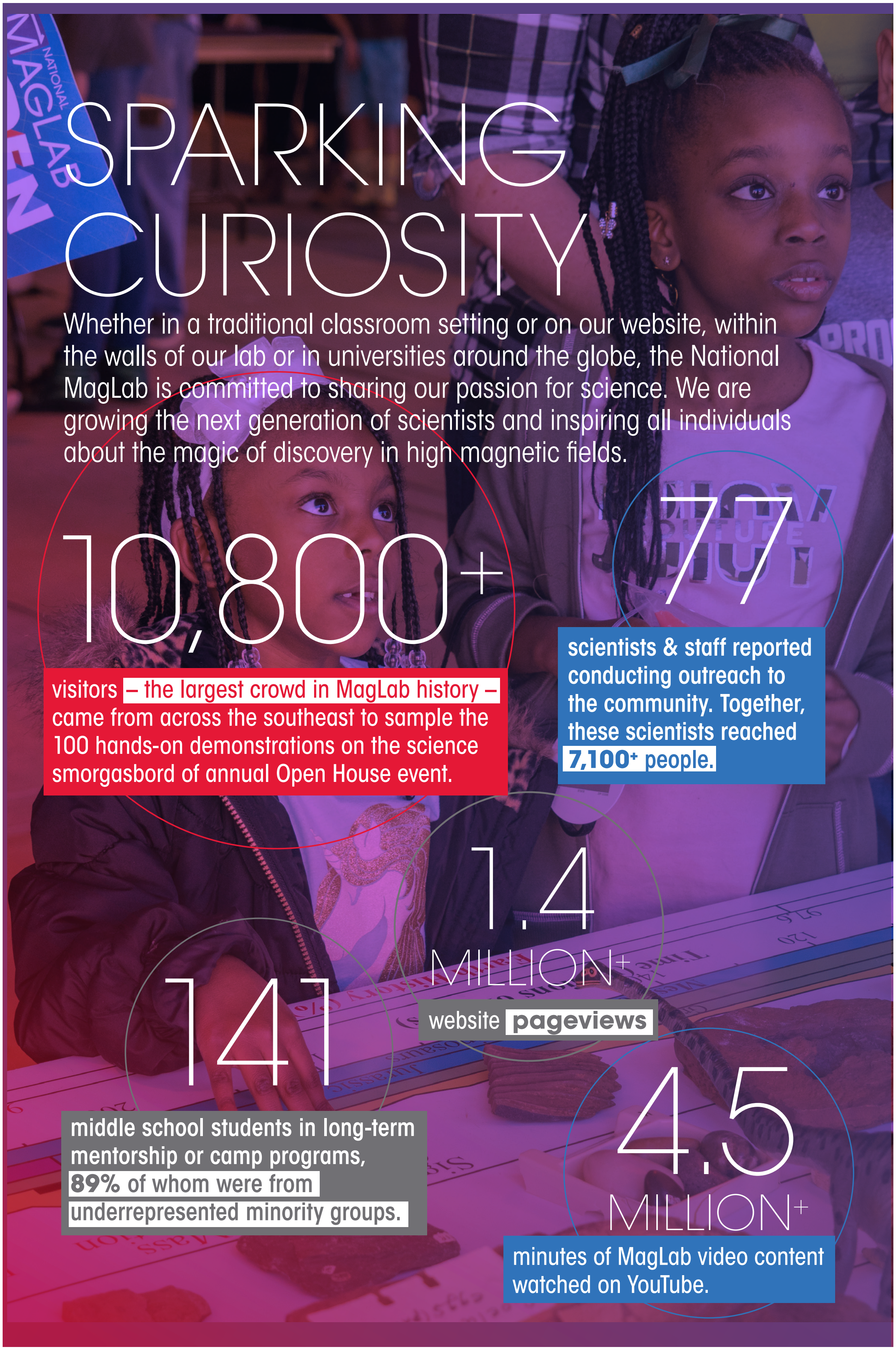
The MagLab employs a diverse workforce that includes scientists, machinists, engineers, administrators, writers and even artists.

Total MagLab Staff: **779**

252	95	94	28	62	172	76

- Senior Personnel: **252**
- Other Professional: **95**
- Support Staff - Technical/ Managerial: **94**
- Support Staff - Clerical: **28**
- Postdoctoral: **62**
- Graduate Student: **172**
- Undergraduate Student: **76**

40% **of MagLab students are female.**



SPARKING CURIOSITY

Whether in a traditional classroom setting or on our website, within the walls of our lab or in universities around the globe, the National MagLab is committed to sharing our passion for science. We are growing the next generation of scientists and inspiring all individuals about the magic of discovery in high magnetic fields.

10,800+

visitors – the largest crowd in MagLab history – came from across the southeast to sample the 100 hands-on demonstrations on the science smorgasbord of annual Open House event.

77

scientists & staff reported conducting outreach to the community. Together, these scientists reached **7,100+ people.**

1.4 MILLION+

website **pageviews**

141

middle school students in long-term mentorship or camp programs, **89%** of whom were from underrepresented minority groups.

4.5 MILLION+

minutes of MagLab video content watched on YouTube.

1. LABORATORY MANAGEMENT

1.1. ORGANIZATION

The Florida State University (FSU), the University of Florida (UF) and Los Alamos National Laboratory (LANL) jointly operate the National High Magnetic Field Laboratory (NHMFL or MagLab) for the National Science Foundation (NSF) under a cooperative agreement that establishes the Lab's goals and objectives. FSU, as the signatory of the agreement, is responsible for establishing and maintaining administrative and financial oversight of the Lab and ensuring that the operations are in line with the objectives outlined in the cooperative agreement.

The structure of the MagLab is shown in the three figures below. **Figure 1.1.1** illustrates the external oversight and advisory committees, as well as the three internal committees that provide guidance to NHMFL leadership.

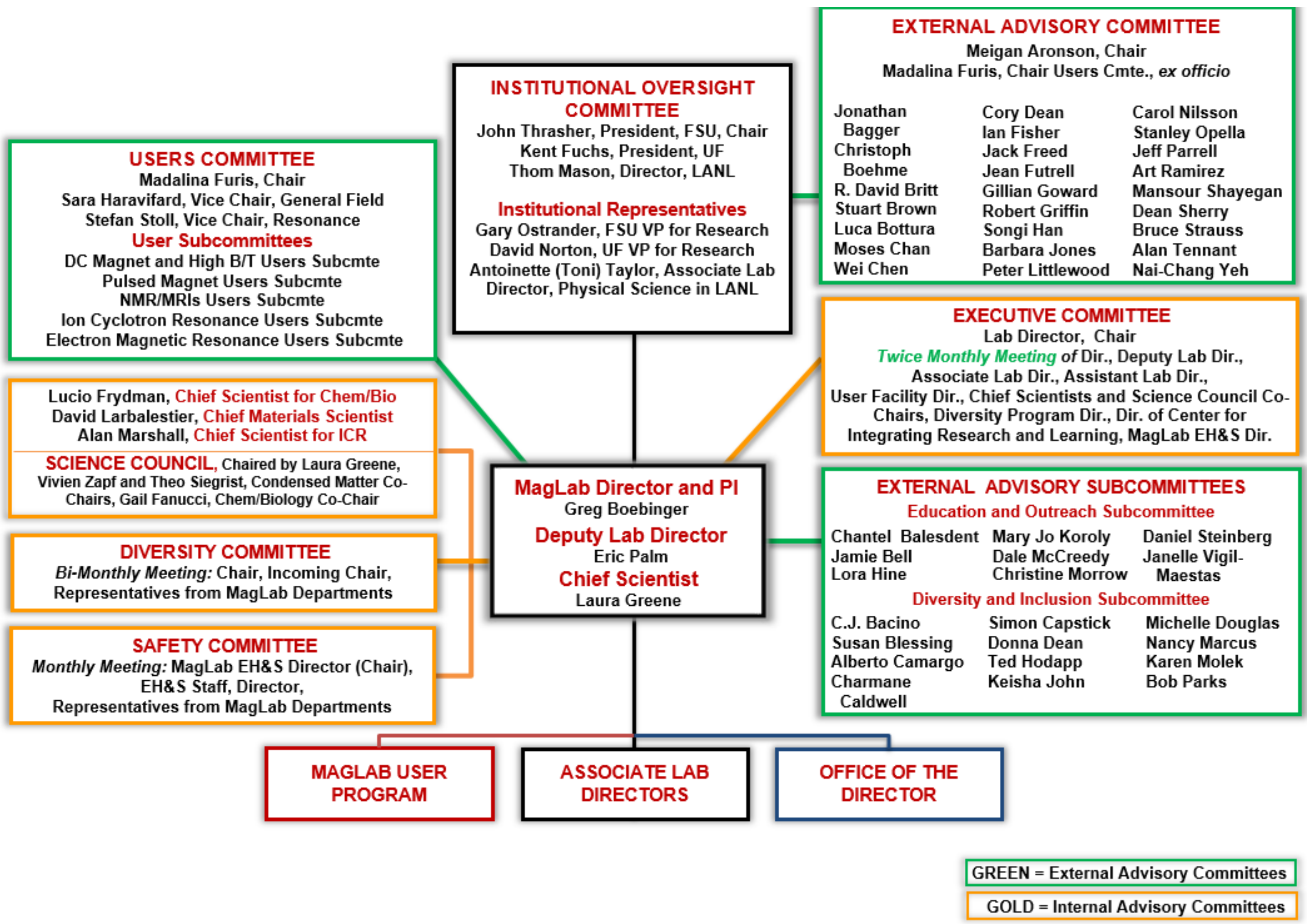


Figure 1.1.1: Advisory Committees of the MagLab, showing internal and external advisory committees (as of December 2019).

Greg Boebinger is the Director of the MagLab and PI of the cooperative agreement. Together, the Director, Deputy Laboratory Director, **Eric Palm,** and Chief Scientist, **Laura Greene**, function as a team to provide management oversight for the Laboratory. **Lab Leadership** — consists of the MagLab Director, Deputy Lab Director, Chief Scientists, Associate Lab Directors and MagLab Facility Directors. Mark Meisel became the new Director for High B/T Facility replacing Neil Sullivan.

The **Executive Committee** meets on a monthly basis to discuss Lab-wide as well as program–specific issues. The Lab's scientific direction is overseen by the **Science Council**, a multidisciplinary "think tank" group of distinguished faculty from all three sites. Two external committees meet regularly to provide critical advice on important issues. The **External Advisory Committee**, made up of representatives from academia, government and industry, offers advice on matters critical to the successful management of the Lab. The **Users Committee**, which reflects the broad range of scientists who conduct research at the Lab, provides guidance on the development and use of facilities and services in support of the work of those scientists. These committees are further described below.

Figure 1.1.2 shows the structure of the user program with its seven user facilities – DC Field Facility, Pulsed Field Facility, High B/T Facility, Electron Magnetic Resonance Facility, Nuclear Magnetic Resonance and Magnetic Resonance Imaging at Florida State University and at University of Florida and Ion Cyclotron Resonance.

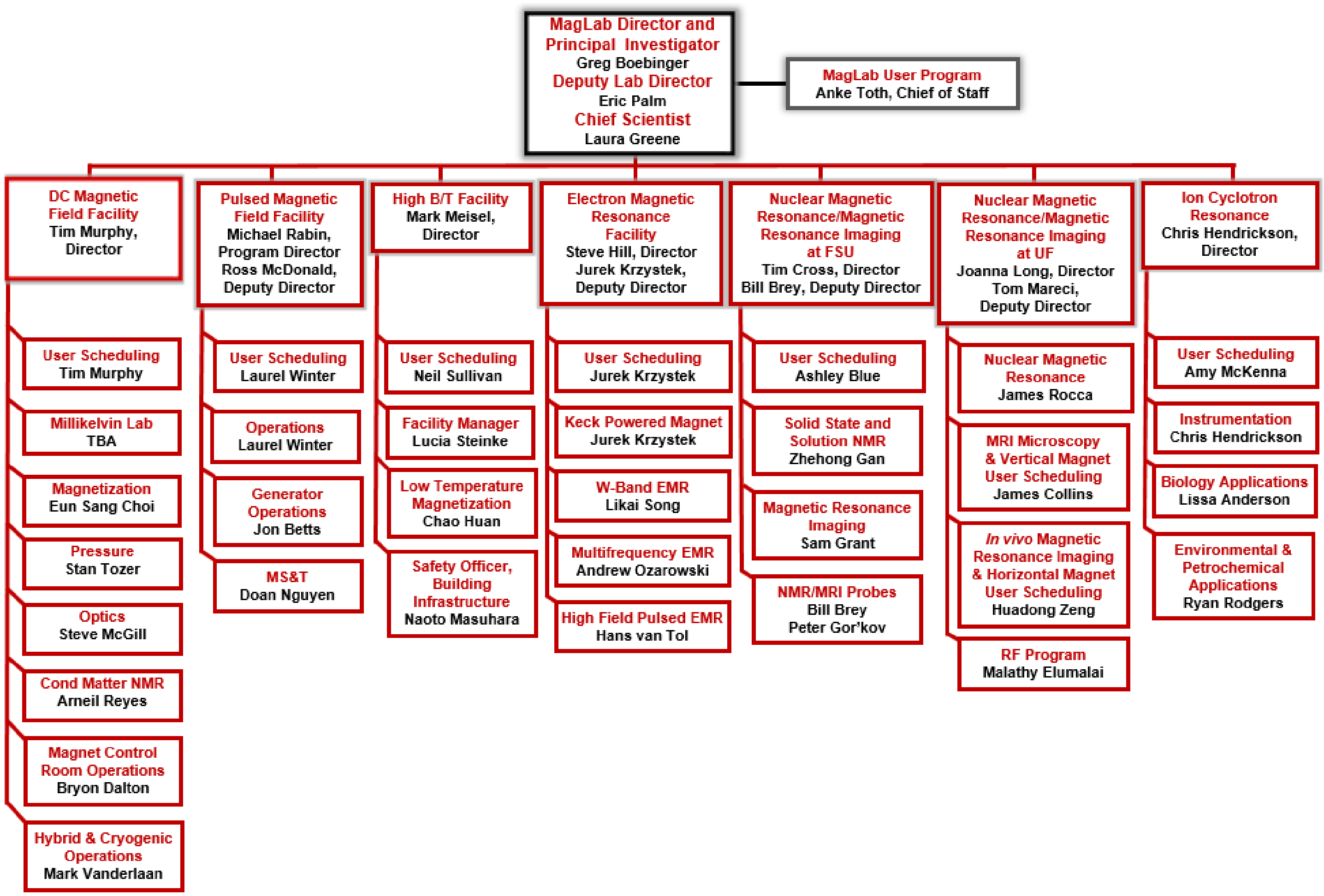


Figure 1.1.2: NHMFL User Program (as of December 2019)

Figure 1.1.3 below displays the internal, operational organization of the Laboratory. It includes the seven user facilities, all Associate Lab Directors as well as the Office of the Director structure.

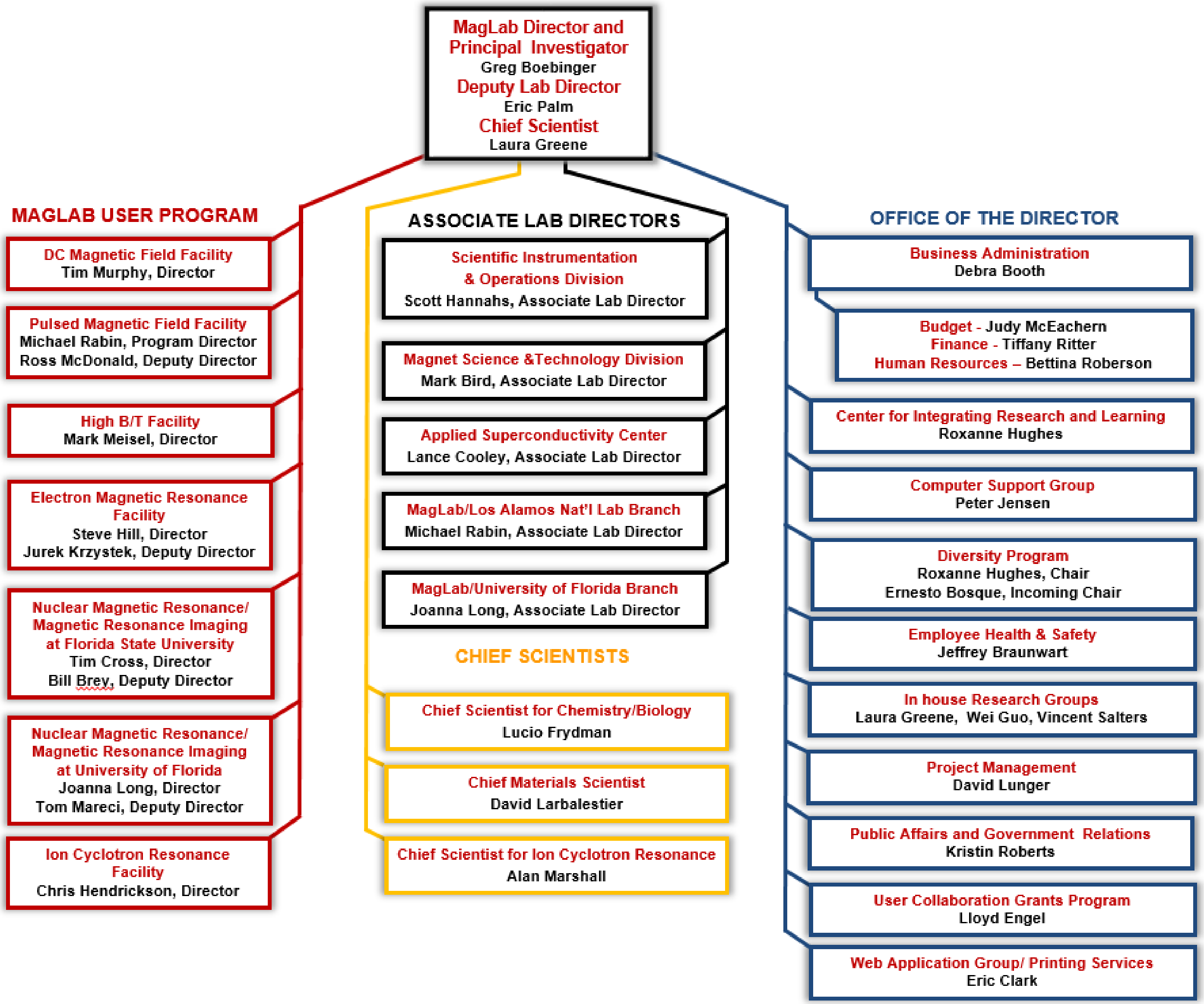


Figure 1.1.3: MagLab Organizational Chart (as of December 2019)

1.2. EXTERNAL ADVISORY COMMITTEE

The External Advisory Committee is made up of representatives from academia, government and industry. This committee offers advice on matters critical to the successful management of the lab.

- Meigan Aronson—*External Advisory Committee Chair—University of British Columbia*
- Madalina Furis—*User Committee Chair* (ex officio member of EAC)—*University of Vermont*

Biology and Chemistry Subcommittee

- R. David Britt—UC-Davis
- Wei Chen—University of Minnesota
- Jean Futrell—Battelle
- Gillian R. Goward—McMaster University
- Robert Griffin—MIT
- Songi Han—UC-Santa Barbara
- Carol Nilsson—Swedish National Infrastructure for Biological Mass Spectrometry
- Stanley Opella—UC-San Diego
- Dean Sherry—UT Southwestern

Condensed Matter Subcommittee

- Christoph Boehme—University of Utah
- Stuart Brown—UC-Los Angeles
- Moses Chan—Penn State University
- Cory Dean—City College of New York
- Ian Fisher—Stanford University
- Barbara A. Jones—IBM Almaden Research Center
- Art Ramirez—UC-Santa Cruz
- Mansour Shayegan—Princeton University
- Nai-Chang Yeh—California Institute of Technology

Magnet Technology and Materials Subcommittee

- Luca Bottura—Magnets, Superconductors and Cryostats
- Jeff Parrell—Oxford Superconducting Technology

Science Management

- Jonathan Bagger—TRIUMF
- Peter Littlewood—University of Chicago
- Bruce P. Strauss—U.S. Department of Energy
- Alan Tennant—Oak Ridge National Laboratory

1.3. USER COMMITTEE

The MagLab's Users Committee represents the MagLab's broad, multidisciplinary user community and advises the Lab's leadership on all issues affecting users of our facilities. The Users Committee is elected from the user base of the NHMFL. Each facility has a subcommittee elected by its users to represent their interests to the NHMFL. DC Field and High B/T facilities have a single, combined subcommittee representing the two user facilities. Likewise, the NMR facilities at UF and FSU have a single, combined subcommittee. Pulsed Field, ICR and EMR facilities have their individual subcommittees. Each subcommittee then elects members to represent it on the Users Executive Committee. This Users Executive Committee elects a chair and two vice chairs. The DC Field/High B/T Advisory Committee, the Pulsed Field Advisory Subcommittee, the EMR Advisory Subcommittee, the NMR/MRI Advisory Committee and the representative from the ICR Advisory Committee met October 1-3 in Santa Fe, NM, to discuss the state of the Laboratory and provide feedback to the NSF and MagLab management. The 2019 User Advisory Committee Report has been made available on our **website**.

User Executive Committee (*)

Representing the DC Field/High B/T Advisory Subcommittee

- Madalina Furis, Chair—University of Vermont
- Sara Haravifard, Vice Chair, General Field Facilities—Duke University

Representing the EMR Advisory Subcommittee

- Stefan Stoll, Vice Chair, Resonance Facilities—University of Washington

Representing the ICR Advisory Subcommittee

- Ljiljana Paša-Tolić—Pacific Northwest National Laboratory

Representing the NMR/MRIs Advisory Subcommittee

- Len Mueller—UC-Riverside
- Aaron Rossini—Iowa State University

Representing the PFF Advisory Subcommittee

- Nicholas P. Butch—IST Center for Neutron Research

DC Field/High B/T Advisory Subcommittee

- Madalina Furis(*), Chair—University of Vermont
- Joseph G. Checkelsky—Massachusetts Institute of Technology
- Sara Haravifard(*)—Duke University
- Ben Hunt—Carnegie Mellon
- Philip Moll—Max Planck Institute
- Jane Musfeldt—University of Tennessee
- Andrea Young—UC-Santa Barbara
- Haidong Zhou—University of Tennessee

EMR Advisory Sub-committee

- Rodolphe Clerac—Centre de Recherche Paul Pascal
- Lloyd Lumata—University of Texas
- Stergios Piligkos—University of Copenhagen
- Hannah Shafaat—Ohio State University
- Stefan Stoll(*)—University of Washington
- Joshua Telser—Roosevelt University

Pulsed Field Advisory Subcommittee

- Adam Aczel—Oak Ridge National Laboratory
- Nicholas P. Butch(*)—NIST Center for Neutron Research
- Krzysztof Gofryk—Idaho National Laboratory
- Pei- Chun Ho—California State University, Fresno
- Zhiqiang Mao—Tulane University
- Priscila Rosa—Los Alamos National Laboratory

NMR/MRI Advisory Subcommittee

- David Bryce—University of Ottawa
- Paul Ellis—Doty Scientific, Inc.
- Richard Magin—University of Illinois at Chicago
- Vladimir Michaelis—University of Alberta
- Doug Morris—National Institutes of Health
- Len Mueller(*)—UC-Riverside
- Dylan Murray—UC-Davis
- Thoralf Niendorf—Max Delbruck Center for Molecular Medicine
- Aaron Rossini(*)—Iowa State University

ICR Advisory Sub-committee

- Jack Beauchamp—California Institute of Technology
- Rene Boiteau—Oregon State University
- Michael L. Easterling—Bruker Corporation
- Ying Ge—University of Wisconsin
- Kristina Hakansson—University of Michigan
- Ljiljana Paša-Tolić(*)—Pacific Northwest National Laboratory

1.4. PERSONNEL

As of January 1, 2020, the MagLab is comprised of 779 people who work at its three sites and are paid by NSF use grant, State of Florida funding, individual investigator awards, as well as home institutions and other sources. A list of MagLab key personnel and other senior personnel is presented in ***Appendix I****.*

Principal Investigators

Boebinger, Gregory (PI)	Director/Professor
Long, Joanna (Co-PI)	Program Director - AMRIS, UF
Marshall, Alan (Co-PI)	Chief Scientist
Palm, Eric (Co-PI)	Deputy Lab Director
Rabin, Michael (Co-PI)	Program Director - LANL

User Facility Directors

Advanced Magnetic Resonance Imaging and Spectroscopy Facility (UF)	Joanna Long
DC Field Facility (FSU)	Tim Murphy
Electron Magnetic Resonance Facility (FSU)	Stephen Hill
High B/T Facility (UF)	Mark Meisel
Ion Cyclotron Resonance Facility (FSU)	Chris Hendrickson
Nuclear Magnetic Resonance (FSU)	Tim Cross
Pulsed Field Facility (LANL)	Michael Rabin

Of 779 people, senior personnel represent the largest group at 32%, followed by graduate students at 22%, other professionals and technical support staff at 12% each. The total distribution appears in **Figure 1.4.1.**

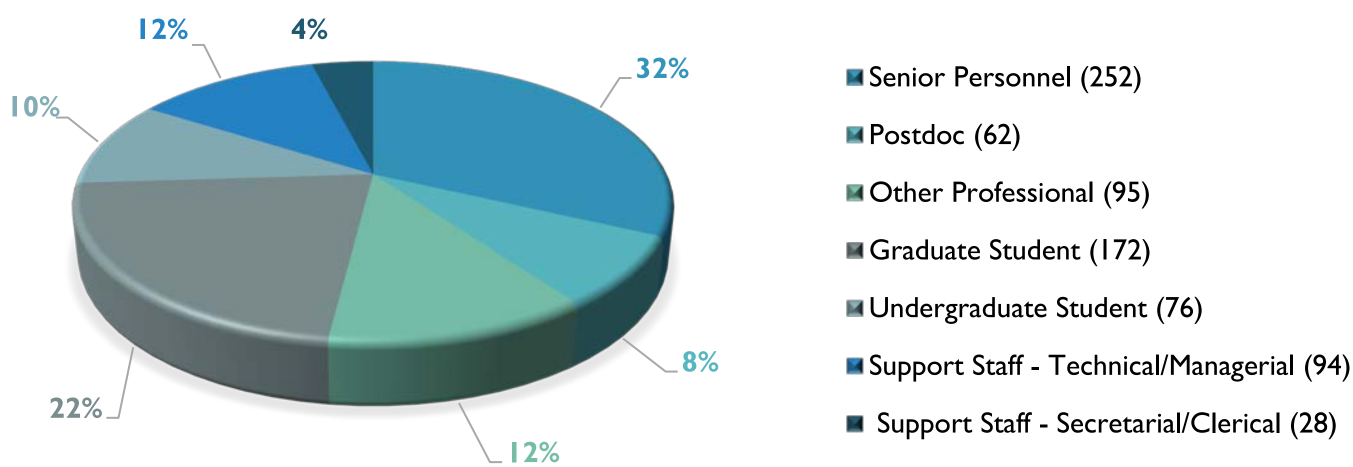


Figure 1.4.1: MagLab Position Distribution (as of January 1, 2020)

Overall distribution of diversity for all three sites of the MagLab includes: 47% white males, 23% Asian males and females, 18% white females, 7% black or African American, and 1% American Indian. The distribution by diversity appears in **Figure 1.4.2.**

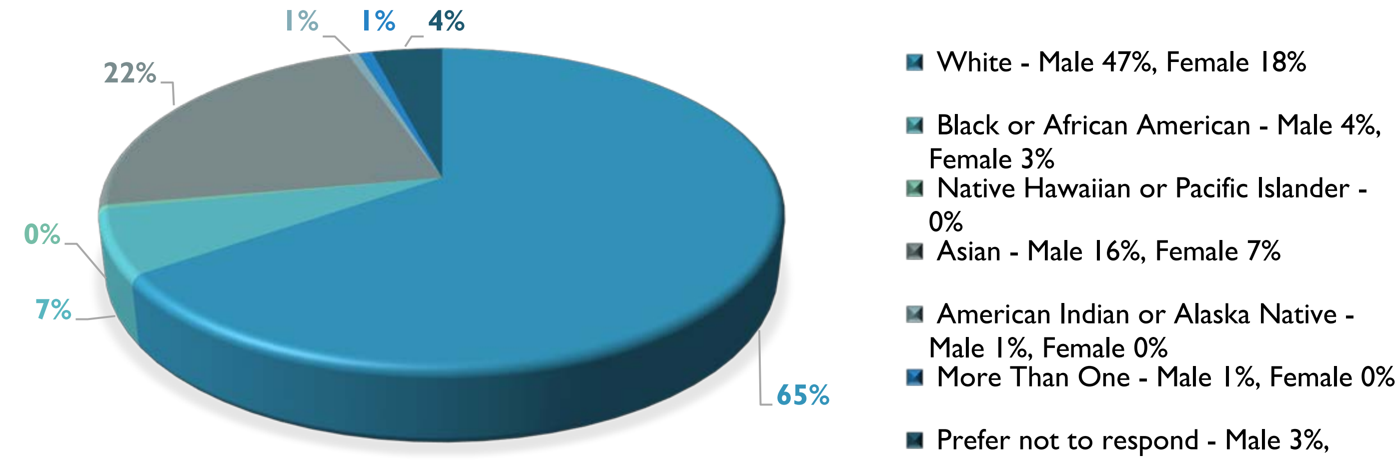


Figure 1.4.2: MagLab Distribution by Race (as of January 1, 2020)

1.4. DIVERSITY ACTION PLAN

The MagLab is committed to diversity and inclusion in the STEM workforce at the MagLab and throughout the nation. To accomplish this goal, our efforts are focused on: outreach to underrepresented and underserved populations in STEM from K-early career scientists; utilizing best practices in our recruitment and hiring strategies to improve the representation of underrepresented minority groups (including women) at the lab and in the STEM workforce; and creating a climate where all personnel feel that they have equal opportunities to career development and mentoring leading them to want to remain at the lab/within the STEM workforce (retention). As part of this strategic plan, the diversity committee structures its budget and subcommittees to align with these efforts.

The MagLab Diversity Committee meets every other month to discuss and review reports and issues facing the lab. The members of the MagLab Diversity Committee in 2019 can be found in **Table 1.5.1.**

Table 1.5.1: 2019 NHMFL Diversity Committee Members (new members are in bold)

Chair: Roxanne Hughes, FSU	Jason Kitchen, FSU	Kristin Roberts, FSU
Incoming Chair: Ernesto Bosque, FSU	You Lai, FSU Graduate Student	Jose Sanchez, FSU
Ryan Baumbach, FSU	Amy McKenna, FSU	John Singleton, LANL
Gregory Boebinger, NHMFL Director	Jennifer Neu, FSU Graduate Student	**Komalavalli Thirunavukkuarasu, FAMU**
Alfie Brown, FSU	Martha L. Chacon Patino, FSU Postdoc	Anke Toth, FSU
Malathy Elumalai, UF	Kirk Post, LANL	Hans van Tol, FSU
David Graf, FSU	Bettina Roberson, FSU	**Kaya Wei, FSU postdoc**
Laura Greene, NHMFL Chief Scientist	Kari Roberts, FSU	Yan Xin, FSU

All of these members work diligently to reach our diversity mission in one and/or all three of the main areas of focus: outreach, recruitment and retention.

Outreach

The summary of outreach diversity initiatives and demographics can be found in the Chapter 3. In addition to the efforts mentioned there, the MagLab also held three additional events:

(1) Event series for the UN International Day of Women and Girls (February 11):
  - On February 11, 2019, the MagLab held a special Science of Skating Event at Skate World, a local Tallahassee skate center (**Figure 1.5.1**). Dr. Amy McKenna led this effort, which included various games and hands-on activities that highlight the physics of skating. Over 100 elementary school girls and boys attended.
  - On February 12, 2019, the MagLab hosted a speed mentoring event wherein 15 women scientists discussed their career paths and then met in small groups with over 50 middle and high school girls from the local Tallahassee area. Participating MagLab mentors included: Dr. Amy McKenna, Dr. Julia Smith, Dr. Laura Greene and Dr. Huan Chen.

Figure 1.5.1: Science of Skating Event at Skate World

(2) Expanding your Horizons (LANL):
For the fourth consecutive year, the MagLab helped to sponsor and provide role models for the annual Santa Fe, NM, Expanding Your Horizons Workshop held in February 2019. Over 250 middle school girls attended; of these more than 50% were a member of an underrepresented minority group.

(3) SciGirls Code:
In October of 2019, Carlos Villa and Brooke Hobbs, a STEM teacher from Florida A&M University Developmental Research School, attended a training for a new coding curriculum developed by the SciGirls national organization. CIRL will run a SciGirls coding camp using these new techniques at FAMU DRS in 2020.

Recruitment and Hiring

The Diversity Committee has two subcommittees that are responsible for overseeing recruitment and hiring procedures. The first of these is the Compliance Subcommittee, chaired by Jason Kitchen. The role of the Diversity Compliance Subcommittee is to help coordinate the efforts of faculty hiring committees in the search for diverse candidates, particularly from underrepresented-in-STEM groups. The Compliance Subcommittee meets with the chair of each hiring committee at the outset of a position search, screens the position advertisement for gender bias verbiage, ensures that all members of a hiring committee have been trained for best practices in successfully staging diversity-promoting candidate searches and that advertisements are sent to networks that reach underrepresented groups. Before hiring committees make a final offer to a candidate, they send the Compliance Subcommittee a summary of the candidate interviewing and selection process.

In 2019 there were eleven active MagLab faculty position searches, including three which started in 2018. These searches were spread between four departments within the MagLab: Condensed Matter Science – DC Field, Magnet Science & Technology, Ion Cyclotron Resonance and Nuclear Magnetic Resonance. Of the 11 searches, seven were for replacement of outgoing personnel and four were newly created positions. In 2019, three of the 11 active searches were completed with acceptance of job offers, which resulted in the hiring of two more women faculty scientists at the MagLab.

The Recruitment Subcommittee, chaired by Kristin Roberts, continued to support recruitment efforts across the MagLab. In 2019, the subcommittee funded MagLab recruitment at a symposium on supporting women in chemistry that took place during the fall American Chemical Society meeting, the American Institute of Chemical

Engineers Conference and at the University of Puerto Rico Rio Piedras, a high-Hispanic serving institution. Recruitment funding in 2019 also supported two prospective candidate visits to the lab and two REU participants who applied to the MagLab's REU program after earlier recruitment trips to Tuskeegee University and the University of Puerto Rico.

The Recruitment Subcommittee also promoted open positions across the lab's social media channels and on the MagLab website. The careers section of the website alone earned nearly 53,000 total page views, an 85% increase from 2018. About 17% of those website page views came from females.

Retention, Advancement and Mentoring

The MagLab conducted its fifth internal climate survey in 2019. Consistent with past years, employees at the MagLab rated their supervisors favorably. Students reported that their supervisors encouraged teamwork and staff reported that their supervisors were accessible, listened to their ideas and treated them with respect. Additionally, students and postdocs rated MagLab leadership favorably, indicating that they felt their contributions to the lab were valued. The results of the climate survey also helped identify topics that employees are interested in seeking professional development opportunities. The top requested topics for 2020 included leadership skills and career planning.

The lab provides several opportunities to enhance employee's professional development. The lab hosts internal sessions, affords employees opportunities on FSU's main campus through the lab's affiliation with FSU and provides funding for employees to travel to seek professional development. In 2019, the lab hosted various professional development sessions (**Table 1.5.2**).

Table 1.5.2: 2019 Professional development opportunities

Date	Title
1/31/2019	Neurodiversity Workshop
2/7/2019	Working with You Is Killing Me
3/26/2019	Greendot Bystander Awareness
5/7/2019	Faculty Recruitment Seminar
5/22/2019	Bystander Awareness: Beginning and Advanced Topics
9/18/2019	Time Management

In order to facilitate professional development opportunities outside of the lab, the Retention, Advancement and Mentoring Subcommittee accepts, reviews and votes on applications for Professional Development Travel Funding. In 2019, eight MagLab graduate students, two postdocs, and two faculty were granted funding to travel domestically and internationally to attend professional development opportunities. Of these 13 scientists, three used the funding to attend workshops or seminars on techniques directly related to their research, eight attended annual meetings of professional organizations, and one used the funding to pursue a collaboration with another magnet lab.

The MagLab recognizes the extra demands outside of a research career placed on caregivers of children and other dependents. For caregivers, travel to the MagLab in order conduct experiments or to conferences to disseminate research findings often incurs extra costs for dependent care. In place since 2011, the MagLab's Dependent Care Travel Grant program offers up to $800 per year for travel expenses for MagLab scientists traveling to conferences or MagLab users traveling to any of the three MagLab facilities. In 2019, the MagLab awarded two grants to faculty.

Diversity and Inclusion External Guidance and Advice

In addition to the internal climate survey and other metrics (such as anonymous reporting through diverse-mag.magnet.fsu.edu, confidential consultations with Roxanne Hughes or other members of the Diversity Committee), members of the MagLab Diversity Committee, serve on committees that allow them to benefit from others expertise and share the MagLab's successes. Dragana Popovic and Roxanne Hughes serve on the FSU Diversity and Inclusion Committee. Hughes continues to be a part of the FSU National Coalition Building Institute (NCBI) Leadership team. NCBI is an international, nonprofit, leadership training organization that works to eliminate prejudice and discrimination. She cofacilitated two trainings in 2019 for FSU faculty, staff and students. Hughes serves as a member of the American Physical Society's Status of Women in Physics Sexual Harassment subcommittee, which drove the APS's updated statement of expectations for professional behaviors and now includes sexual harassment as an example of unprofessional behavior. Amy McKenna is one of the co-founders of the FSU Women in STEM affinity group for women STEM faculty.

The MagLab also utilizes an External Advisory Committee, which reviews our policies and procedures. In 2019, this committee reviewed an executive summary of our 2018 Climate Survey Report and our 2018 Annual Report Chapter. We held a virtual meeting for members of our External Advisory Committee to discuss the report and our progress with MagLab leadership including: Gregory Boebinger, Eric Palm, Roxanne Hughes and Ernesto Bosque. The EAC members present for the meeting on April 16, 2019, were:

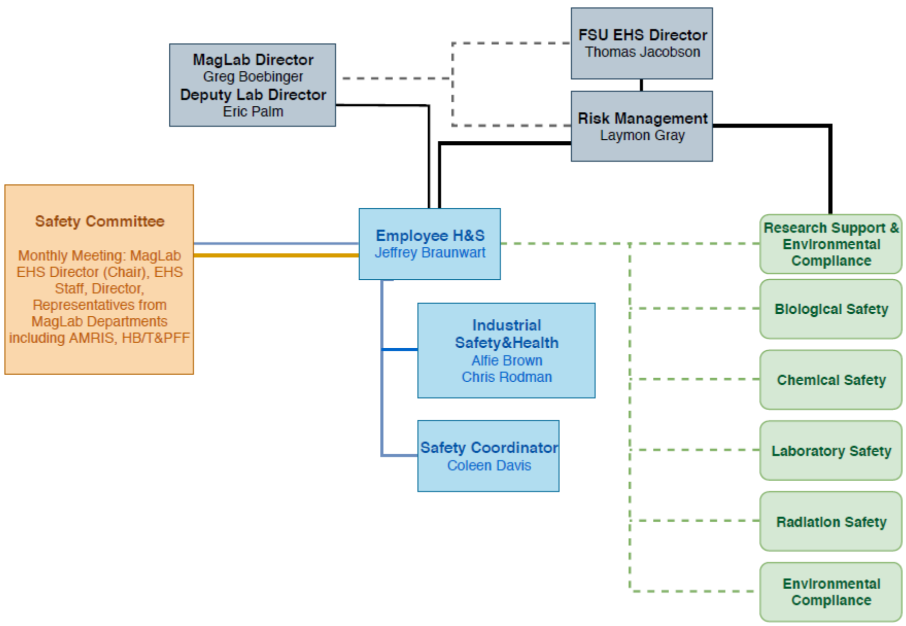
- Charmane Caldwell, Student Success Director for Florida Agricultural and Mechanical University-Florida State University College of Engineering
- Simon Capstick, FSU Physics Professor
- Donna Dean, Tulane University School of Science and Engineering retired -- research focuses on improving mentoring for women.
- Ted Hodapp, American Physical Society Director of Education and Diversity
- Keisha John, Director of Diversity Programs, Graduate and Postdoctoral Affairs, University of Virginia
- Karen Molek, University of West Florida, Chemistry Associate Professor
- Adrienne Stephenson, FSU Assistant Dean, The Graduate School

In addition to general recommendations, Hughes also asked for advice related to the following: (1) the current length of the annual climate survey; (2) how we can gather climate information from people so that they feel safe and anonymous.

Overall, the members of the committee were impressed with what the MagLab is currently doing in terms of Outreach, Recruitment and Retention, particularly the use of a climate survey and bystander intervention trainings. They suggested uniform diversity and inclusion trainings across all three sites; exit interviews for individuals who leave; fewer demographic categories on the climate survey so that underrepresented minorities would be more difficult to identify. We utilized the latter suggestion on our 2019 Climate Survey which only included the following categories: postdoc, student, faculty/staff, race/ethnicity, gender.

1.5. SAFETY

A central focus of all activities conducted at MagLab is to ensure employees, users, visitors and contractors are provided with a safe and educational environment. The MagLab's Environmental, Health and Safety team works collaboratively with management, researchers, staff and users, as well as with other public and private entities, to proactively mitigate hazards in our industrial, laboratory and office settings. The MagLab Safety Department is integrated with Florida State University's Central Environmental Health and Safety Department. This integration provides substantial support to existing safety programs at the MagLab. Areas of integration and support include Chemical Safety, Laboratory



Safety, Biological Safety, Radiation Safety, Industrial Hygiene, Fire Safety, Environmental Compliance and Building Code Compliance (**Figure 1.6.1**). The MagLab uses Integrated Safety Management (ISM) to integrate safety and health requirements, and controls into daily work activities to ensure the protection of the MagLab Community.

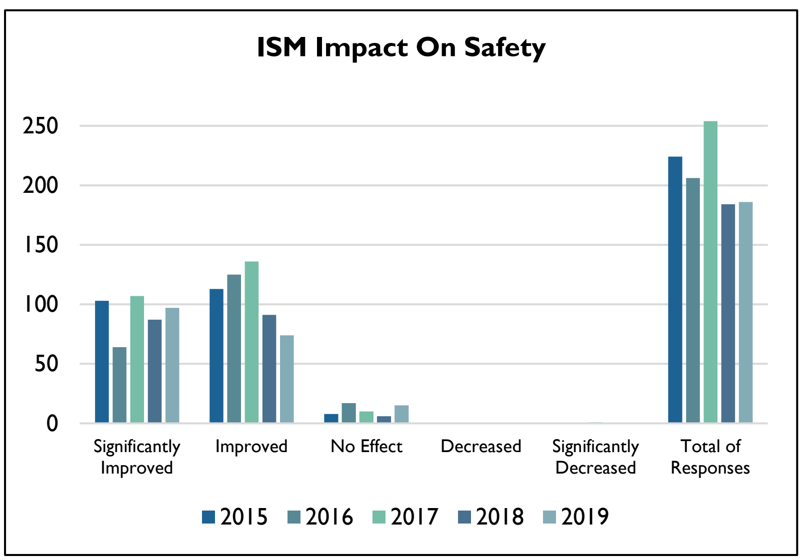
The MagLab continues to foster a sustainable and strong Safety Culture. Examples of the activities that contribute to our commitment to a strong Safety Culture at the MagLab are listed below.

Figure 1.6.1: Environmental Health & Safety (EHS) Organization Chart

a. Safety is viewed as an investment not a cost.
b. Management drives and is actively involved with promoting our Safety Culture.
c. Quarterly Safety Meetings are conducted by the Director of the MagLab to address lab wide safety issues and initiatives.
d. The Director of the MagLab and Director of Safety routinely walk through lab areas to engage researchers, staff and users, and to observe ongoing work.
e. New Employee Orientation and New Employee safety training is provided to all incoming employees with their supervisor with specific emphasis on our ISM System. New employees are taught that safety is the top priority at the MagLab, to have a questioning attitude about their safety and about our Stop Work Policy and no-fault self-reporting near miss and accident policy.

Safety Survey

In order to gauge the continued effectiveness of the Safety program and the overall attitude toward safety, the MagLab conducted its Annual Safety Survey. The data from the survey provides reliable and measurable feedback. The results of the 2019 Safety Survey continue to indicate a positive climate for the ISM process and our EH&S program.



Investments in Safety

Our investments in safety equipment and materials along with management support and employee involvement demonstrates our strong commitment to sensibly utilize resources in a manner that protect all MagLab personnel, property and the environment.

In 2019, the MagLab strategically invested over $120,000 for safety related equipment, supplies, training and processes. Some of the key investments included personal protective equipment, equipment used to lockout/tagout and verify hazardous energy sources, installation of oxygen deficient monitoring systems and equipment for environmental testing.

Safety Support and Coordination with FSU Main Campus Safety Team

Safety at the MagLab is supported by a dedicated on-site team as well as support from the Florida State University (FSU) Environmental, Health and Safety Department team. The two teams work together to provide comprehensive integrated safety support to all activities at the MagLab. Machine Shop, Biosafety, Laboratory, Laser and Radiation inspections were conducted and completed with team members from both groups. The two teams also work together to provide safety training.

Committees

Safety Committees

Safety committees are an integral part of the MagLab's ISM. Committees meet to discuss and address safety concerns and provide program reviews. The following are a list of committees.

- Directors Monthly Safety Committee (includes representative from UF and LANL Facilities)
- Safety Concerns Committee
- Lock/Tag Verification Committee
- Cryogen Safety Committee
- Laser Safety Committee

Members of these committees also form subcommittees as needed based on the need to address specific safety issues.

Safety Highlights

Situational Awareness Training & Security Assessment

Situational awareness training was provided by the Florida State University Police Department (FSUPD). During the training employees learned techniques to improve their perception of what is going on around them at any time. This improved perception helps to identify potential threats and dangerous situations. The training also provided direction on how to respond to threats. Employees were taught the concepts of Run, Hide, Fight in response to an active shooter situation. The MagLab Safety Team also worked with the FSUPD Crime Prevention division to conduct an onsite security assessment of the MagLab. A report was provided that detailed recommendations to improve lighting and security at the MagLab. The MagLab is working to implement the recommendations provided in the assessment.

Annual Maintenance Shutdown

During November and December, the MagLab performed its annual maintenance shutdown, which included a week-long power outage. Beginning in June, planning meetings were held to discuss work plans, safety equipment needs, organization of lockout/tagout boards and contractor coordination. The MagLab used its Lock/Tag/Verify Program to organize and coordinate lockouts to ensure all hazardous energy sources were safely controlled. In addition to the normal maintenance activities that occur annually during shutdown, the existing magnet cooling water treatment system was replaced, significant upgrades to electrical switchgear were completed and the first phase of the power supply upgrades was completed. A new PS breaker control scheme was also implemented, which greatly reduces worker's exposure to arc flash hazard. The cooling plant's 480V switchgear was replaced with a design that greatly reduces arc flash hazards to workers, allows for remote operation and provides capacity for future expansion. These projects represent over $3.2 million dollars invested to provide more reliable and safer operations.

The greatest challenge during the shutdown was to carefully coordinate all work activities among many workgroups to ensure safety remained the top priority. To facilitate safe work, each morning all workgroups including contractors, met to review and discuss each group's planned work for the day. This facilitated communication among workgroups prior to initiating tasks to ensure jobs were safely coordinated and all safety hazards were communicated. Also discussed were any difficulties or lessons learned from the previous workday. Although there were numerous interdependent work processes and workgroups involved with the shutdown, using ISM all employees and contractors safely completed their assigned work activities.

Laboratory Decommissioning

The MagLab Safety Team decommissioned two laboratory spaces in 2019. The first lab space was fully relocated to make way for a new researcher and the development of a next generation Scanning Atomic Force Microscope (AFM) that will be coupled with a powerful superconducting magnet. The researcher will utilize AFM and high magnetic field technology to develop new measurement and atomic manipulation techniques necessary in a new and vibrant area of research at nanometer length scales.

The second space required the decommissioning of the MagLab's Low Pressure Chemical Vapor Deposition system (LPCVD). In the process of decommissioning, a purge valve failed to shut, preventing the complete purge and nitrogen backfill of the carrier gas supply line. This line contained 10% Silane (balance hydrogen) – an extremely toxic gas that ignites violently when exposed to air.

The MagLab Safety Team worked with subject matter experts to develop a plan to safely decommission the equipment. It was determined that based on the safety features and the relatively small volume of Silane, the MagLab's Safety Team would perform the work. The plan was executed successfully and the LPCVD unit was safely decommissioned and removed from the facility.

Safety and Security at Open House

Safety reviewed all exhibits and provided guidance on setup and personal protective equipment to ensure the safety of MagLab personnel and the public. Additionally, Safety coordinated with the FSUPD to ensure security was visible and present to address any security threats and coordinated with the FSU's Medical Response Units to provide onsite medical response should an immediate safety need arise with employees or the public.

User Facility Safety

The MagLab's User facilities (DC Field, Pulsed Field, High B/T, NMR, AMRIS, EMR and ICR) provide support to internal and external users. To facilitate their visit, users are assigned online training modules that are specific to the experiment they are conducting and the hazards associated with each facility they will be working in. These are generally coordinated several weeks prior to their arrival if they are an external user. Internal users complete the required training prior to receiving authorization to start work. When users arrive at the facility, they receive hands-on training that is specific to each location and discuss any potential safety concerns with user support. While at each facility users are assigned an in-house scientist and support technician to ensure both technical and safety needs are met. Non-routine and any particularly hazardous activities are completed by trained and experienced facility technicians to minimize risks to users.

1.6. INDUSTRIAL PARTNERS & COLLABORATORS

The MagLab collaborated with nearly 100 companies, national/international labs, universities or community groups in 2019. In addition, several spinoff companies continued to operate in 2019, including:

- *Future Fuels Institute, FL*

The Future Fuels Institute (FFI) was established to enhance the existing Ion Cyclotron Resonance (ICR) Program at the NHMFL to deal specifically with bio- and fossil fuels, particularly for heavy oils and synthetic crudes. Supported by sponsoring companies and collaborative entities (instrument companies, universities and research institutes), the FFI works to develop and advance novel techniques for research applications and problem solving. FFI is actively seeking up to six industrial collaborators as corporate members to support core research programs. Each of these corporate members will be asked to provide $250,000/year for four years. The member may terminate the membership by giving the institute 30 days written notice prior to the membership renewal date. Current corporate members include Total and Reliance Industries. The institute also serves as a training center for fuel-related science and technology. (MagLab contact/ Director: Ryan Rodgers)

- *Omics LLC, FL*

Omics LLC is a spinoff company that serves the data analysis and interpretation needs of the high res mass spectrometry market. It was formed eight years ago and has grown over the years to address a wider analytical community. (MagLab contact: Ryan Rodgers)

- *Magnetics Corporation (MagCorp), FL*

MagCorp is a new Tallahassee company that facilitates access to the world's leading magnetic experts to solve real world industrial problems. MagCorp was created to meet industry needs for feasibility studies, prototyping and product development while eliminating the confusion that can come from partnering with academic institutions and research foundries. MagCorp is the world's one-stop shop for magnet science solutions and is the essential conduit between the private and government sectors and the National High Magnetic Field Lab. Leveraging completely new client and partner facing business models, MagCorp has already begun to attract industry to Tallahassee and put it on the map as the emerging magnetic capital of the world. (MagLab contact: Kristin Roberts)

1.7. BUDGET

The National High Magnetic Field Laboratory, and its seven user programs, is primarily funded by the National Science Foundation. Other operating funds are provided through the participating institutions: The Florida State University, the University of Florida, and the Los Alamos National Laboratory. Additionally, faculty and staff have been very successful in securing individual research funding for specific areas of research from a wide variety of sources, including federal, State, and private sectors.

The National Science Foundation Division/Directorate approved the National High Magnetic Field Laboratory's facilities award for 2018-2022 on March 23, 2018.

For the Calendar Year 2019, NSF provided an operating budget of $35,760,000.

Table 1.8.1 represents the budget allocation and percentage of the total budget to each division of the National High Magnetic Field Laboratory and **Table 1.8.2** summarizes the MagLab's budget position as of December 31, 2019. The report includes our annual funding per our Cooperative Agreement.

Table 1.8.1. NSF Budget by NHMFL Division

Division/Program	CY 2019 Funding	Budget (%)
Operations/Safety	1,876,956	5.25%
DC Field Facility	7,610,346	21.28%
Magnet Science & Technology	4,678,340	13.08%
NMR	1,338,597	3.74%
ICR	1,730,000	4.84%
EMR	825,738	2.31%
CIRL and REU	573,575	1.60%
ASC	2,030,662	5.68%
Electricity & Gases	3,886,875	10.87%
LANL	8,951,759	25.03%
UF High B/T	442,802	1.24%
UF - AMRIS	927,789	2.59%
Diversity	80,000	0.22%
User Collaboration Grants Program	806,562	2.26%
TOTAL NSF BUDGET FOR CY 2019	**35,760,000**	**100%**

Table 1.8.2. NSF Budget and Expenses - *Calendar Year 2019*

Expense Classification	Budget	Disbursed and Encumbered	Balance as of 12/31/2019
Salaries and Fringe	10,106,348	14,329,054	(4,222,706)
Subawards	10,865,544	12,896,692	(2,031,148)
Equipment	982,666	1,296,280	(313,614)
Other Direct Costs	6,352,068	7,089,135	(737,067)
Subtotal	**28,306,626**	**35,611,161**	**(7,304,535)**
Indirect	7,453,374	8,530,152	(1,076,778)
Total Direct and Indirect	**35,760,000**	**44,141,313**	**(8,381,313)**

Notes:

Per Cooperating Agreement for DMR 11644799, the budget for CY $35,760,000. Negative values are attributed to the following:

- *Salaries for 01/01/2020-04/30/2020 were encumbered in December 2019.*
- *Subaward contracts were paid or encumbered for 01/01/2020-04/30/2020.*
- *Equipment and Other Direct Costs include expenses and encumbrances from 40T and Major Equipment Supplements received in 2018.*

1.8. COST RECOVERY REPORT

The NHMFL did not receive program income during CY 2019.

2. USER FACILITIES

2.1. USER PROGRAM

Proposal Review Process

Across all seven facilities, proposals for magnet time are submitted online via https://users.magnet.fsu.edu and reviewed in accordance with the NHMFL User Proposal Policy. In brief, each user facility has a User Proposal Review Committee (UPRC) comprised of at least seven members, with more external members than internal. UPRC memberships are treated confidentially by the laboratory but are available for review by NSF and NHMFL advisory committees. Proposal reviews are conducted in strict confidence and are based on two criteria: (1) the scientific and/or technological merit of the proposed research and (2) the "broader impacts" of the proposed work. They are graded online according to a scale, ranging from "A" (Proposal is high quality and magnet time must be given a high priority.) to "C" (Proposal is acceptable and magnet time should be granted at NHMFL discretion.) to "F" (Proposal has little/no merit and magnet time should not be granted.). The Facility Directors dovetail the UPRC recommendations with availability and scheduling of specific magnets, experimental instrumentation and user support scientists and make recommendations for magnet time assignments to the NHMFL Director. The NHMFL Director is responsible for final decisions on scheduling of magnet time based on these recommendations. All 2019 User Proposals can be found in **Appendix V**.

User Funding Opportunities

Depending Care Travel Grant

The MagLab recognizes the extra demands outside of a research career placed on caregivers of children and other dependents. For caregivers, travel to the MagLab in order conduct experiments or to conferences to disseminate research findings often incurs extra costs for dependent care. In place since 2011, the MagLab's Dependent Care Travel Grant program offers up to $800 per year for travel expenses for MagLab scientists traveling to conferences or MagLab users traveling to any of the three MagLab facilities. In 2019, the MagLab awarded two grants.

First Time User Support

The NHMFL is charged by the National Science Foundation with developing and maintaining facilities for magnet-related research that are open to all qualified scientists and engineers through a peer-reviewed proposal process. Facilities are generally available to users without cost. In an effort to encourage new research activities, first-time users are provided financial support for travel expenses. International users are provided $1,000 of support and domestic users are provided $500 of support for their travel costs. This funding is provided by the State of Florida and is available for Tallahassee user facilities only.

User Collaboration Grants Program (UCGP)

The NSF charged the NHMFL with developing an internal grants program that utilizes the MagLab facilities to carry out high quality research at the forefront of science and engineering and advances the facilities and their scientific and technical capabilities. UCGP, established in 1996, stimulates magnet and facility development and provides intellectual leadership for research in magnetic materials and phenomena.

The Program strongly encourages collaboration between NHMFL scientists and external users of NHMFL facilities. Projects are also encouraged to drive new or unique research, i.e., serve as seed money to develop initial data leading to external funding of a larger program. In accord with NSF policies, the NHMFL cannot fund clinical studies.

A total of 22 UCGP solicitations have now been completed with a total of 577 pre-proposals being submitted for review. Of the 577 proposals, 300 were selected to advance to the second phase of review, and 136 were funded (23.6% of the total number of submissions).

2019 Solicitation and Awards

The NHMFL UCGP has been highly successful as a mechanism for supporting outstanding projects in the various areas of research pursued at the laboratory. It uses two-stage proposal review process is handled by means of a web-based system. Proposal review is done be a combination of internal and external reviewers. Details of the process and review criteria are available on the https://ucgp.magnet.fsu.edu/Guidance/ReviewCriteriaAndProcess. The most recent solicitation, announced in March, 2019, is complete, and its awards will be issued approximately in March 2020.

Of the 13 pre-proposals received the committee recommended that eight pre-proposals moved to the full proposal state. Of the eight full proposals, five were awarded with start date in 2020, and one deferred to 2021. A breakdown of the review results is presented in **Tables 2.1.1 and 2.1.2**.

Table 2.1.1: UCGP Proposal Solicitation Results – 2019

Research Area	Pre-Proposals Submitted	Pre-Proposals Proceeding to Full Proposal	Projects Funded
Condensed Matter Science	6	4	3
Biological & Chemical Sciences	5	3	2
Magnet & Magnet Materials Technology	2	1	1
Total	**13**	**8**	**6**

Table 2.1.2: UCGP Funded Projects from 2019 Solicitation.

Principal Investigator	NHMFL Institution	Project Title	Funding
Jan Jaroszynski	FSU	Fast fatigue and transport current assessment in REBCO coated conductors	$188,870
Frederic Mentink	FSU	Development of Faster Magic Angle Spinning - Dynamic Nuclear Polarization probes	$200,000
Dominique Laroche	UF	Coulomb drag of spin-polarized Luttinger liquids at ultra-low temperatures	$194,207
Amy McKenna	FSU	Organic-Metal Complex Speciation at 21 Tesla	$228,332
Wan Kyu Park	FSU	Electron Tunneling Spectroscopy under High Magnetic Fields	$199,779
Xiao-Xiao Zhang	UF	Probing dark exciton dynamics in monolayer semiconductors under high magnetic field	$200,000

Results Reporting

To assess the success of the UCGP, reports were requested in January 2020, on grants issued from the five solicitations which had start dates from 2014 through 2019 (there was no solicitation in 2016). At the time of the reporting, some of these grants were in progress, and some had been completed. For this "retrospective" reporting, PIs were asked to include external grants, NHMFL facilities enhancements, and publications that were generated by the UCGP. Since UCGP grants are intended to seed new research through high risk initial study or facility enhancements, principal investigators (PIs) were allowed and encouraged to report results that their UCGP grant had made possible, even if these were obtained after the term of the UCGP grant was complete. The PIs reported:

- Lab enhancements, which are listed in **Table 2.1.3** below.
- At least partial support for five undergraduate researchers, 42 grad students and 18 postdocs.
- 21 funded external grants, which were seeded by results from UCGP awards. The total dollar value of the external grants was $34.06M, of which $10.5M was an Energy Frontier Research Center, $15.6M was an NSF MRSEC and $5.8M was an NIH P41.
- 150 publications, many in high profile journals, including seven in *JACS*, 1 in *Science,* one in *Nature*, 12 in *Nature Communications*, two in *PNAS* and eight in *Phys. Rev. Lett.*

Table 2.1.3: Facility Enhancements Reported from Awards with starts from 2014-2019

Enhancement and available date	Users *
Software to model proteins of bacteria from isotopically depleted media (1/20)	1
PEPPI-MS using 10x10cm minigel (10/19)	1
3GPa proximity detector (7/19)	1
Modified 1800C tube furnace for molten metal flux growth of uranium compounds (1/15)	6
Development of capabilities for hazardous substance handling (1/15)	4
System for continuous flow 99% para enrichment at 30K (12/19)	2
Time-domain THz spectroscopy using TOPTICA Teraflash system (11/17)	3
0.75mm 100 kHz Magic-Angle Spinning HXY triple-resonance probe	2
Coil winder fro AC susceptibility (10/16)	5
Hybrid piston cylinder cell (10/16)	2
Two element surface quadrature 1H coil and linear 1H birdcage coil (12/14)	2
Diffusion-weighted relaxation-enhanced spectroscopy (8/16)	5
Chemical Shift saturation transfer relaxation-enhanced spectroscopy (8/16)	1
Improved EMR high pressure facility (11/16)	2
High-temperature, high-resolution NMR (11/16)	9
Two-channel homodyne pulsed NMR spectrometer (9/19)	1
Customized Razorbill piezo for uniaxial strain, for 31T (6/19)	3
mK (^{3}He and dilution fridge) NMR probes and power amplifier (8/15)	14
Electrocrystallization facility for BEDT-TTF or ET (6/15)	9
Direct optics for photoluminescence, reflectance and Raman in several magnets	10
MALDI ionization source (8/19)	1
mK faraday Force magnetometer (6/15)	1
Pulsed EPR at 395GHz (5/18)	2
Quasioptical beam transport in MAS DNP 600MHz NMR (11/17)	1

* *Number of external users (PI's only) reported to have used the enhancement.*

Visiting Scientist Program

The National High Magnetic Field Laboratory provides researchers from academia, industry and national laboratories the opportunity to utilize the unique, world-class facilities of the laboratory to conduct magnet-related research. In 2019, the Visiting Scientist Program provided financial support of $56,170 for 10 research projects on a competitive basis. To apply for support from the Visiting Scientist Program, interested researchers are required to submit an application and a proposal that will be reviewed by appropriate facility directors and scientists at the NHMFL. All requests for support must be submitted online at https://vsp.magnet.fsu.edu/.

Annual User Survey

The MagLab conducted its ninth annual user survey between June 3, 2019, and June 30, 2019. User input assisted all seven facilities to respond to user needs, improve facilities and services and guided the MagLab in setting priorities and planning for the future. This request was sent to all MagLab User Principal Investigators (PI) and to their collaborators who received magnet time between June 1, 2018, and May 31, 2019, including PIs who sent samples, where the experiment was performed by laboratory staff scientists. From 1,080 eligible users (891 external / 189 internal), we received feedback from 197 (22 %) external users. All user responses were treated confidential. The presented **Figures 2.1.4-2.1.10** exclude internal responders.

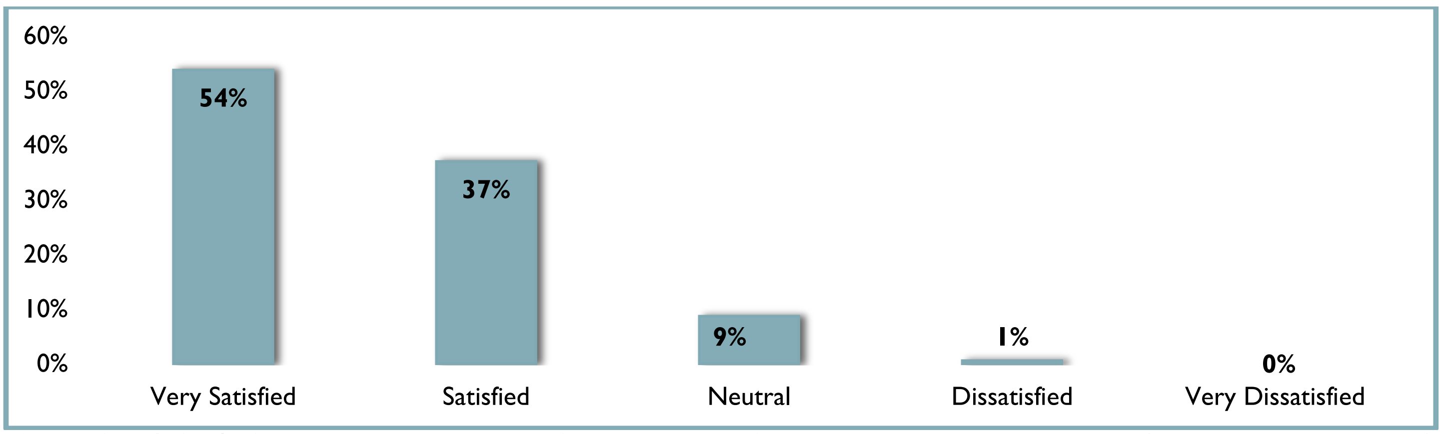


Figure 2.1.4: 91% of external users were satisfied or very satisfied with the **proposal process** (e.g., submission, review).

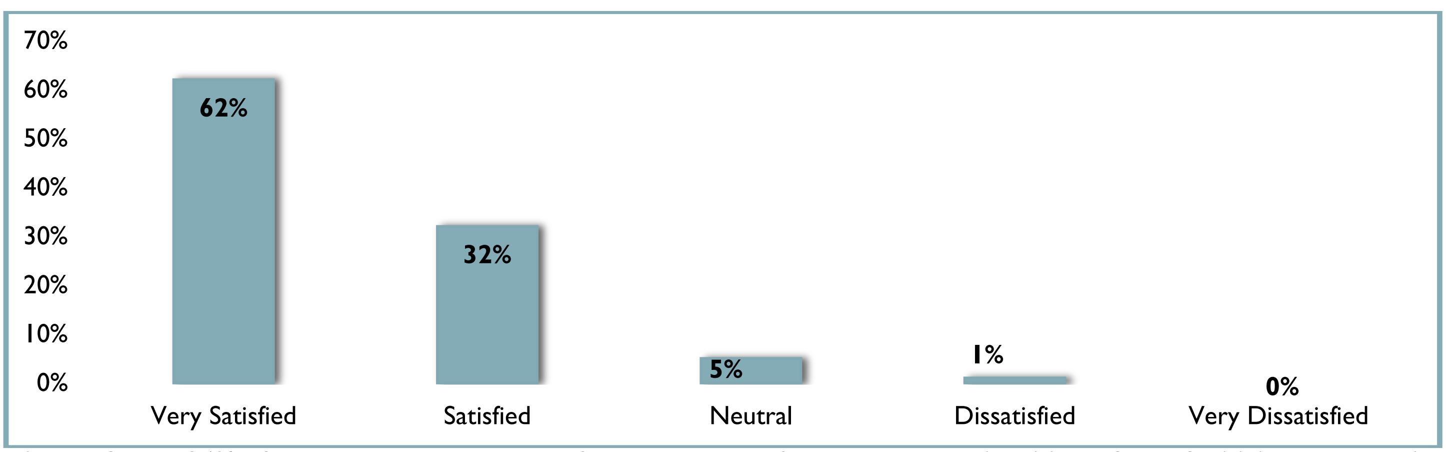


Figure 2.1.5: 94% of external users were satisfied or very satisfied with the **availability of the facilities and equipment**.

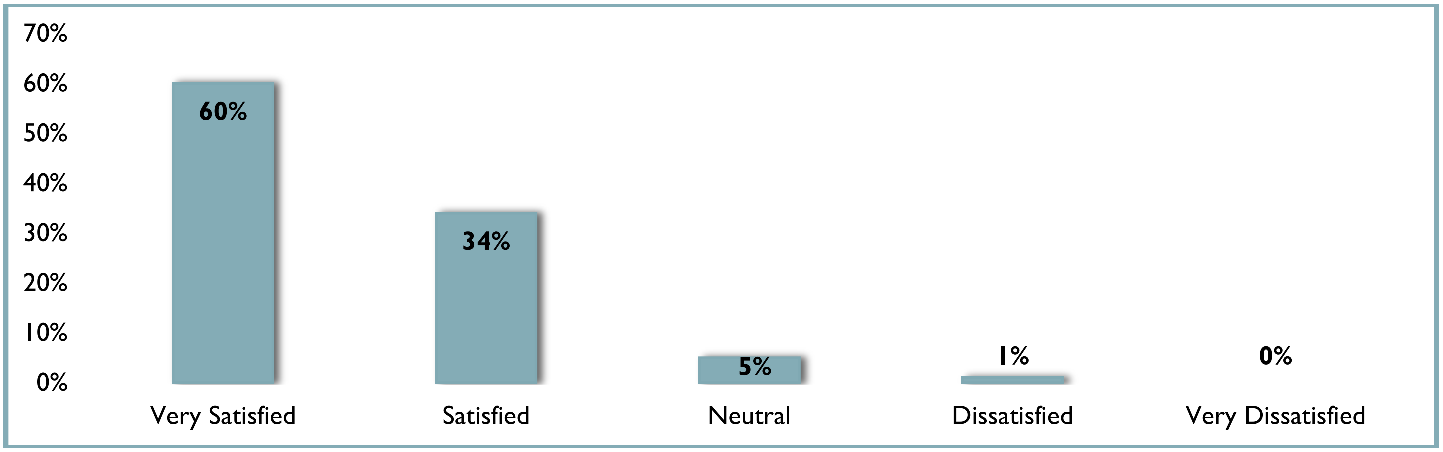


Figure 2.1.6: 94% of external users were satisfied or very satisfied with **user friendliness of training and safety procedure.**

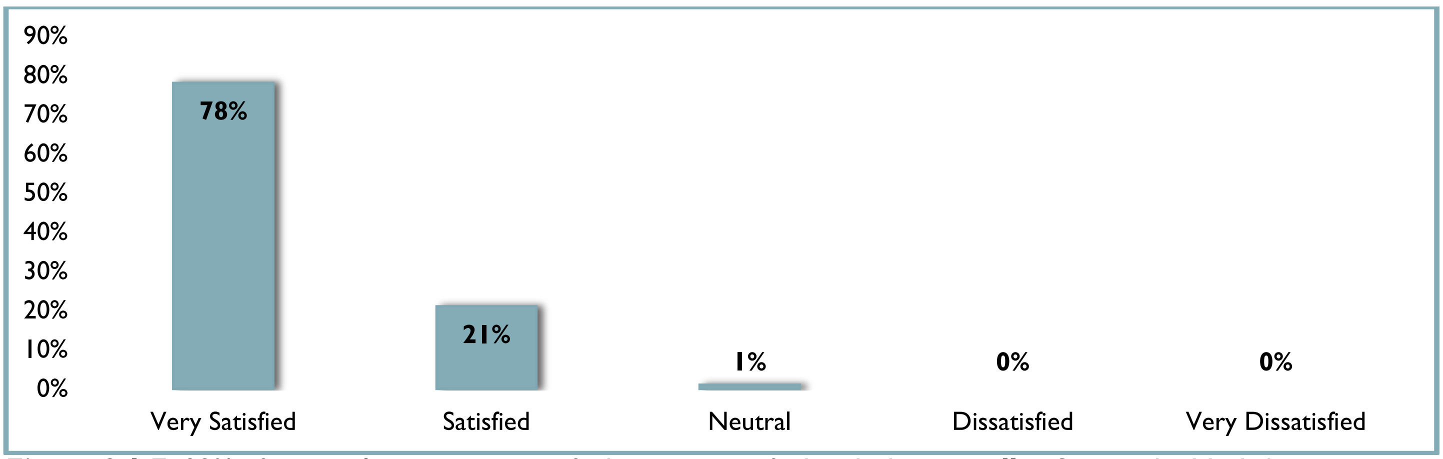


Figure 2.1.7: 99% of external users were satisfied or very satisfied with the **overall safety** at the MagLab.

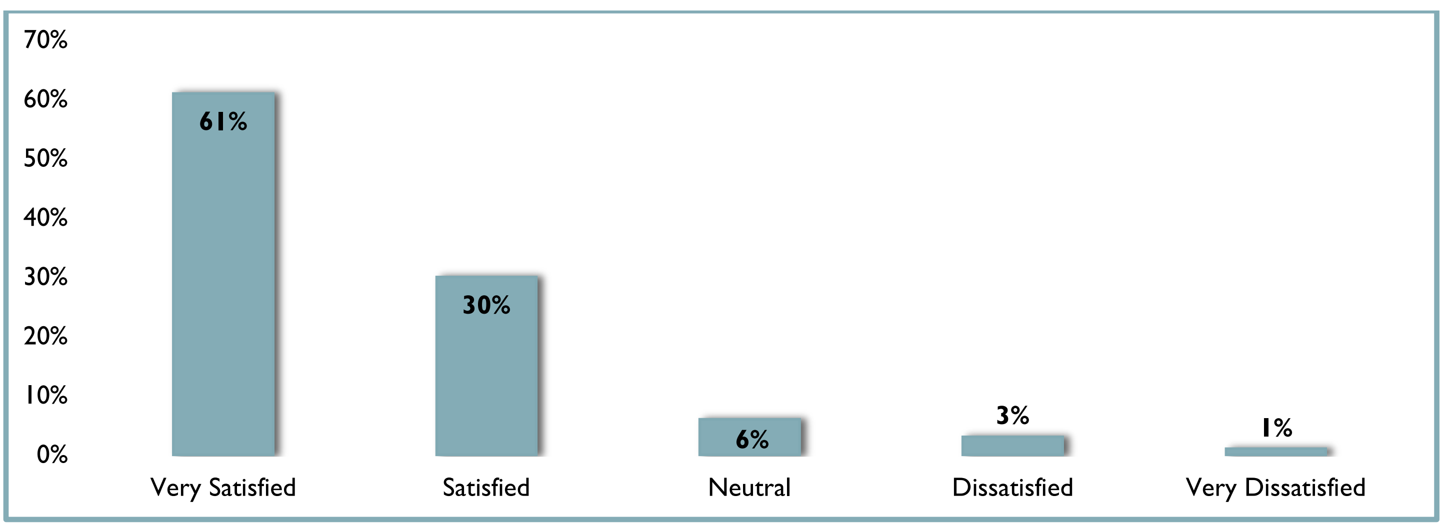


Figure 2.1.8: 91% of external users were satisfied or very satisfied with the **performance of facilities and equipment** (e.g., were they maintained to specifications for intended use, ready when scheduled, etc.).

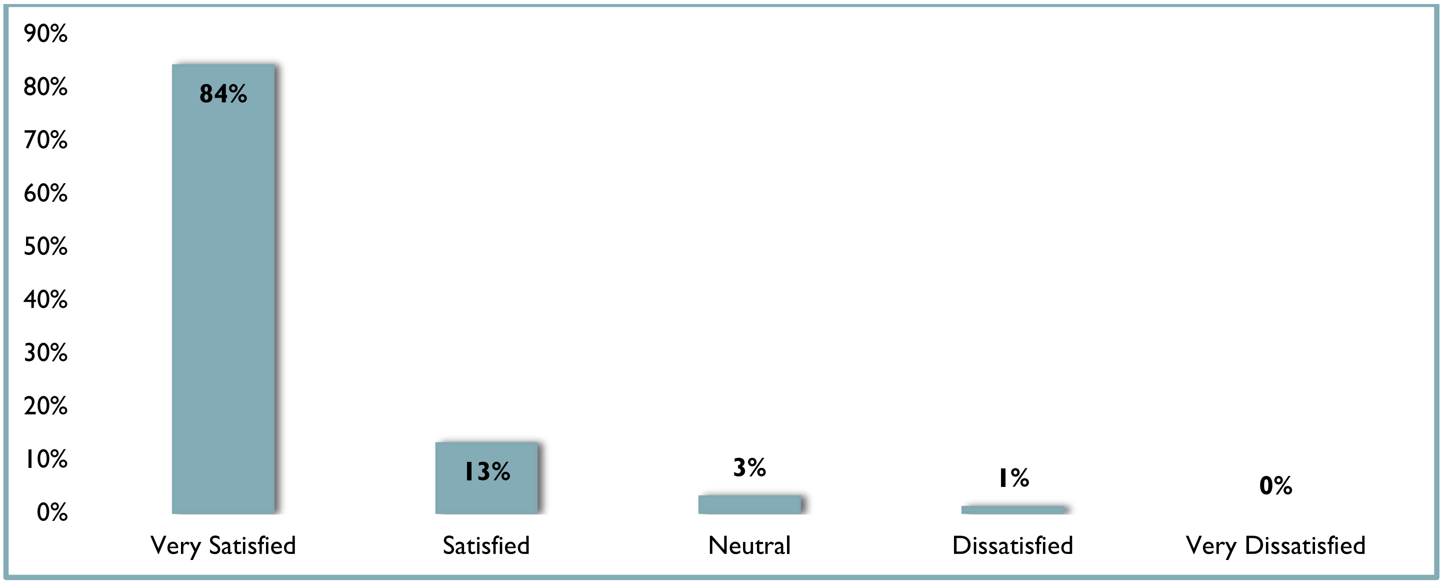


Figure 2.1.9: 97% of external users were satisfied or very satisfied with the **assistance provided** by MagLab facilities **technical staff.**

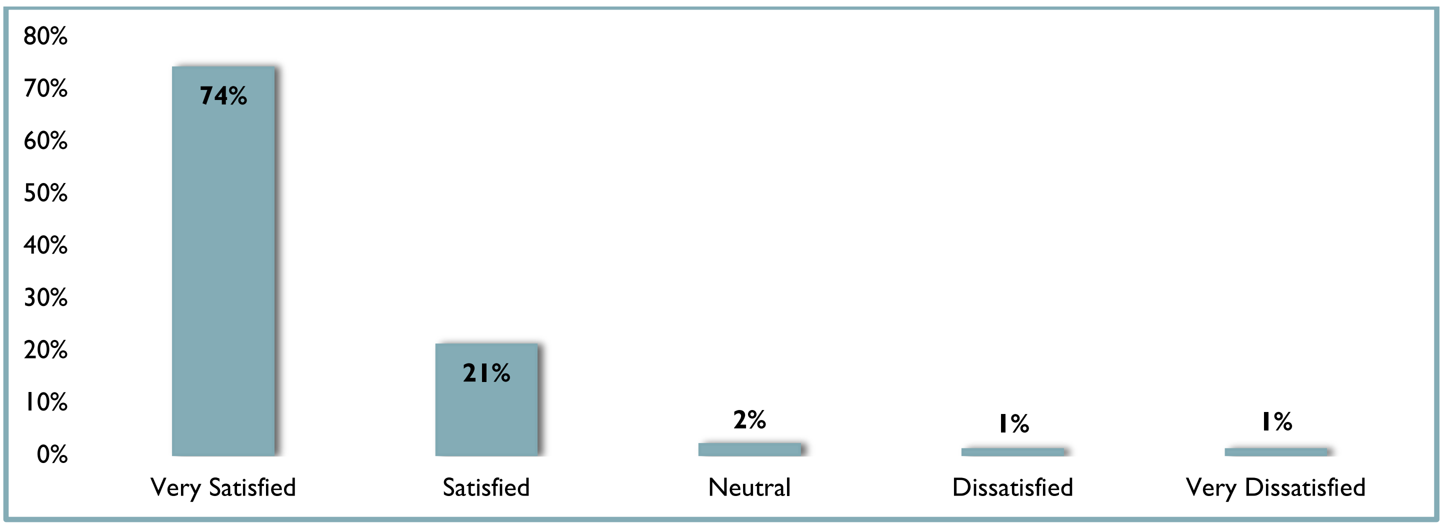


Figure 2.1.10: 95% of external users were satisfied or very satisfied with the **assistance provided by** MagLab facilities **administrative staff.**

2.2. SEVEN USER FACILITIES

The geographical distribution of our users' organizations can be found on our website.

1. AMRIS Facility

The AMRIS facility at the University of Florida supports nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI) studies of chemical compounds, biomolecular systems, tissues, small and large animals. We currently offer fourteen systems with different magnetic fields and configurations to users for magnetic resonance experiments. AMRIS has fourteen professional staff members to assist users, maintain instrumentation, build new coils and probes and help with administration.

Unique Aspects of Instrumentation Capabilities

Several of the AMRIS instruments offer users unique capabilities: the 750MHz wide bore provides outstanding high-field imaging for excised tissues and small animals, as well as diffusion measurements with gradient strengths up to 30T/m; the 11.1T horizontal MRI has a large 400mm bore size and gradient strengths up to 1.5T/m; the 600MHz 1.5-mm HTS cryoprobe is the most mass-sensitive NMR probe in the world for ^{13}C detection and is ideal for natural products research; the 5T DNP polarizer enables both fundamental studies of DNP mechanisms down to 1.2K as well as *in vivo* metabolism measurements when coupled to either the 4.7T or 11.1T systems, as well as the potential for perfusion studies in the newly installed wide bore 600MHz system. These systems support a broad range of science, including natural product identification, membrane protein structure determination, cardiac studies and correlation of neural structures with brain function and chemistry **(Table 2.2.1.1).**

Table 2.2.1.1: *NMR & MRI Systems in the AMRIS Facility at UF in Gainesville*

^{1}H Frequency	Field (T), Bore (mm)	Homogeneity	Measurements
800MHz	18.8, 63	1ppb	Solution/solid-state NMR and HR-MAS
800MHz	18.8, 54	1ppb	Solution NMR (Cryoprobe)
750MHz	17.6, 89	1ppb	Solution/solid-state NMR and MRI
600MHz	14.1, 51	1ppb	NMR and hyperpolarization
600MHz	14.1, 89	1ppb	NMR and microimaging
600MHz	14.1, 54	1ppb	Solution NMR (CryoProbe)
600MHz	14.1, 54	1ppb	Solution NMR (HTS Cold Probe)
500MHz	11.7, 54	1ppb	Solution/solid-state NMR
470MHz	11.1, 400	0.1ppm	DNP, MRI and NMR of animals
212MHz	5.0, 89	1ppm	DNP polarization
200MHz	4.7, 330	0.1ppm	DNP, MRI and NMR of animals
143MHz	3.35, 52	1ppm	DNP polarization

Facility Developments and Enhancements

The installation of a ^{13}C-optimized 10mm cryoprobe at 600MHz in combination with the Hypersense DNP polarizer previously installed now enables real-time metabolic measurements in functioning cardiac tissue. Working directly with Bruker, we have successfully tested a new shielded gradient setup on the 750MHz system, which significantly increases SNR during imaging experiments. Further in-house development is transforming this prototype into a more rigorous, user-friendly setup. In June 2019, a 1.7-mm TCI MicroCryoProbe arrived and was installed on our Bruker 600MHz with an Avance-Neo console. In November 2019, we installed a 600MHz wide bore (89mm) magnet with a Bruker AVIIIHD console and 800MHz narrow bore (54mm) magnet and a three channel Bruker AVIII console. The wide bore 600 has a specialized QNP switch, enabling ^{19}F/^{1}H or ^{19}F/BB experiments. User operation have begun on both of these systems, and a 5mm cryoprobe is being installed on the 800 system, ensuring that this high field NMR systems offer the latest in sensitivity and pulse sequence capabilities.

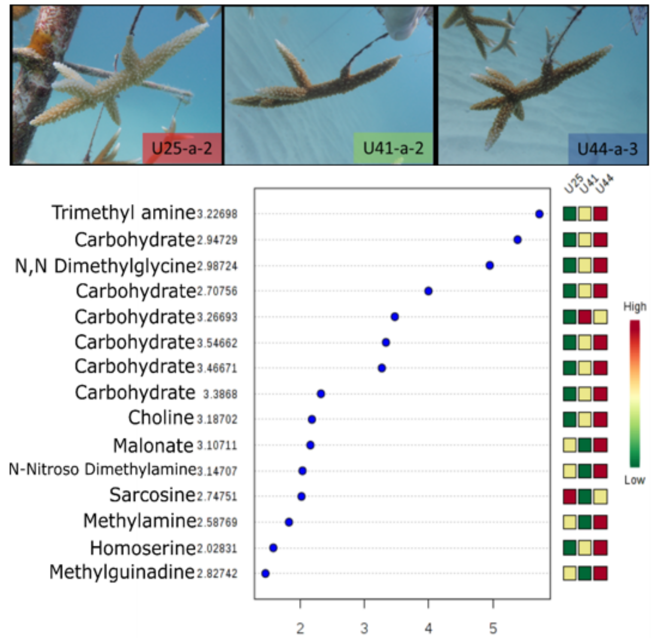


Figure 2.2.1.1: Top: Three genotypes of Acropora cervicornis from an established coral nursery near Tavernier, FL, used in this study. Bottom: VIP scores plot showing the important metabolites distinguishing genotypes identified by PLS-DA, with their relative concentrations represented by color boxes (right).

Major Research Activities and Discoveries

This year we saw continued user growth in our major research focus areas. The first area was in fundamental DNP studies and their application to *in vivo* metabolic studies. A second area of growth was in supporting users pursuing quantitative studies for metabolomics and structural biology. A third area of growth was in the use of *in vivo* MRI and MRS to study structure/function/chemistry in rodent models up to 17.6T. Research in these areas led to and will leverage the enhancements described in section above. AMRIS facility users reported 42 peer-reviewed publications and 28 theses and dissertations for 2019. Three notable examples are listed below.

Research into metabolomics and metabolic flux (Figure 2.2.1.1). NMR-based metabolite profiling of biofluids is exquisitely sensitive to changes in metabolism. High-resolution ^{1}H spectra can generate a significant amount of metabolic data and, in conjunction with multivariate analysis, can be effective for determining variability of metabolomic profiles among unique genotypes, including distinguishing between coral samples. Researchers at the Florida Aquarium collaborated with users at the University of Technology Sydney and the University of Florida to characterize the metabolomic profiles of different genotypes of coral *Acropora cervicornis* growing in a common garden, as published in *Scientific Reports*. They found levels of the metabolite trimethylamine-N-oxide, an important osmolyte that protects against nitrogen overload, can distinguish the three genotypes studied. Some fatty acids and carbohydrates were

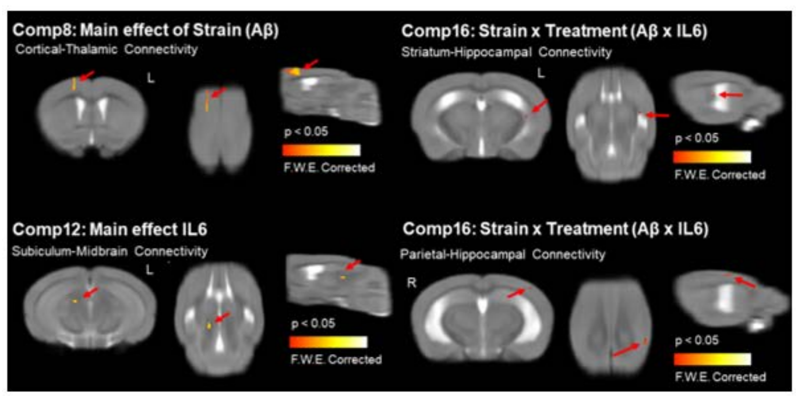


Figure 2.2.1.2: Resting state functional MRI revealed the effects of β -amyloid (Aβ) plaque deposits and inflammation on brain microstructures and networks. By comparing normal, healthy mice to mice which either had elevated levels of β -amyloid (Aβ) plaque deposits and/or the inflammatory protein interleukin-6 (IL6) we found a significant main effect of Aβ on cortical -thalamic connectivity (upper left), a significant main effect of IL6 on subiculum-midbrain connectivity (bottom left) and a significant Aβ x IL6 interaction in striatum-hippocampal connectivity and parietal-hippocampal connectivity (right).

also found to be significant in distinguishing species. The global loss of coral reefs is increasing and has tremendous impacts on global ecology and fisheries. Elucidation of intraspecific variation in coral metabolite profiles could help understand underlying mechanisms that promote coral survival and performance in stressed environments. These measurements demonstrated ^{1}H NMR-based metabolomics is a powerful technique for assessing and distinguishing metabolism among different coral species.

Characterizing the effects of inflammation on long-term brain resilience (Figure 2.2.1.2). Alzheimer's disease is a neurodegenerative disease, which is linked to changes in the microstructure of the brain. Extracellular β-amyloid (Aβ) plaque deposits and inflammatory immune activation, mediated in part by interleukin-6 (IL6), are suspected to cause the altered tissue microstructure. Quantifying early changes in brain microstructures via MRI could help to monitor and predict disease progression, as well as potentially suggest new treatment methods. Using a mouse model of Alzheimer's disease, users at the McKnight Brain Institute demonstrated that high-field diffusion MRI measurements can detect early changes in white matter (WM) due to increased levels of either Aβ or IL6. Quantifying changes in the brain using MRI will help to monitor and predict disease progression, as well as potentially suggest new treatment methods.

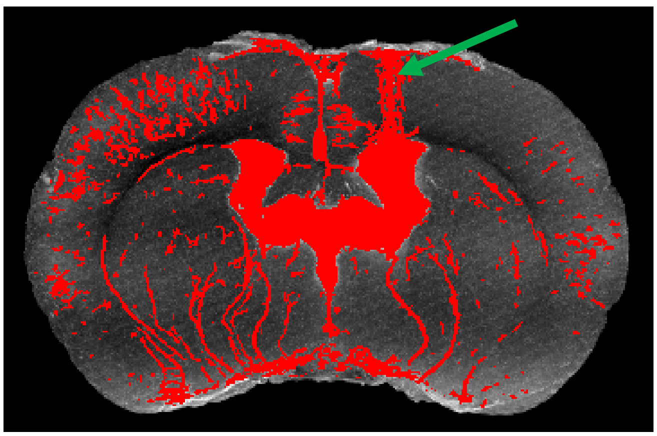


Figure 2.2.1.3: A contrast agent, Gd-Albumin, was injected (green arrow) and permeated the perivasculature in the brain. Contrast-enhanced MRI enabled visualization of the perivascular system (PVS). A PVS network was constructed using a tubeness following algorithm since the PVS surround the blood vessels in the brain.

Understanding how the brain clears waste products (Figure 2.2.1.3). The brain is the only part of the body without a lymphatic system to clear metabolic waste. Recent evidence suggests brain clearance of waste may be accomplished in the annular spaces around cerebral blood vessels, called perivascular spaces (PVS), through which cerebrospinal fluid (CSF) is transported from the subarachnoid space into brain parenchyma to exchange with interstitial fluid. Using high resolution MRI, users reconstructed the PVS network in whole rat brain to elucidate both PVS uptake and clearance pathways. PVS connections were highlighted repeatedly across several brains, and new PVS connections between ventricles and different parts of the brain parenchyma were revealed. This suggests a role for the ventricles as a source or sink for metabolites in the brain.

Facility Plans and Directions

Our users have consistently and successfully pursued federal funding to support their research programs in addition to assisting the AMRIS facility in writing proposals to upgrade instrumentation. The successful partnership of the NHMFL user program with individual investigator research grants also provides constant scientific motivation for our technology development. To aid in the progress of our NIH P41 technology center grant that funds continuing development of NMR probes with world-leading sensitivity for challenging biomolecular studies, we have received funding for a new Bruker Neo Console and cryo platform for installation in 2020. We successfully partnered with the University of Central Florida to relocate 600MHz and 800MHz NMR system in AMRIS, enabling researchers to have improved access to high field spectrometers and expertise. The instruments will be further developed with hyperpolarization (600MHz) and HTS cryoprobe (800MHz) capabilities in 2020/2021.

Outreach to Generate New Proposals-Progress on STEM and Building User Community

In August of 2019, Amy Howe replaced Kelly Deuerling as the NHMFL coordinator at the University of Florida. Howe and Deuerling, along with nine other UF graduate students and postdoctoral fellows, visited 90 classrooms in 26 schools, reaching 1,674 students as part of the NHMFL classroom outreach program in Gainesville. All but two of these schools were classified as Title 1 schools in 2019, and our events reached a diverse population of students.

Other Alachua County Schools' events, such as school carnivals, science career nights and STEM/STEAM family nights, provided opportunities to converse with an additional 740 K-12 students and their family members at six school locations within a 60-mile radius of AMRIS. We were proud to continue an active role in the Fort Clarke Middle School afterschool science club program, originally created in 2017 by then-AMRIS coordinator, Elizabeth Webb, where an additional four activities were conducted over the course of the year.

This year, Deuerling volunteered at the Women in Science and Engineering (WiSE) Girls spring break camp with AMRIS engineer Malathy Elumalai. This weeklong camp brought middle school girls from Alachua County to the University of Florida to learn about a variety of different sciences. Deuerling also led one day of summer STEM science camp activities for rising ninth grade students at Santa Fe College. Both camps included exploration of magnet properties, building electromagnets and 3D printing for scientific research.

Faculty associated with the AMRIS Facility mentored four NHMFL REU students over the summer and gave tours of the facility to nine groups, reaching 95 individuals of diverse backgrounds. These faculty consistently have ~20 undergraduate and high school students working on projects at any given time.

In June, we again held our very popular RF Coil building workshop in the AMRIS Facility. Five participants came for a week to learn the physics behind MRI, RF coil theory and how to build RF coils. As part of the course, participants built a quadrature surface MRI coil to bring back to their home institutions.

In October, AMRIS assisted with a Dynamic Nuclear Polarization Workshop at the NHMFL in Tallahassee for a group of seven graduate students and postdocs who plan to use DNP techniques at their home institutions throughout the United States. Lecturers provided instruction about software, hardware and data handing in the students' areas of research. Participants acquired their own NMR spectra, and then subsequently analyzed those spectra with the assistance of expert instructors, both from AMRIS and NHMFL collaborators.

Also in October, AMRIS assisted in organizing and hosting the Southeastern Magnetic Resonance Conference (SEMRC). This three-day event was attended by over 150 junior and senior magnetic resonance researchers primarily from the Southeast region of United States as well as other places. The notable hallmark of the SEMRC is the active participation of young scientists (students and postdocs). This year over 25% of the total 45 oral presentations were from these younger scientists and over 60 posters were presented. SEMRC is one of a few magnetic resonance conferences where solid-state NMR presentations are mixed with EPR approaches, hyperpolarized MR, in vivo MRI and solution NMR. Such a diverse selection of topics is based on a belief that the magnetic resonance community benefits greatly from interactions among researchers in related, yet quite distinct, scientific areas.

Facility Operations Schedule

The AMRIS facility operates year round, except during the last week of December when the University of Florida is shut down. Vertical instruments for *ex vivo* samples are scheduled 24/7, including holidays and weekends. Horizontal instruments operate primarily 8-12 hrs/day, 5 days/week due to the difficulty in running animal studies overnight. The AMRIS facility operates as an auxiliary under federal cost accounting standards. Local and NHMFL-affiliated users pay for magnet time from federally funded projects (primarily individual investigator grants); the NHMFL funds magnet time for users from outside the UF system and development projects.

2. *DC Field Facility*

The DC Field Facility in Tallahassee serves a large and diverse user community by providing continuously variable magnetic fields in a range and quality unmatched anywhere in the world. The DC Field user community is made up of undergraduate students, graduate students, post docs and senior investigators from around the country and the world. State-of-the-art instrumentation is developed and coupled to these magnets through the efforts of our expert scientific and technical staff. The users of the DC Field Facility are supported throughout their visit by the scientific, technical and administrative staff to ensure that their visit is as productive as possible. The interaction between the NHMFL scientific and technical staff with the students, post docs and senior investigators who come to the DC Field Facility to perform their research results in a continuous mix of scientific ideas and advanced techniques that are passed both to and from users.

Unique Aspects of Instrumentation Capabilities

Table 2.2.2.1: DC Field Magnets

FLORIDA-BITTER and HYBRID MAGNETS		
Field, Bore, (Homogeneity)	**Power (MW)**	**Supported Research**
45T, 32mm, (25ppm/mm) **41.5T**, 32mm, (25ppm/mm) **36T**, 40mm, (1ppm/mm)[2] **35T**, 32mm (x2) **31T**, 32mm to 50mm[1] (x2) **25T**, 32mm bore (with optical access ports)[3]	30.4 32 14 19.2 18.4 27	Magneto-optics – ultra-violet through far infrared; Magnetization; Specific heat; Transport – DC to microwaves; Magnetostriction; High Pressure; Temperatures from 30mK to 1500K; Dependence of optical and transport properties on field, orientation, etc.; Materials processing; Wire, cable and coil testing. NMR, EMR and sub/millimeter wave spectroscopy.
SUPERCONDUCTING MAGNETS		
Field, Bore	**Sample Temperature**	**Supported Research**
18/20T, 52mm **18/20T**, 52mm **17.5T**, 47mm **10T**, 34mm[3]	20mK – 1K 0.3K – 300K 4K – 300K 0.3K – 300K	Magneto-optics – ultra-violet through far infrared; Magnetization; Specific heat; Transport – DC to microwaves; Magnetostriction; High pressure; Temperatures from 20mK to 300K; Dependence of optical and transport properties on field, orientation, etc. Low to medium resolution NMR, EMR and sub/millimeter wave spectroscopy.

1. *A coil for modulating the magnetic field and a coil for superimposing a gradient on the center portion of the main field are wound on 32mm bore tubes.*
2. *Higher homogeneity magnet for magnetic resonance measurements.*
3. *Optical ports at field center with 4 ports each 11.4° vertical x 45° horizontal taken off of a 5mm sample space*

Table 2.2.2.1 lists the magnets in the DC Field Facility. The MagLab leads the world in available continuous magnetic field strength, number of high field DC magnets available to users and accessibility for scientific research. The 45T hybrid magnet is the highest field DC magnet in the world, which is reflected in the number of proposals from PIs located overseas. The 41.5T resistive magnet is the highest field resistive magnet in the world. The 36T Series Connected hybrid magnet features two configurations: a 40mm bore, with 1ppm homogeneity for chem/bio NMR experiments and a 48mm bore with 20ppm homogeneity for condensed matter physics experiments in a top-loading cryogenic system. The 35T, 32mm bore and 31T, 50mm bore magnets are coupled to top loading cryogenic systems that have impressive performance, flexibility and ease of use. The 25T Split-Helix magnet is the highest field direct optical access/scattering magnet in the world. With 4 optical ports located at field center each having a 11.4° vertical x 45° horizontal taken off of a 5mm opening, the ability to perform ultrafast, time resolved and x-ray scattering experiments are now a reality at high magnetic fields.

Facility Developments and Enhancements

New Magnet Cooling Water Treatment System

In mid-November 2019, we entered our annual maintenance shutdown and began several large projects that had taken many months of planning to prepare for. The first of these projects was the replacement of our existing magnet cooling water treatment system. The magnet cooling water treatment system is critical to magnet operations as it removes the metal ions shed by the resistive magnets as they operate. The water is continuously treated in order to keep the electrical resistance of the cooling water very high (~15 Mohm-cm), thus preventing electrical shorts between the energized coils and the magnet housing. The current water treatment system was installed during the construction of MagLab in 1992-93 and had reached the end of its service life. The new system, **Figure 2.2.2.1**, is configured with two water treatment columns (resin beds) that allow for simultaneous regenerations (cleaning) of one resin bed, while the other is operating. The old system was configured with a single resin bed which meant that magnet operations would need to be suspended for several weeks while the resin bed was regenerated. The new system allows us to regenerate one bed while the other continues to operate giving us greater operational flexibility. In addition we can operate the resin beds in both a series and parallel configuration depending on facility needs.

Figure 2.2.2.1: New magnet cooling water treatment system

Figure 2.2.2.2: Three-phase 12.5kV-480V switchgear

New 12.5kV – 480V Electrical Switchgear

Over the prior two years we have experienced facility downtime due to failures in the electrical switchgear (circuit breakers & transformers) that provide three-phase, 4160V and 480V power to the large array of pumps, chillers, compressors and other equipment that are needed to operate the resistive and hybrid magnets. MagLab personnel worked in concert with FSU facilities staff and Schneider Electric to plan and safely execute the the replacement of this switchgear, ensuring that the work was done safely and minimized the downtime required as we had to turn off most of the power that feeds the physical plant. The new switchgear (**Figure 2.2.2.2**) has significantly improved capability to protect equipment and personnel from overcurrent

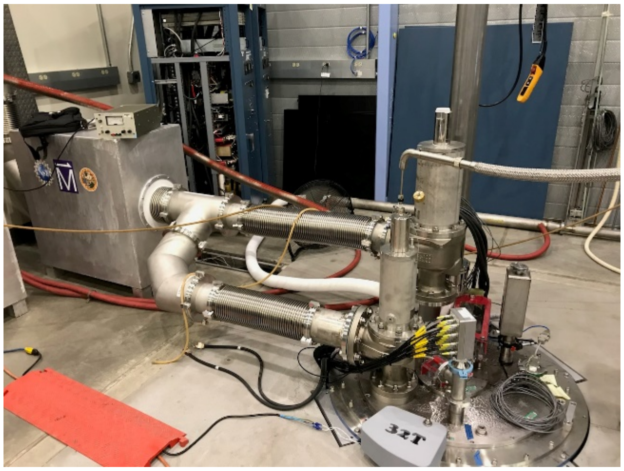


Figure 2.2.2.3: 32T all-superconducting magnet shown during cooldown to 4.2K.

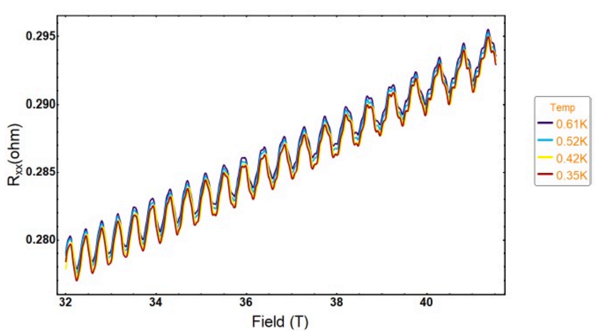


Figure 2.2.2.4: Shubnikov-de Haas quantum oscillation data acquired in the 41.5T resistive magnet (courtesy B. Ramshaw).

and ground-fault scenarios and provides a large amount of diagnostic information that allows us to monitor the health of the switchgear itself.

32T Superconducting Magnet (SCM 4) Installed in mK Expansion

The 32T all-superconducting magnet was moved to its final home in July after work was completed on modifying the current leads to the HTS coil. This work was done following a post-test inspection that revealed a higher than expected amount of force was being applied to the current leads. The HTS current leads were redesigned and then mechanically cycled thousands of times in a test facility. The HTS insert quench protection and detection system received extensive hardware and software revisions as a result of data and experience acquired in the cell 4 testing as well as changes in the configuration of the electronics necessitated by the move to the new location. The magnet was cooled to 4.2K in November and testing is expected to begin early in 2020 once work is completed on the quench protection and detection electronics and software (**Figure 2.2.2.3**).

User Operations Commenced on the 41.5T Resistive Magnet (Project 11)

Users began taking data in the new 41.5T resistive magnet in August. The 41.5T magnet uses three power supplies like the 45T hybrid magnet and is able to sweep through zero field like the other resistive magnets. The first user group to run in the magnet was from Cornell University (Brad Ramshaw) and their measurements focused on the Fermi surface of strained thin films, shown in **Figure 2.2.2.4.** The new advanced vibration isolation system (**Figure 2.2.2.5**) coupled to the top-loading cryogenic system is working well and the vibration isolation concept will be propagated to other magnet cells over time.

Major Research Activities and Discoveries

The scientific directions taken by the users of the DC Field Facility touched on a number of topics in condensed matter physics, materials science, chemistry and biology.

The properties of a potential topological superconductor were investigated by the group of Dave Young from Louisiana State University. The magnetization of single crystals of BiPd were measured using torque magnetometry up to 35T (cell 12) at temperatures down to 350mK. Their results provide further support for the assertion that BiPd is a topologically nontrivial superconductor.

One method of determining if topological states are present is by measuring the Fermi surface of a material. This was accomplished via torque magnetometry, a technique that is highly sensitive to changes in the magnetization and allows a measurement of the angular dependence of the de Haas-van Alphen effect. The measurements were performed in a 35T resistive magnet coupled to a cryostat with a base temperature of 350mK. An

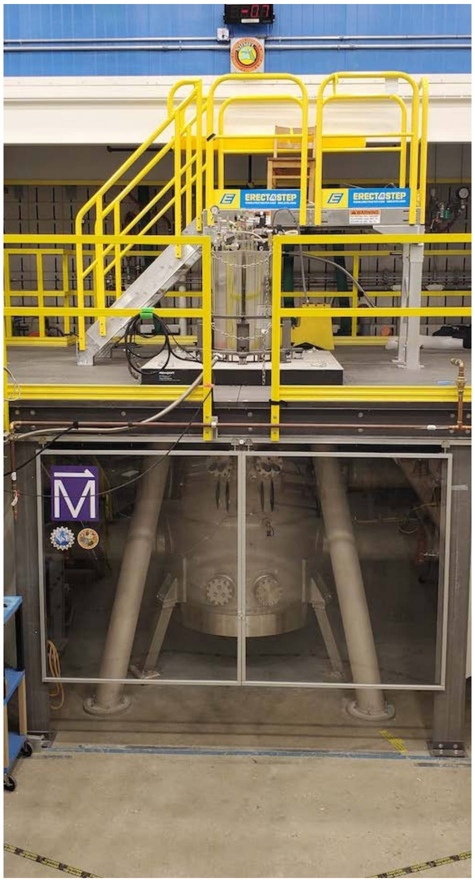


Figure 2.2.2.5: Cell 6 (41.5T) cryostat with advanced vibration isolation.

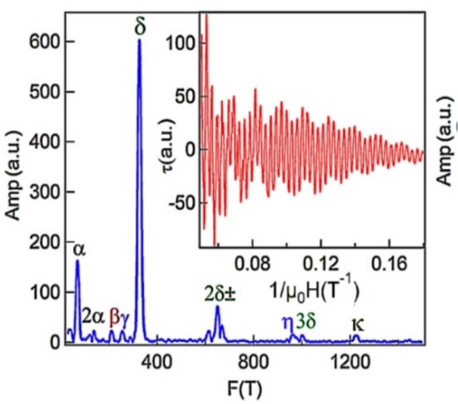


Figure 2.2.2.6: dHvA quantum oscillations in BiPd.

example of one of the magnetic field sweeps is shown in **Figure 2.2.2.6**. Analysis of data collected over a wide range of temperature, magnetic field and angle revealed that a nontrivial Berry phase is associated with the α frequency, strongly suggesting the presence of topological states in bulk BiPd.

Reentrant "Lazarus" superconductivity at fields above 35T in UTe2 was discovered using the 45T hybrid magnet, a 35T resistive magnet in the DC Field Facility and a 65T pulsed magnet in the Pulsed Field Facility. The experiments required the MagLab's high field magnets to determine the largest value of the upper critical magnetic field: an amazing 35T (blue region in **Figure 2.2.2.7**), which is an incredibly high upper critical field for a superconductor with a 1.6K critical temperature. Indeed, 35T is an order of magnitude greater than the paramagnetic limit of conventional superconductors above, which all electron spins would be expected to be aligned. This find strongly indicates that spins of the paired electrons in UTe2 are parallel in a spin triplet configuration, not antiparallel as in most superconductors.

Unexpectedly, an additional high-field superconducting phase was found to be stabilized at even higher fields, but only over a limited range of field direction. This reentrant "Lazarus" superconductivity between 40T and 65T challenges our understanding of how magnetic fields typically destabilize superconductivity. In addition, these spin-triplet superconducting states are strong candidates for unusual nodal p-wave pairing and may harbor sought-after topological Majorana zero-energy modes. Research groups from NIST and the University of Maryland were assisted by MagLab scientists in conducting the high-field experiments that revealed this intriguing behavior.

Facility Plans and Directions

32T superconducting magnet will begin user operations in 2020. The variable temperature insert (VTI) has been installed in the magnet and is ready for experiments once the magnet has completed the testing phase. The top-loading dilution refrigerator was delivered in 2019 and is currently undergoing zero-field acceptance tests in cell 16 prior to installation in the 32T magnet.

Addition of a sixth magnet cooling water pump. Currently the DC Field Facility has five magnet cooling water pumps used to circulate high-purity water through the magnets. Four of the pumps are 500HP and one is 850HP. These pumps are operationally grouped in different configurations depending on the needs of the magnets in operation. Adding a sixth pump both increases the reliability of the cooling water plant and provides a larger operational envelope of pressure and flow for future magnet designs.

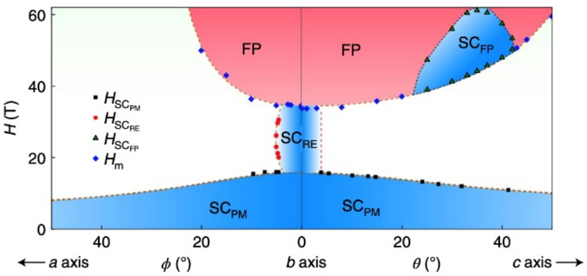


Figure 2.2.2.7: Phase diagram of UTe2.

Outreach to Generate New Proposal-Progress on STEM and Building User Community

The DC Field Facility continued to be in high demand with the scientific community in 2019 as shown by the usage tables in **Appendix II**. In spite of this oversubscription, however, the DC Field Facility has continued to make bringing new primary investigators (PIs) into the NHMFL a priority. We reach out wherever possible in order to expand the user program and enable research efforts for PIs from backgrounds underrepresented in the scientific community. In particular, the NHMFL sponsored a booth at the 2019 APS March Meeting in Boston and the 2019 MRS Fall Meeting to advertise the capabilities and opportunities offered by the MagLab. The booth is staffed by MagLab scientists and staff who explain the spectrum of research possibilities and support available at the NHMFL. In addition, our DC Field Facility user support scientists regularly travel to conferences to present the results of their research that showcase the capabilities of the laboratory and to recruit new users.

Appendix II shows the DC Field Facility attracted 41 new PIs in 2019. This is in addition to the 51 new PIs reported last year (2018) and 10 in 2017. A portion of this high number is due to the addition of the new superconducting magnets, SCM5 and SCM6, as well as a full year of Series Connected Hybrid operations.

The DC Field Facility also hosted the *2019 NHMFL User Summer School* that attracted 28 graduate students and post doc attendees (**Figure 2.2.2.8**). It is a five-day series of lectures and practical exercises in experimental condensed matter physics techniques developed and taught by members of the MagLab scientific staff as well as experts from industry. It has proven to be an excellent vehicle for communicating valuable experimental knowledge to the next generation of scientists from the enormous trove of knowledge and experience encompassed by the MagLab scientific staff. The feedback from both the students and the Users Committee is always extremely positive.

Figure 2.2.2.8: 2019 NHMFL User Summer School participants.

Facility Operations Schedule

At the heart of the DC Field Facility are the four 14MW, low noise, DC power supplies. Each 20MW or 28MW resistive magnet requires two power supplies to run; the 45T hybrid and the 41.5T resistive magnets each require three power supplies; and the 36T Series Connected Hybrid requires one power supply. Thus the DC Field Facility operates in the following manner: in a given week there can be four resistive magnets and five superconducting magnets operating or the 45T hybrid/41.5T resistive, series connected hybrid, two resistive magnets and five superconducting magnets. The water-cooled DC resistive and hybrid magnets operated for 45 weeks in 2019 with a six-week shutdown for infrastructure maintenance and upgrades from November 11 to December 20 and a one-week shutdown period for the university-mandated holiday break from December 23, 2019 to January 2, 2020. The five superconducting magnets operated for 46 weeks out of the year with staggered maintenance periods as required. The daily operation schedule for the resistive and hybrid magnets is as follows: 7 hours/day on Monday and 21 hours/day Tuesday-Friday. The superconducting magnets operate 24 hours/day 7 days/week. The effects of Hurricane Dorian in August resulted in a one-week shutdown of the DC Field Facility.

3. EMR Facility

Electron Magnetic Resonance (EMR) covers a variety of magnetic resonance techniques associated with the electron. The most widely employed is Electron Paramagnetic/Spin Resonance (EPR/ESR), which can be performed on anything that contains unpaired electron spins. EPR/ESR has thus proven to be an indispensable tool in a large range of applications in physics, materials science, chemistry and biology, including studies of impurity states, molecular clusters, molecular magnets; antiferromagnetic/ferromagnetic compounds in bulk, as well as thin films and nanoparticles; natural or induced radicals, optically excited paramagnetic states, electron spin-based quantum information devices; transition-metal based catalysts; and for structural and dynamical studies of metalloproteins, spin-labeled proteins and other complex bio-molecules and their synthetic models.

Unique Aspects of Instrumentation Capabilities

The EMR facility at the NHMFL offers users several home-built, high-field and multi-high-frequency instruments covering the continuous frequency range from 9GHz to ~1THz, with additional frequencies up to 2.5THz using a molecular gas laser. Several transmission probes are available for continuous-wave (CW) measurements, which are compatible with a range of magnets at the Lab, including the highest field 45T hybrid. Some of the probes can be configured with resonant cavities, providing enhanced sensitivity as well as options for in-situ rotation of single-crystal samples in the magnetic field, and the simultaneous application of pressure (up to ~3GPa). Quasi-optical (QO) reflection spectrometers are also available in combination with high-resolution 12 and 17T superconducting magnet systems; a simple QO spectrometer has also been developed for use in the resistive and hybrid magnets (up to 45T). EMR staff members can assist users in the DC field facility using broadband tunable homodyne and heterodyne spectrometers as well.

In addition to CW capabilities, the NHMFL EMR group boasts the highest frequency pulsed EPR spectrometer in the world, operating at 120, 240, 336GHz and now 395GHz with <100ns time resolution. A new quasi-optical 94GHz spectrometer (HiPER) with 1 ns time resolution was recently upgraded for high power (1kW) operation. A commercial Bruker Elexsys 680 operating at 9/94GHz (X-/W-band) is also available upon request. This unique combination of CW and pulsed instruments may be used for a large range of applications in addition to EPR, including the study of optical conductivity, electron cyclotron resonance and Dynamic Nuclear Polarization.

Facility Developments and Enhancements

The main area of development during 2019 centered around the high-power pulsed 94GHz spectrometer – HiPER. These efforts included integration of Arbitrary Waveform Generation and DNP/ENDOR capabilities. The former now enables generation of arbitrary shaped high-power waveforms, including chirped pulses spanning a 1GHz (94.0±0.5GHz) bandwidth, enabling wideband excitation and implementation of state-of-the-art pulse schemes, e.g., chirp echo Fourier transform EPR, akin to what is possible in NMR.

Meanwhile, an in-situ NMR spectrometer was integrated with HiPER such that NMR experiments can be performed by themselves, or in combination with the high-power pulsed microwave capabilities of the spectrometer for performing Electron Nuclear Double Resonance (ENDOR) and/or Dynamic Nuclear Polarization (DNP) type experiments. The NMR spectrometer is composed of a Varian Direct Drive console for controlling NMR pulse sequences. The HiPER probe has been modified such that a set of swappable NMR compatible inserts can be used to study various different nuclei. We have in effect one dedicated proton insert, one dedicated carbon insert, and two spare inserts for other nuclei, e.g., 15N and 31P). The newly installed hardware allows NMR experiments on one channel (only) at a time, and inserts can be used at temperatures from 10K up to room temperature, with nitrogen active cooling, which is particularly critical for high-power DNP experiments due to significant microwave heating. The NMR inserts can also be used for ENDOR experiments.

In addition to hardware development, the EMR group experienced significant personnel changes in 2019, with several new postdocs and students joining the ranks. The new postdocs include: Krishnendu Kundu, who joined from the Weizmann Institute and has been assigned to work on the development of HiPER; Livia Batista Lopes Escobar, who joined from the Federal University of Fluminense in Rio de Janeiro; and Daphné Lubert-Perquel, who joined from Imperial College, London. In addition, two other new postdocs affiliated with the NMR program have worked closely with EMR scientist Thierry Dubroca on development of the high-field (14.1T) solution-state DNP capability. They are Murari Sondararajan, who joined from Ecole Polytechnique Fédérale de Lausanne (EPFL), and University of Florida postdoc, Faith Scott.

Major Research Activities and Discoveries

29 peer-reviewed journal articles were reported by our users during the past year, as well as numerous presentations at conferences. The number of publications is lower than recent years (37 in 2017 and 41 in 2018), which can be attributed to significant disruptions to EMR operations at the end of 2018 and during the first half of 2019, as discussed in more detail in section below. In spite of this, the quality of publications was exceptionally high, including articles in the following journals: *Nature Chemistry* (1); *J. Am. Chem. Soc.* (2); *Angew. Chem.* (1); *Proc. Nat'l Acad. Sci.* (2); *Chem. Sci.* (2); *Phys. Rev. Lett.* (1); *Chem. Comm.* (1); *Inorg. Chem.* (4); *Dalton Trans.* (3); *Organometallics* (1); *Phys. Chem. Chem. Phys.* (2); *Materials Lett.* (1); *J. Chem. Phys.* (1); *J. Phys. Chem. B* (1); and *J. Phys. Cond. Matter* (1). Projects in the facility spanned a range of disciplines, from applied materials research to studies of proteins.

The EMR Program has also played a role in supporting efforts associated with several major center-type research initiatives and international collaborations involving multiple universities. These include: the DOE funded Energy Frontier Research Center for Molecular Magnetic Quantum Materials (M2QM) based at the University of Florida (PI – Hai-Ping Cheng), with co-PIs at the University of Central Florida, Florida State University, Caltech and Los Alamos National Labs; an AFOSR funded Multidisciplinary University Research Initiative focusing on Terahertz Electronics Based on Antiferromagnets, headquartered at the University of Central Florida (PI – Enrique del Barco), with co-PIs at New York University, Oakland University, The Ohio State University, UC Riverside and UC Santa Cruz; and an AFOSR funded international network focusing on Molecular Quantum Technologies involving Florida State university, the University of Modena and Reggio Emilia in Italy, and Osaka City University in Japan.

Following are two research highlights from 2019 demonstrating the breadth of research performed in the EMR Program.

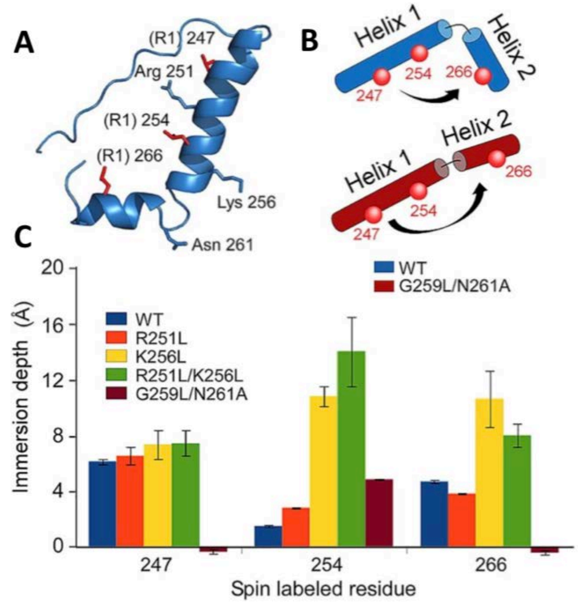


Figure 2.2.3.1: EPR of T-cell antigen receptor α transmembrane domain (TCRαTMC). (A) Molecular structure of TCRαTMC. Labeled residues (R1) for EPR studies are highlighted in red. (B) EPR distance and (C) immersion depth measurements of wild type (WT) and various mutant TCRαTMC.

Research Highlights

Molecular Movements Within T-Cells That Activate the Immune Responses that Attack Infected or Diseased Cells (Figure 2.2.3.1): T-cells and their surface proteins, T-cell antigen receptors (TCRs), perform immune surveillance to prevent or combat infections, cancers and other diseases. Here, researchers determined the molecular details of the structure of the TCR α subunit and its dynamic movements during T-cell activation.

Experiments at the MagLab involved Electron Paramagnetic Resonance (EPR) and spin labeling techniques. Researchers measured the relative distances between different segments within TCRα and how deep these segments are immersed in lipids mimicking cell membranes. These measurements identified a flexible L-shaped formation of the transmembrane domain of TCRα in the membrane, which undergoes stepwise movements during T-cell triggering as demonstrated by functional and mutational studies. These findings contribute to the conclusion that T-cell activation is initiated via a dissociative mechanism, shifting disposition of individual segments to rearrange TCR membrane topology and weaken its association with another T cell surface protein - CD3.

This study defined the structural movements within the TCRα transmembrane domain linked to fundamental TCR complex mechanobiology and cell activation. The findings provide insight into developing new drugs to fine tune T-cells that combat cancers or other nonmalignant diseases. This work, which was directed by researchers from the Dana-Farber Cancer Institute at Harvard Medical School, was published in the journal *Immunity* [49, 829-841(2018)].

Anomalous Spin Excitations in a Chiral Staggered Chain (Figure 2.2.3.2): For antiferromagnets (AFMs), there can be an energy difference between the ground state and first excited state (a gapped AFM) or this energy difference can be zero (a gapless AFM), in which the AFM is driven purely by quantum mechanics rather than anisotropy. An applied magnetic field can drive quantum phase transitions between gapped and gapless phases. S=1/2 antiferromagnetic Heisenberg chains typically remain gapless, but alternating local spin environments can lead to a field-induced spin gap. This study looked at a system with a chiral staggered spin environment and found a behavior different than for non-chiral staggered systems, due to additional terms involving a uniform Dzyaloshinskii-Moriya coupling and a fourfold periodic staggered field.

The experiments of magnetometry, heat capacity, electron spin resonance and the theoretical analysis involved a diverse group of scientists from the U.K., Japan and the U.S. The high magnetic field Electron Magnetic Resonance available at the MagLab was a crucial component to the success of this study of this chiral staggered spin chain.

The results demonstrate that spin chains with a screw symmetry can present a remarkable suppression of the magnetic-field-induced spin gap. This opens the quest for finding other materials where anisotropic interactions and particular crystal symmetries conspire to enable entirely novel magnetic states. This work, which involved researchers from the University of Oxford (U.K.), Durham University (U.K.), the University of Warwick (U.K.), the University of Tokyo (Japan) and Eastern Washington University (U.S.), as well as MagLab researchers from Florida State University and Los Alamos National Lab, was published in the journal *Physical Review Letters* [122, 057207 (2019)].

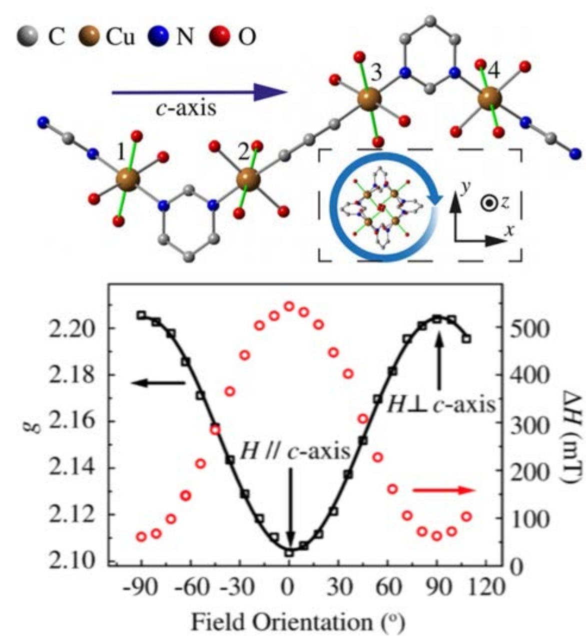


Figure 2.2.3.2: (Top) Chain Structure of Cu(pym)(H2O)4SiF6·H2O. Staggered elongated Cu-O bonds (green) correspond to local g‖ axes. (Bottom) Orientation dependence of Cu(II) g-factor and linewidth at 300K.

Facility Plans and Directions

Over the past several years, a significant number of hardware acquisitions have resulted in remarkable enhancements to the instrumentation offered by the EMR program. Our ongoing plans involve the hiring of postdocs to work with these sophisticated instruments, in most cases supported by external grants. As an example, postdoc Marcus Giansiracusa will join the group from the University of Manchester in the U.K. starting in late spring 2020.

As part of the ongoing upgrades to the HiPER spectrometer, several additional hardware components will be acquired and integrated during the coming year in order to optimize the wideband pulsed EPR capabilities. These items include additional W-band waveguide switches and a fast (6GS/s) computer data average card (12 bit). We are also negotiating the loan of a high-power (2W) continuous-wave solid-state amplifier.

Finally, successful tests of the new 950GHz source and mixer-detector were completed during 2019. Final development of the cryostat and probe assembly for the Series Connected Hybrid (SCH) Magnet should be completed toward the end of the summer of 2020. We therefore anticipate the first high-resolution EPR measurements in the SCH towards the end of 2020.

Outreach to Generate New Proposal-Progress on STEM and Building User Community

The total number of proposals that received magnet time during 2019 was 62, of which 14 were from first-time users, meaning that ~25% of our users were new to the program. Meanwhile, the EMR program assisted 161 individual researchers in 2019, of which approximately a quarter of those reporting were female (23%) and 7% minority. In an effort to attract new users, the EMR group continues to provide up to $500 in financial support to first-time visitors to the Lab ($1,000 for overseas users). The EMR group also continues to maintain tremendous diversity among its own students and staff: 50% are female and 12% minority.

Members of the EMR group continue to make aggressive efforts to advertise the facility at regional, national and international workshops and conferences, as well as via seminars at universities around the globe. The EMR director gave 16 such presentations in 2019. These efforts included attending and presenting at conferences outside of their own immediate research areas. In 2019, the EMR director served as chair of the American Physical Society's Topical Group on Magnetism and its Applications (GMAG). Members of the EMR group also served on the organizing committees for the following events: a three-day Symposium titled Magnetism Across Length Scales at the American Chemical Society National Meeting and Exposition in Orlando; the European Conference on Molecule-Based Magnets in Florence, Italy; the International Conference on Crystalline Organic Metals and Ferromagnets in Tomar, Portugal; and the Rocky Mountain Conference on Magnetic Resonance in Denver. In addition, the EMR group provided financial support in the form of student travel grants for the two main EPR conferences in the U.S. – the Southeastern Magnetic Resonance Conference and the Rocky Mountain Conference on Magnetic Resonance. Finally, the EMR group has participated in several outreach activities, including the mentorship of undergraduate students and local high-school interns.

Facility Operations Schedule

Operations in the EMR User Program were significantly impacted during 2019 due to construction in an adjoining lab-space that required relocation of our workhorse 17T homodyne transmission spectrometer. This instrument was taken out of service in early December 2018 at the time of the lab-wide shutdown. It was temporarily relocated to a different laboratory during the busy summer months, with limited availability to users, then finally returned to normal service in mid-August; it was again unavailable during the lab-wide December shutdown. Consequently, this instrument was available only 135 days during 2019, compared to over 300 days in a normal year. During the periods when this instrument was available to users, it was under exceptionally high demand (over-subscribed), including operation seven days per week, on many holidays and night-time operation. At the time of writing, the EMR Program is still coping with a significant backlog of user applications for time on this instrument. It should be noted that only 22 of the 135 days (16%) of operation during 2019 were allocated to local users.

Located in the same laboratory as the 17T homodyne spectrometer, the 12T heterodyne/pulsed instrument was also impacted by the construction and lab-wide shutdown. Moreover, this spectrometer is not straightforward to operate, requiring constant oversight by the EMR staff member (van Tol) responsible for the instrument. Users are therefore not usually scheduled when this staff member is traveling. Consequently, just 174 days of usage were reported in 2019, compared to 183 days in 2018, which was also affected by a labshut down. Taking into consideration the December lab-wide shutdown, 174 days constitutes ~80% of the available working days (not including weekends and holidays). Of these, just 24.5 days (14%) were allocated to NHMFL-affiliated and/or local users.

A total of 236 days were logged on the high-power pulsed 94 GHz EPR spectrometer, HiPER, slightly down from the 258 days reported in 2018. This reduction resulted mainly from a short period of downtime caused by a failure of the He gas flow cryostat. In spite of this, the 236 days exceeds the available working weekdays during the year (i.e., excluding holidays, weekends and the December lab-wide shutdown). As noted earlier, a significant amount of the usage in 2019 was dedicated to the integration of new hardware into this instrument. For this reason, 112 days are listed as being used for Instrument Development. Of the remaining time, over 60% was allocated to external users.

The Bruker E680 spectrometer was also significantly over-subscribed during 2019. The instrument is shared between the FSU Biology Department and the EMR user program. Only 30% of the machine time was originally designated for the MagLab user program; 234 days of usage were reported in 2019, exceeding the number of available weekdays. Of these 234 days, just 22 (~10%) were allocated to local users, while 69 days (~30%) were used for method development, meaning that external users accounted for 60% of the usage, significantly exceeding the original 30% designation.

Finally, we note that the Mössbauer instrument was taken out of service in 2018 and is no longer available to users (see 2018 annual report).

As a whole, the four instruments offered by the EMR User Program were significantly oversubscribed by ~30% in 2019, i.e., 1,007 days were requested and only 779 total days allocated.

4. High B/T

The High B/T Facility, located on the University of Florida campus, offers users a safe, diverse and inclusive atmosphere for performing research in high magnetic fields (up to 16.5 Tesla) and at ultralow temperatures (down to 0.5mK) with an ultraquiet electromagnetic interference (EMI) environment. These conditions are provided by two demagnetization cryostats, one equipped with high cooling power provided by a bundle of PrN5 and the other using a copper stage that provides lower temperature. A variety of specialized measuring techniques and experimental cells are available for user research projects, and new approaches suggested by users are possible in consultation with staff scientists. A fast-turnaround instrument, operating down to 50mK and providing magnetic fields up to 10 Tesla, is available for verification of the sample and detection of the signal with the appropriate dynamic range required for the experiment. The cells are of "plug and play" design, so once tested on the fast-turnaround platform, the entire cell can be transferred to one of the demagnetization instruments. ***Table 2.2.4.1*** *summarizes the present and future capabilities, which are described later in this section.*

Proposals for magnet time may be submitted at any time, and contact/discussions with staff is recommended prior to submission. Users work with the staff scientists to mount and tune the experiments on site, and when the experiments begin, most users have the staff perform the instant-to-instant steps while the users are consulting from off-site locations. This arrangement is particularly effective when the experiments span long periods of time due to the nature of these experiments at the extremes of parameter space.

Table 2.2.4.1. The instrumentation available in the MagLab High B/T Facility tabulated, and their unique combination of temperature, magnetic field, and techniques are highlighted. Specialty shielding and filtering of the equipment provides the ultraquiet electromagnetic interference environment.

Equipment	Features	Supported Research
Bay 3: 16.5T superconducting magnet, 20mm dia. sample space	Temperatures ≤ 1mK, by 8T demag of $PrNi_5$ stage	Magnetization, quantum transport, torsional oscillator, viscosity, specific heat, dielectric, MEMS
Bay 2: 8T superconducting magnet, 32mm dia. sample space	Temperatures ≤ 0.5mK, by 8T demag of Copper stage	NMR, quantum transport, ultrasound, capacity, pressure cell, thermal transport
Bay 1: 8T superconducting magnet, 32mm dia. sample space[1]	Added in Fall 2019, Update/Revisions in progress, specs TBA for "nimble" instrument	Planned: quantum transport with rotation, novel magnetometry, scanning probes
Annex: 10T superconducting magnet, 25mm dia. sample space	Temperatures ≤ 50mK for fast- turnaround sample/cell transfer to Bays 1-3	Exploratory, novel technique development, sample/cell verification prior to use on Bays 1-3
High Bay Convergence Lab: 18.8T[2], 14.1T[1], and 9.4T[3] (89mm, room-temp bores)	Added in Fall 2019, providing AMRIS and High B/T teams common space and resources	Probe development for DNP NMR imaging, new refrigeration with enhanced magneto-caloric effect, materials growth far from equilibrium

[1] Operation projected in 2021, [2] Operation projected in fall 2020, [3] Operation projected in summer 2020

Unique Aspects of Instrumentation Capabilities Providing "Multimessenger" Information

Demountable and interchangeable cells provide "plug and play" possibilities that allow experiments to move seamlessly between platforms. The samples are immersed in pure liquid 3He to ensure excellent thermal contact to the thermal reservoir provided by the demagnetization stage, while sintered silver heat exchangers, constructed from 50µm Ag power, are also used to thermalize all electrical leads contacting the cells. Thermometry is linked to international scales using 3He melting curve capacitance-pressure cells to calibrate Pt NMR thermometry. Electrical conductivity studies are the most widely used experimental technique, and a World Record of 4mK for an electron temperature in a field of 3.5Tesla was set in 1999 [W. Pan et al., **Phys. Rev. Lett.** 83, 3530 (1999)] and remains a milestone even today. **Figure 2.2.4.1** shows a magnetic susceptibility cell, which provides an overall sketch of the geometries for all "plug and play" cells. **Table 2.2.4.1** provides an overview of the various "library" techniques available for users, and the staff are prepared to work with users who may have special design and measuring protocols. Overall, these resources provide users with "multimessenger" data sets at the extremes of temperature – magnetic field phase space.

Other specialized instrumentation – A compact user-friendly 3He purifier is available and operates with a simple charcoal absorption column that is inserted in a liquid helium transport dewar. By adjusting the position in the dewar, the temperature changes all 3He to be distilled, resulting in 3He with impurities at the few ppm level. This station provides an important service for colleagues to recover expensive 3He that may have been mixed with other gasses. This system is operated by undergraduate students working in the lab of Yoonseok Lee.

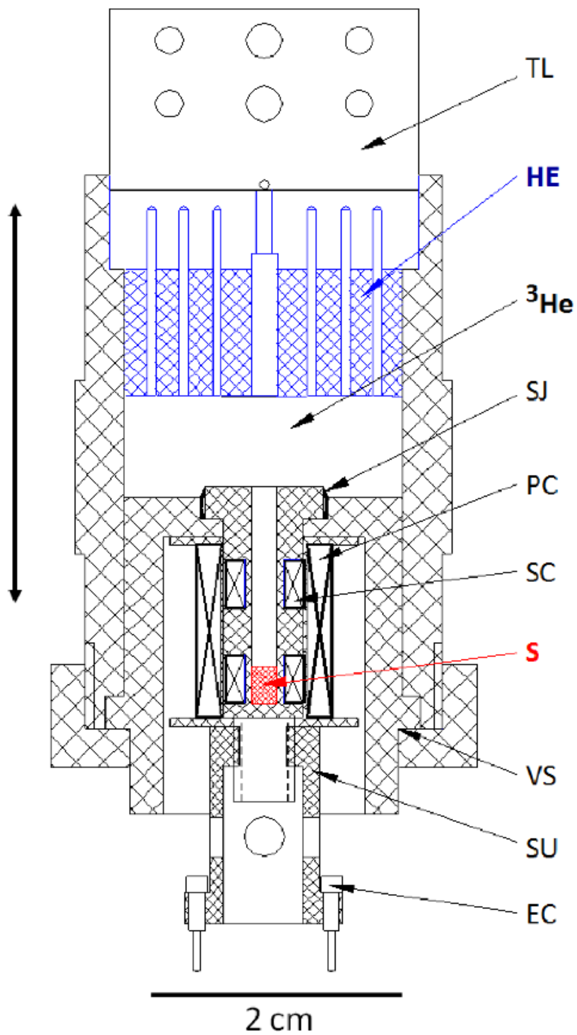


Figure 2.2.4.1: An example of an ac magnetic susceptibility cell. TL = thermal link, HE = heat exchanger, 3He = pure 3He insures thermal contact, SJ = sealed joint, PC = primary coil, SC = secondary coil, S = sample, VS = vacuum seal, SU= screw union, and EC = electrical connection. The double headed arrow represents the magnetic field orientation.

Facility Developments and Enhancements

New Staff and Staffing Updates - In June 2018, long time staff member, Jian-Sheng Xia, who joined the HBT team when the MagLab was founded, retired. After an international search spanning 2018-2019, this position was filled when Lucia Steinke arrived in Gainesville in September 2019 and joined the High B/T Facility and Department of Physics faculty as an Associate Scientist. In August 2019, Neil Sullivan, who was instrumental in establishing UF involvement at the very start of the MagLab and who served as the co-PI of the grant for numerous granting periods, stepped aside from being the director of the High B/T Facility, and Mark Meisel agreed to assume this role. As a part of this change, the UF Vice President for Research David Norton provided a new Scientist position and significant equipment funding, which was matched by the MagLab, for opening Bay 1 in the Microkelvin Laboratory as a new, "nimble" instrument in the repertoire of High B/T Facility, see **Table 2.2.4.1.** By the end of 2019, an international search was underway to identify candidates for this new assistant/associate scientist position.

In January 2019, Dominique Laroche joined the Department of Physics as an assistant professor, with an affiliation with the MagLab High B/T Facility. The search for this position was authorized by the UF Provost's Office in fall 2017 as one of two new lines made available to explicitly support MagLab operations at UF. Dominique specializes in design and fabrication of quantum devices coupled at nanoscales and operating at low temperatures and in magnetic fields. As a graduate student in the Guillaume Gervais group at McGill University in Montreal, Dominque used the High B/T Facility as an extended term visitor. In August 2019, Xiao-Xiao Zhang joined the Department of Physics as an Assistant Professor, with an affiliation with the MagLab High B/T and High Bay Convergence Labs. Xiao-Xiao employs a wide-range of optical techniques to study two-dimensional and related systems. As a graduate student at Columbia University while working at Stanford University, Xiao-Xiao performed optical experiments with Dmitry Smirnov, who is a staff scientist with the MagLab DC Facility.

In summary and at the end of 2019, the full-time staffing of the High B/T Facility was Associate Scientist Lucia Steinke, Assistant Scientist Chao Huan, Senior Engineer Naoto Masuhara, and Postdoctoral Researcher Andrew Woods, while a search continues for a new Assistant/Associate Scientist to join the team in 2020. The experimental faculty members in the Department of Physics, also affiliated with the MagLab High B/T Facility, are James Hamlin, Dominique Laroche, Yoon Lee, Mark Meisel, Neil Sullivan, Yasu Takano, and Xiao-Xiao Zhang. This team has close connections with the theoretical faculty members Peter Hirschfeld, Dmitrii Maslov, Chris Stanton and Yuxuan Wang, whose research includes high magnetic field and low temperature research on superconductors, strongly correlated electron systems, semiconductors and topological phases.

New MagLab High Bay Convergence Lab at UF – Along with the new scientist position funded by the UF VP for Research, the MagLab High B/T Facility was provided with a large, high bay research space, **Figure 2.2.4.2.**, that had previously been used by the experimental high energy group to design, construct, debug and assemble the outer detection chambers for the CMS at CERN. This space was cleared by the end of 2019 and is being configured for operations scheduled to start during summer 2020.

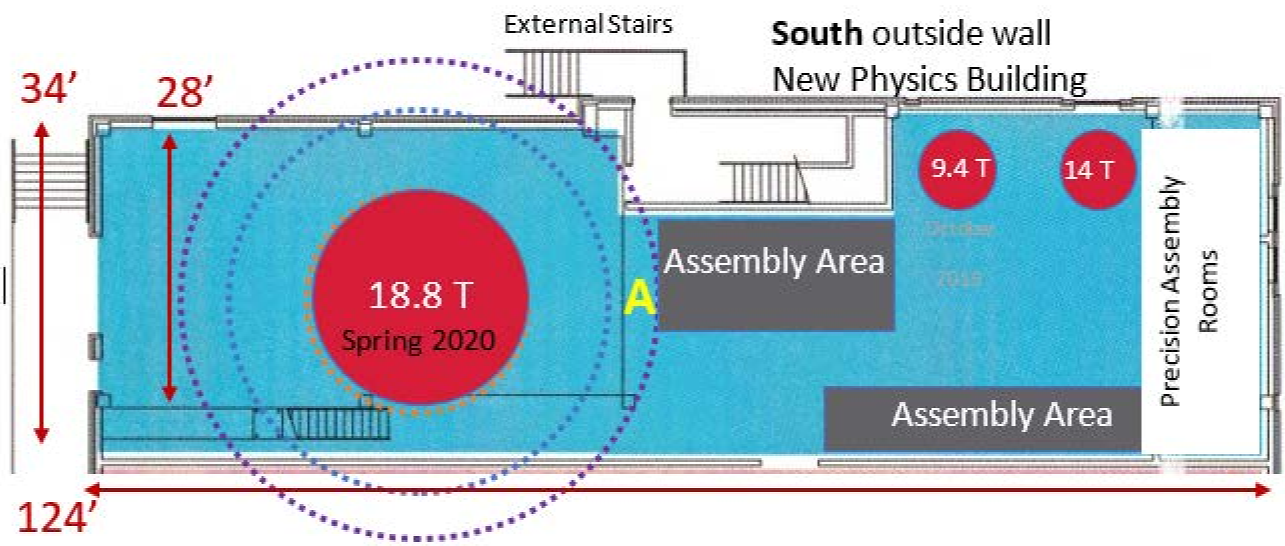


Figure 2.2.4.2: The anticipated general layout of the main floor of the new MagLab High Bay Convergence Lab. Three NMR quality superconducting magnetic systems, each with 89mm room-temperature bores provide a basis of new probe development and expanded scientific opportunities as the MagLab AMRIS and High B/T Facilities share common space. The left-half of the lab has 22 feet of clearance and a 10-ton tracking crane, and the 18.8T systems is expected to arrive in spring 2020 and to be operational by fall 2020. The 9.4T systems is expected to be moved and operational during summer 2020, and the 14T instrument is expected to arrive by the end of summer 2020.

Research Highlights

Studies of Novel Phases of 3He in Extreme Conditions - The confinement of quantum fluids to nanoscale dimensions, where the thermal de Broglie wavelength is comparable to the channel size, has been predicted to lead to new quantum states. In particular, strong correlations in one-dimension make all excitations collective and the properties of the system must be described in terms of Tomonaga–Luttinger liquid (TLL) physics. Exploring these quantum states beyond electronic materials is important, and 3He provides an excellent model system as the Coulomb repulsion is not present.

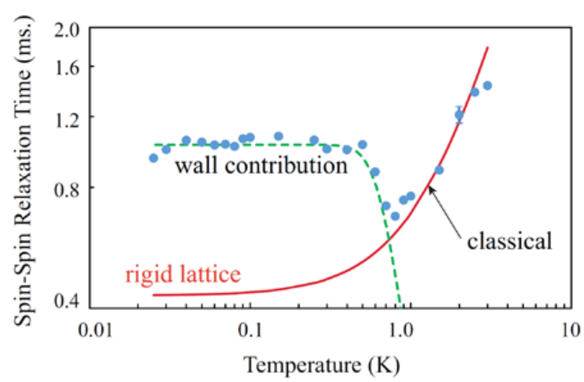


Figure 2.2.4.3: Variation of the nuclear spin–spin relaxation time with temperature for 3He in MCM-41 plated with 4He. The solid red line is the temperature dependence calculated for a classical system, and the broken green line is for quantum tunneling of a small number of 3He atoms in the 4He in the wall layer. Taken from C. Huan et al., *J. Low Temp. Phys.* (available online, 30 Jan 2020), doi:10.1007/s10909-020-02358-w.

Specifically, the MagLab High B/T Facility provides the low temperature, magnetic field, and electromagnetically quiet environment where NMR experiments can be performed on 3He confined to nanotubes available in a commercially available filter known as MCM-41. For the case when the walls of the nanotubes are plated with 4He, the dynamical response of the 3He atoms was obtained from measurements of the nuclear spin–spin relaxation time (known at T2), which probes the low frequency spectrum of the 3He motion. An unusual minimum in the relaxation time was detected, **Figure 2.2.4.3**, and is different from the temperature dependence observed for the nuclear spin–lattice relaxation time (known at T1). This difference clearly shows that the dynamics cannot be described in terms of a unique correlation or diffusion time, which is a feature expected for a system governed by Tomonaga–Luttinger liquid physics.

With the sample arrangement characterized, the studies are poised for the NMR studies to be extended well below 10mK. The research team consists of Don Candela (University of Massachusetts, Amherst) and MagLab High B/T members Chao Huan, Naoto Masuhara, and Neil S. Sullivan, and the instrumentation being used was made possible by a MagLab User Collaboration Grants Program (UCGP).

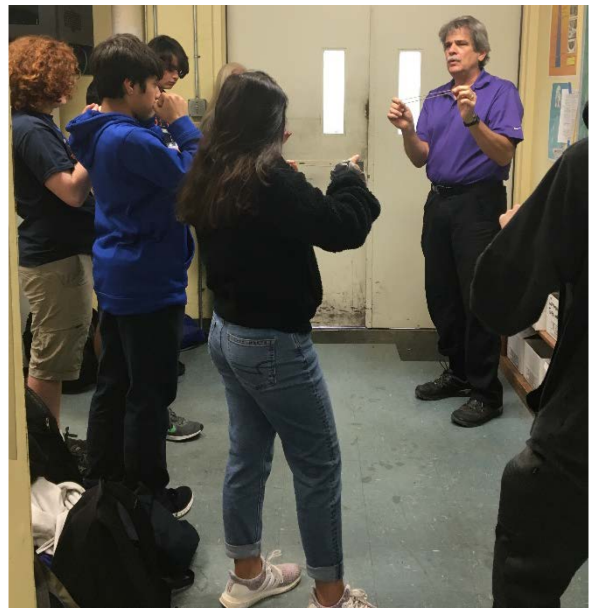


Figure 2.2.4.4: As one of several hands-on activities used during tours, Mark Meisel discusses how a cartoon model of the polymer chains in a relaxed and stretched rubber band serve as simple analogues of adiabatic demagnetization, a magnetic refrigeration technique that is employed to cool samples to ultralow temperatures in the facility.

Outreach to Generate New Proposal-Progress on STEM and Building User Community

Engaging with teachers and school groups is an annual practice at High B/T, and this year, Mark Meisel, Lucia Steinke and Naoto Masuhara led eight facility tours, reaching 75 high school students and their teachers from schools as far away as Tampa, FL. High B/T and AMRIS staff also participated in four Family Science Nights for local Title 1 middle and elementary schools, reaching approximately 500 students; presented at three career fairs, reaching an additional 300 middle and high school students; judged posters from 40 high school students at the Florida Regional Junior Science, Engineering, and Humanities Symposium, held at the University of Florida campus; and judged the science fair for 60 sixth through eigth graders at Fort Clarke Middle School (**Figure 2.2.4.4)**.

This year, the Women in Science and Engineering (WiSE) Girls spring break camp was organized by AMRIS employee Malathy Elumalai. This weeklong camp brought 14 middle school girls from Alachua County to the University of Florida to learn about a variety of different sciences and included a tour and magnet demonstration at the High B/T Facility.

5. ICR Facility

During 2019, the Fourier Transform Ion Cyclotron Resonance (ICR) Mass Spectrometry program continued instrument and technique development as well as pursuing novel applications of FT-ICR mass spectrometry. These methods are made available to external users through the NSF National High-Field FT-ICR Mass Spectrometry Facility. The facility features seven staff scientists who support instrumentation, software, biological, petrochemical and environmental applications, as well as a machinist, technician and several rotating postdocs, who are available to collaborate and/or assist with projects.

Unique Aspects of Instrumentation Capabilities

The Ion Cyclotron Resonance facility provides operations for sample analysis that requires the ultrahigh resolution ($m/\Delta m_{50\%}$ > 1,000,000 at *m*/z 500, where $\Delta m_{50\%}$ is the full mass spectral peak width at half-maximum peak height) and sub-ppm mass accuracy only achievable by FT-ICR MS coupled to high magnetic fields. The facility's four FT-ICR mass spectrometers feature high magnetic fields up to 21 tesla, and are compatible with multiple ionization and fragmentation techniques (**Table 2.2.5.1**).

Table 2.2.5.1: ICR Systems at the MagLab in Tallahassee

Field (T), Bore (mm)	Homogeneity (ppm)	Ionization Techniques
21, 123	< 1	ESI, APPI, MALDI
14.5, 104	1	ESI, APPI, MALDI
9.4, 220	1	ESI, APPI
9.4, 155	1	FD, LD

Facility Developments and Enhancements

The ICR facility continues to enhance the capabilities of the first 21 tesla Fourier transform ion cyclotron resonance mass spectrometer. The 21 tesla magnet is the highest field superconducting magnet ever used for FT-ICR and features high spatial homogeneity, high temporal stability and negligible liquid helium consumption (**Figure 2.2.5.1**) (*J. Am. Soc. Mass Spectrom*., 26, 1626-1632 (2015)).

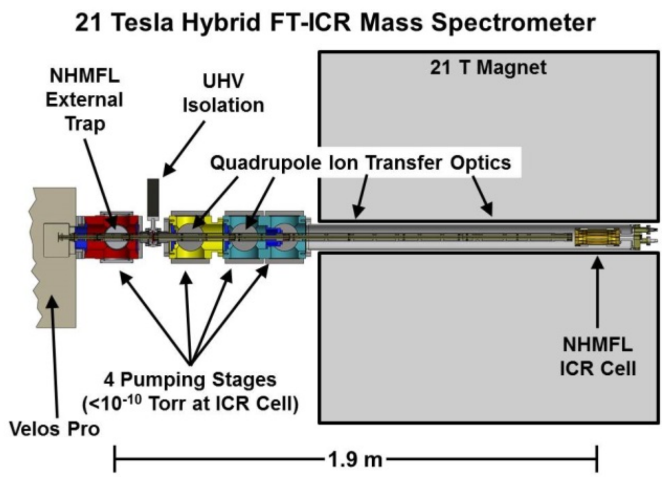


Figure 2.2.5.1 (right): Schematic of the 21 tesla FT-ICR mass spectrometer. Approximately half of the magnet cross-section is shown. Differentially pumped vacuum chambers are shown in red, yellow and blue (the blue chamber contains two differentially pumped regions, the second of which includes the ICR cell). The scale at the bottom shows the approximate distance from the external quadrupole trap to the ICR cell.

Mass resolving power of 150,000 ($m/\Delta m_{50\%}$) is achieved for bovine serum albumin (66 kDa) for a 0.38 second detection period (see **Figure 2.2.5.2**). For complex mixtures such as petroleum crude oil or natural organic matter, mass resolving power greater than 2,700,000 at m/z 400 is routinely achievable, and broadband mass measurement accuracy is typically less than 80 ppb rms. Analysis of electron transfer dissociation spectra results in 87% sequence coverage for carbonic anhydrase. Proton-transfer reactions (PTR) and parallel ion parking (PIP) have been added to the instrument to improve protein detection sensitivity and sequence coverage. The instrument is part of the NSF High-Field FT-ICR User Facility and is available free of charge to qualified users. The instrument includes a commercial dual linear quadrupole trap front end that features high sensitivity, precise control of trapped ion number and collisional and electron transfer dissociation. A third linear quadrupole trap offers high ion capacity and ejection efficiency, and rf quadrupole ion injection optics deliver ions to a novel dynamically harmonized ICR cell. We have improved the cell performance by simultaneously optimizing the quadrupolarity of the trapping field and decreasing the cell capacitance for higher detection sensitivity.

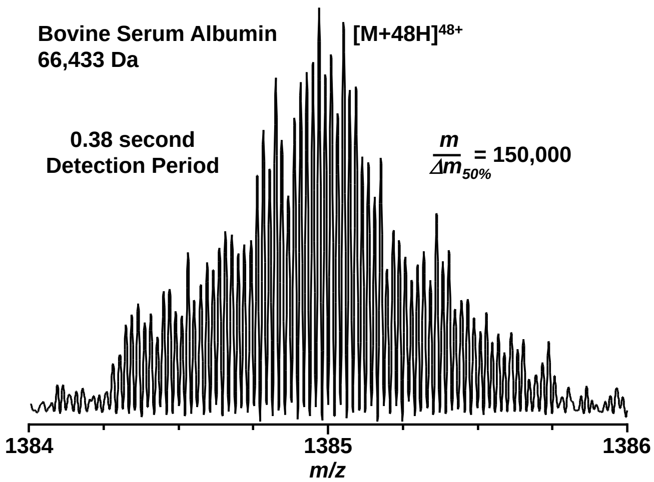


Figure 2.2.5.2: Single-scan electrospray FT-ICR mass spectrum of the isolated 48+ charge state of bovine serum albumin following a 12s detection period. Mass resolving power is approximately 2,000,000, and the signal-to-noise ratio of the most abundant peak is greater than 500:1. The ion accumulation period was 250ms and the ion target was 5,000,000.

An actively shielded 14.5T, 104mm bore system offers high mass measurement accuracy (<150 parts-per-billion rms error) and very high combination of scan rate and mass resolving power (second only to the 21 Tesla system). The spectrometer features electrospray, atmospheric pressure photoionization (APPI), atmospheric pressure chemical ionization sources (APCI); linear quadrupole trap for external ion storage, mass selection and collisional dissociation (CAD); and automatic gain control (AGC) for accurate and precise control of charge delivered to the ICR cell. We have upgraded this system with a novel ICR cell that detects at triple the ion cyclotron frequency, which increases mass resolving power threefold for the same detection period. We have also added proton-transfer reactions (PTR) and parallel ion parking PIP) for improved protein detection sensitivity and sequence coverage.

The 9.4T, passively shielded, 220mm bore system offers a unique combination of mass resolving power (m/Δm = 8,000,000 at mass 9,000 Da) and dynamic range (>10,000:1), as well as high mass range, mass accuracy, dual-electrospray source for accurate internal mass calibration, efficient tandem mass spectrometry (as high as MS^8) and long ion storage period (*J. Am. Soc. Mass Spectrom.,* **25**, 943-949 (2014)). When applied to compositionally complex organic mixtures such as dissolved organic matter (*Proc. Natl. Acad. Sci. USA,* **115**, 549-554 (2018); *Water Research,* **131**, 52-61 (2019); *Env. Sci. Technol.*, **50**, 3391-3398 (2016); *J. Geophys. Res. Biogeosci.*, **123**, 2998-3015 (2018), biofuels (*Fuel*, **216**, 341-348 (2018) and petroleum fractions (*Energy Fuels*, **32**, 12198-12204 (2018), mass "splits" as small as 0.3 mDa are readily separated and identified by FT-ICR MS *(Energy Fuels*, **30**, 3962-3966 (2016)). The magnet is passively shielded to allow proper function of all equipment and safety for users. The system features external mass selection prior to ion injection for further increase in dynamic range and rapid (<100 ms time scale) MS/MS (*Anal. Chem*., **75**, 3256-3262 (2003)). Available dissociation techniques include collision-induced (CID), infrared multiphoton-induced (IRMPD) (*J. Am. Soc. Mass Spectrom.,* **23**, 644-654 (2012)), and electron capture-induced (ECD) (*J. Phys. Chem. A*., **117**, 1189-1196 (2013)).

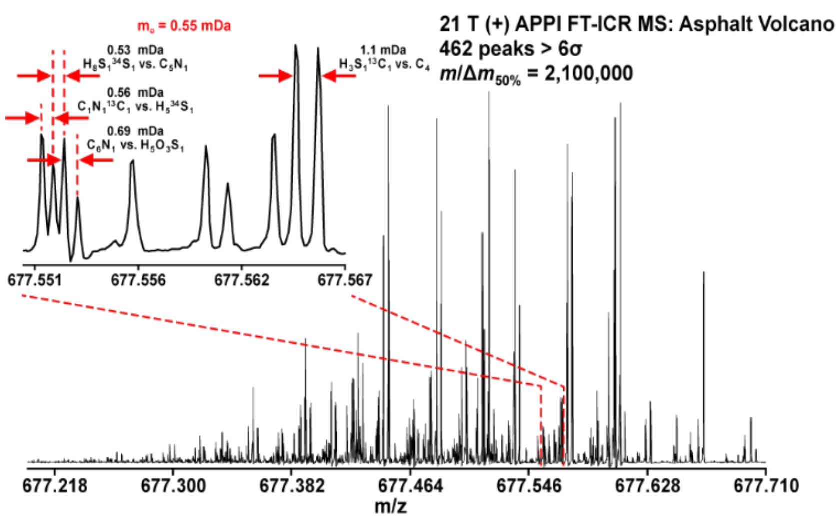


Figure 2.2.5.3: Mass scale expanded segment of 21T (+) APPI FT-ICR mass spectrum of an asphalt volcano sample after ion trap isolation. Inset illustrates the need for ultrahigh mass-resolving power to resolve ions with a mass difference on the order of the mass of an electron (me = 0.55mDa).

Major Research Activities and Discoveries

Complex mixture analysis by FT-ICR MS at 21T- The high mass-resolving power, mass accuracy, and dynamic range of FT-ICR enable resolution and confident elemental formula assignment for tens of thousands of unique components in complex organic mixtures. Here, we present complex mixture characterization on the newly developed MagLab 21T FT-ICR mass spectrometer. Combined with absorption-mode data processing, mass resolving power increases as much as a factor of two higher than conventional magnitude-mode display, an improvement otherwise requiring a more expensive increase in magnetic field strength. To the best of our knowledge, this mass spectrum represents the most peaks resolved and identified in a single spectrum of any kind, and represents the highest broadband resolving power for any petroleum mass spectrum, and emphasizes the need for ultrahigh resolving power achievable only by 21T FT-ICR MS sufficient to separate isobaric overlaps prevalent in complex seep samples (**Figure 2.2.5.3**, *Anal. Chem.*, 90, 2041-2047 (2018)).

Biological applications of FT-ICR MS include multiple myeloma research at 21T, including top-down proteomics (*Nature Methods*, 16, 939-940 (2019); *Anal. Chem.*, 91, 3263-3269 (2019); *Proteomics*, 19, 1800361. (2019) and diagnosis of hemoglobinopathy from hemoglobin blood (*Clinical Chem.*, 65, 986-994 (2019).

The current five-year survival rate for systemic ALamyloidosis or multiple myeloma is ~51%, indicating the urgent need for better diagnosis methods and treatment plans. Here, we describe highly specific and sensitive top-down and middle-down MS/MS methods owning the advantages of fast sample preparation, ultrahigh mass accuracy and extensive residue cleavages with 21 telsa FT−ICR MS/MS (**Figure 2.2.5.4)**. Unlike genomic testing, which requires bone marrow aspiration and may fail to identify all monoclonal immunoglobulins produced by the body, the present method requires only a blood draw. In addition, circulating monoclonal immunoglobulins spanning the entire population are analyzed and reflect the selection of germline sequence by B cells. The monoclonal immunoglobulin light chain FR2-CDR2-FR3 was sequenced by database-aided de novo MS/MS and 100% matched the gene sequencing result, except for two amino acids with isomeric counterparts, enabling ac-curate germline sequence classification. The monoclonalimmunoglobulin heavy chains were also classified into specific germline sequences based on the present method. This work represents the first application of top/middle-down MS/MS sequencing of endogenous human monoclonal immunoglobulins with polyclonal immunoglobulins background (*Anal. Chem.*, 91, 3263-3269 (2019)).

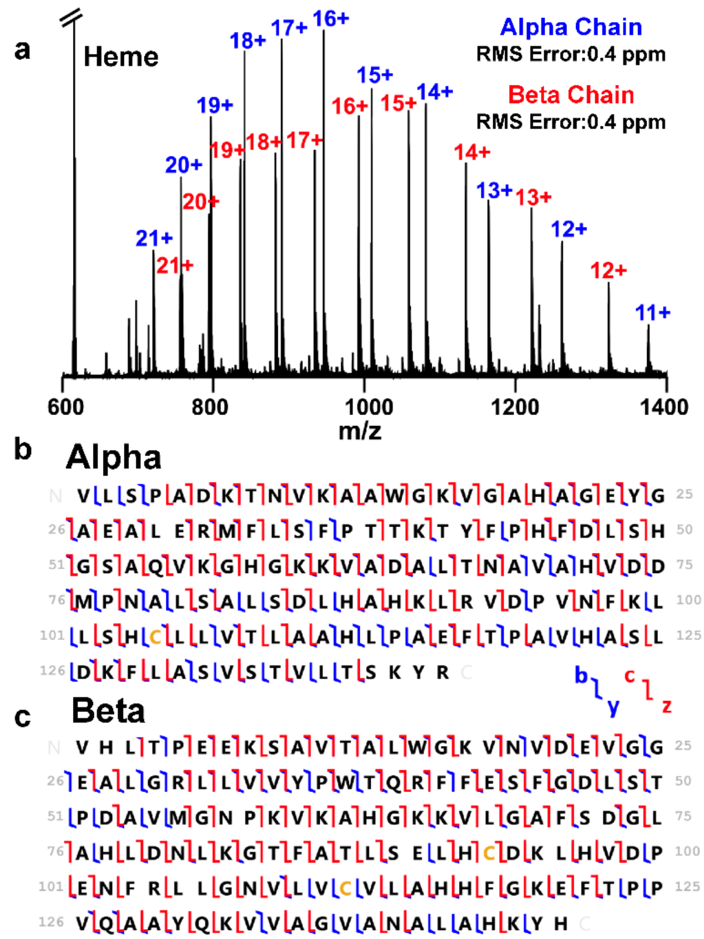


Figure 2.2.5.4 (right): Total ion chromatogram for AL amyloidosis patient sample I subunits after IdeS digestion and TCEP re-duction. Broadband mass spectra of mIg light chain, heavy chain Fc/2 and heavy chain Fd charge state distributions are shown as insets. The minor peak at ~19.3min corresponds to a light chain with one disul-fide bond reformation (isotopic distribution shifted to lower m/z by two isotopic peaks). Minor peaks between the light chain and heavy chain Fd correspond to the IdeS enzyme and slight carryover of the light chain.

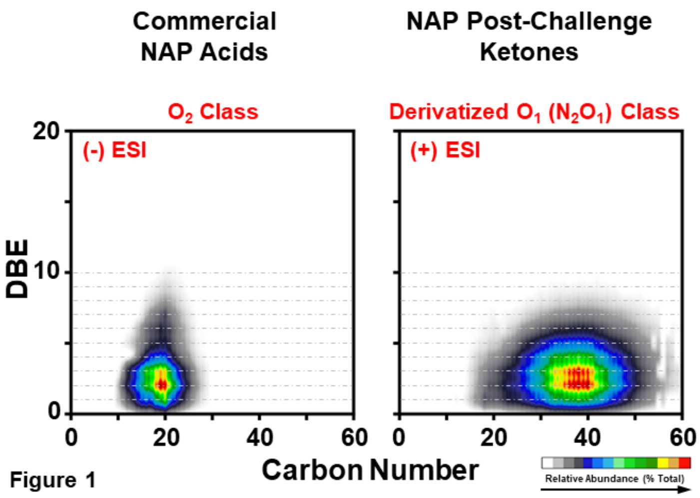


Figure 2.2.5.5: Isoabundance-contoured DBE versus carbon number plots for members of the O2 class (carboxylic acids) of the commercial NAP acids, based on (−) ESI FT-ICR MS (left) and of the derivatized O1 (N2O1) class from the DCM fraction of the NAP postchallenge sample based on (+) ESI FT-ICR MS (right). The acids have a carbon number centered around C19−20 and most abundant DBE of 2. The derivatized ke-tones/aldehydes have a carbon number range of ~C25−50, with the most abundant at DBE ≈ 2−3.

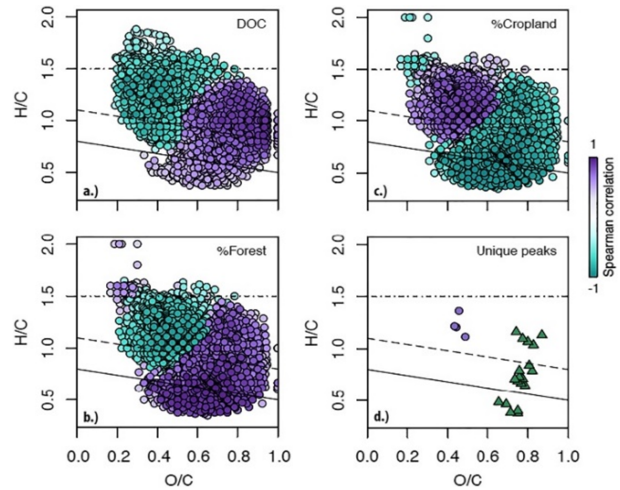


Figure 2.2.5.6: Spearman-rank correlations between the relative abundance of assigned molecular formulae and (a) dissolved organic carbon (DOC) concentration, (b) % forest in the catchment and (c) % cropland in the catchment. Colors represent the correlation coefficient (ρs) between the relative abundance of each molecular formula and the respective variable with purple formulae exhibiting positive correlations and green formulae exhibiting negative correlations. (d) Unique molecular formulae found solely in cropland samples (purple circles) and forest samples (green triangles).

The, 9.4T and 14.5T instruments are primed for immediate impact in *environmental and petro-chemical analysis***,** where previously intractably complex mixtures are common. The field of "petroleomics" has been developed largely due to the unique ability of high-field FT-ICR mass spectrometry to resolve and identify all of the components in petroleum samples (*Energy Fuels*, 33, 4420-4431 (2019), *Energy Fuels*, 33, 1882-1891 (2019), *Energy Fuels*, 33, 2018-2029 (2019).

Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS) is utilized for direct comparison of the chemical composition of *corrosive ketones*. Because the rate of naphthenic acid corrosion does not correlate with the concentration of acids, it has been proposed that a subset of naphthenic acids in petroleum to form ketones at corrosion temperatures (250−400°C), so characterization of ketones in corrosion fluids could potentially be used to identify the reactive acids that generated the iron naphthenate. Previous work with model acids has reported the development of a method to characterize such ketones by isolation with strong anion exchange separation and detection, with the assistance of ketone targeting derivatization reagent, by Fourier transform ion cyclotron resonance mass spectrometry. Here, we extend that method to characterize fractions may be more corrosive than others. The primary corrosion products (iron naphthenates) decompose the ketones formed in a corrosion test by use of commercially available naphthenic acids (NAP) in a flow-through reactor. The NAP corrosion test yields a single O1 ketones/aldehydes distribution close to that toward predicted from the O2 acids distribution before corrosion, with no bias in the carbon number and a slight bias lower double bond equivalents in the reactive acids detected. Ketone distributions did not appear to change over the 24-h test. With a fluid residence time of only ~30 min at reactor temperature, the results suggest that the ketones were formed rapidly beneath an FeS scale. (**Figure 2.2.5.5),** *Energy Fuels*, 33, 4946-4950 (2019). *Dissolved Organic Matter (DOM)* consists of soluble organic materials derived from the partial decomposition of organic materials (*Water. Res*, 166, 115048 (2019)); *J. Geophys. Res. Biogeosci*., 124, 1637-1650 (2019); *Geochim. Cosmochem. Acta*, 244, 216-228 (2019); *J. Geophys. Res. Biogeosci*., 124, 1545-1559 (2019); *Biogeochem*, 142, 281-298 (2019); *J. Geophys. Res. Biogeosci*., 124, 2021-2038 (2019). Agriculture is one of the major human impacts on Earth. Croplands and pastures currently occupy approximately 40% of the Earth's land surface, and their area is continuing to expand and intensify particularly in the tropics. Dr. Spencer's group examined the impacts of cropland expansion in Amazon Basin headwater streams in terms of dissolved organic carbon (DOC) concentration and dissolved organic matter (DOM) composition via ultrahigh-resolution mass spectrometry at the MagLab. Streams draining croplands had lower DOC concentrations and DOM molecular signatures enriched in N- and S-containing formula in comparison to forested streams. Cropland streams were also enriched in aliphatic, peptide-like and highly unsaturated and phenolic (low O/C) compound categories in comparison to forest streams (enriched in polyphenolics, condensed aromatics and highly unsaturated and phenolic [high O/C] compound categories) indicative of the shifting of sources from organic-rich surface soils and litter layers to autochthonous and more microbial biomass. Distinct molecular assemblages were strongly correlated with cropland and forest catchments **(Figure 2.2.5.6**), highlighting headwater streams as sentinels for detecting change. On investigation of unique molecular formulae present in only cropland sites, four cropland markers provided the ability to track agricultural impacts in the region. Overall, these patterns indicate reduced organic matter inputs in croplands and greater microbial degradation at these sites leading to declining DOC concentrations, and DOM of more microbial character in receiving streams that is more biolabile, with clear ramifications for downstream ecology and biogeochemical cycles. (*J. Geophys. Res. Biogeosci*., 124, 1637-1650 (2019)).

Of the estimated 5 million barrels of crude oil released into the Gulf of Mexico from the Deepwater Horizon oil spill, a fraction washed ashore onto sandy beaches from Louisiana to the Florida panhandle. This study investigated the quantity of DOC and quality of DOM compounds that are produced when thin oil films were subjected to sunlight over time as well as their potential toxicity. The objectives for this study were to (1) quantify the amount of DOC produced from thin oil films over extended irradiation times, (2) examine changes in optical properties of DOMHC, (3)

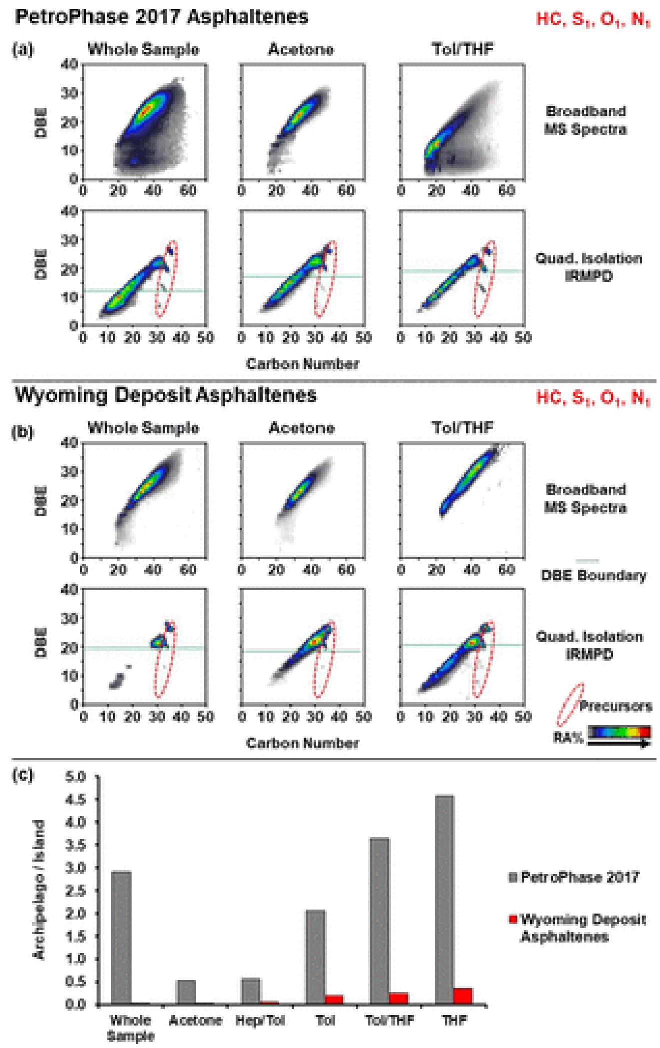


Figure 2.2.5.7: Isoabundance combined color-contoured plots of DBE versus carbon number for HC, S1, N1, and O1 for (a) PetroPhase 2017 and (b) Wyoming asphaltenes. Top rows in (a) and (b) present the broad-band spec-tra composition; bottom rows in (a) and (b) present the composition for precursor and fragment ions. (c) Relative ratio archipelago/island as a function of fraction for PetroPhase 2017 (gray bars) and Wyoming asphaltenes (red bars). RA denotes relative abundance. Green dotted lines show the DBE boundaries.

characterize DOMHC at the molecular level to determine changes in composition occurring at each exposure time period, and (4) examine relationships between acute toxicity per unit carbon and the chemical composition of DOMHC as a function of exposure time. Thereis a general paucity of laboratory studies surrounding the characterization, transformation, and toxicity of DOMHC produced from the photodissolution of petroleum. Identifying the optical and molecular composition of DOMHC and how it changes over time can lead to important inferences about how it influences bioavailability, dissolution, and toxicity in the environment. (*Env. Sci. Technol*., 53, 8235-8243 (2019)).

Asphaltene Chemistry. **Figure 2.2.5.7** summarizes the molecular composition and structure for PetroPhase 2017 and Wyoming asphaltenes accessed by positive-ion APPI Fourier transform ion cyclotron resonance (ICR) mass spectrometry and infrared multiphoton dissociation (IRMPD). **Figure 2.2.5.7** focuses on the most abundant fractions: acetone and Tol/THF. **Figure 2.2.5.7a** (top row) presents the isoabundance combined color-contoured plots of DBE versus carbon number for hydrocarbons (class HC, species containing only C and H), and monoheteroatomic classes S1, O1, and N1 (species containing C, H, and one heteroatom) for PetroPhase 2017. The whole PetroPhase 2017 sample exhibits atypical composition, as evidenced by the detection of species with DBE < 15, which is not consistent with the Yen–Mullins model that defines asphaltenes as highly aromatic/alkyl-deficient species. The PetroPhase 2017 acetone fraction, that with the highest ionization efficiency in AP-PI, is enriched with compounds at the classical asphaltene compositional space, whereas the composition of the Tol/THF fraction, with significantly lower ionization efficiency, shifts to lower atypical DBE values. On the other hand, the molecular composition of whole Wyoming asphaltenes (**Figure 2.2.5.7b**, top row, left) is typical, enriched with species with DBE > 20 and few carbon atoms in alkyl side chains, as indicated by the narrow range of carbon number for each DBE value. The acetone fraction, also with the highest ionization efficiency, resembles the composition of the whole sample, and the composition of the Tol/THF fraction, with lower ionization efficiency, shifts to higher DBE values with a lower content of alkyl chains (*Energy Fuels*, 33, 3, 1882-1891 (2019)).

Endohedral metallofullerenes, which are metal-encapsulated nanoscale carbon cages, are of particular interest because of their unique properties that offer promise in biomedicine and photovoltaics. An understanding of chemical formation mechanisms is essential to achieve effective yields and targeted products. One of the most challenging endeavors is synthesis of molecular nanocarbon. Nevertheless, the mechanism of formation from metal-doped graphite has largely eluded experimental study, because harsh synthetic methods are required to obtain them (*Nat. Commun.* **5:5844**, 1-8 (2014); *Carbon*¸ **129**, 750-757 (2018)).

Facility Plans and Directions

The ICR facility will continue to expand its user facility, particularly to add capabilities to the world's first 21 tesla FT-ICR mass spectrometer. We will continue to develop novel protein fragmentation methods to im-prove protein sequence coverage, including proton transfer reactions and parallel ion parking. We will add online liquid chromatography methods for complex mixture analysis that will be applied to a wide array of bi-ogeochemistry and emerging environmental contaminant analyses. Finally, we will continue to develop ICR frequency-multiple detection capabilities for improved resolving power and data acquisition rate.

Outreach to Generate New Proposal-Progress on STEM and Building User Community

The ICR program had 26 new principal investigators in 2019. The ICR program also enhanced its undergraduate research and outreach program for six undergraduate scientists. The ICR program in 2018 supported the attendance of research faculty, postdoctoral associates and graduate, undergraduate, and high school students at numerous national conferences to present current results.

Facility Operations Schedule

The ICR facility operates year-round, with weekend instrument scheduled. Two shifts (eight hours each) are scheduled for each instrument year-round, including holiday shutdowns, which are utilized for routine instrument maintenance. In addition, the lab-wide power outage December 16 -20, 2019, required all ICR instruments to be shut down with no instrument usage during that time.

The Future Fuel Institute

The Future Fuels Institute completed its seventh full year in 2019 to support research to address challenges associated with petroleum production, processing and upgrading. The Future Fuels Institute supported one fulltime technician and 1.5 fulltime research faculty to pursue analytical method development and analytical support services. Additionally, the FFI partners with two instrument manufacturers (Leco Instruments, Waters Instrument Company) for the evaluation of state-of-the-art instrumentation prior to commercial release.

6. NMR Facility

The NMR and MRI User Program in Tallahassee is a partner with the AMRIS User Program at the University of Florida, Gainesville. The specialty of the Tallahassee's facility is biological and materials solid state NMR spectroscopy, although we do some solution NMR and MRI. Our flagship 900MHz ultrawide bore spectrometer is the world's highest field instrument for in vivo imaging and spectroscopy. This past year we sailed past 100 publications from this awesome magnet designed and constructed at the MagLab.

The Series Connected Hybrid (SCH) magnet (35.2 T and 1500 MHz) operates for solid state NMR in an approximate eight-hour shift four days a week for approximately 30 weeks in the year. The SCH spectra of quadrupolar nuclei are spectacular, and the instrument is having a major impact in the materials research arena. Progress is also being made with its impact in biological studies of proteins, but the spectroscopy of spin ½ nuclei such as Magic Angle Sample spinning 1H, 13C and 15N spectroscopy has been very challenging due to magnet instabilities of as little as a few tenths of a ppm – i.e., better stability than the magnet's design specifications.

Our 600MHz Dynamic Nuclear Polarization (DNP) instrument is drawing many high-profile users and generating excellent publications. New probes for DNP are under construction that will add to the unique capabilities of this facility. In addition, this facility offers 10 more superconducting instruments including three 800MHz instruments, four 600MHz instruments and lower field NMRs that provide users with excellent capabilities in solid state NMR and MRI.

Unique Aspects of Instrumentation Capabilities

In our previous annual report (2018) we reported on the first year of SCH operations. All of our users are accustomed to operating perfectly stable magnets, which can be run for a week or even several weeks of time (24 hours a day, seven days a week) to obtain a single multidimensional data set on a single sample. Here, we are restricted to an eight-hour shift, although spectra from day to day can be summed. While we reported that trips from field happened several times in our previous report – the power supply operations have improved with only the occasional tip from field. This is allowing for better signal averaging conditions on the SCH. The materials and biological small molecule research on the SCH has been very successful.

Facility Developments and Enhancements

The 600MHz solid state DNP system has been assembled around a wide bore field swept 600MHz magnet, a demo gyrotron, a used spectrometer from Bruker, and a home-built quasi-optic table and is now the DNP instrument in the country with the highest operational up-time thanks to superb scientific and engineering staff. As reported last year, numerous publications are being generated from this instrument and a very strong user program is in full swing.

Jeff Schiano's field stabilization unit is being refined and enhanced to give the SCH better and better field stability. However, this is dependent on a lock signal from the probe. The lock signal comes from a separate coil removed from the center of the field where the sample coil is located. However, the uniformity region of the SCH is small and we have been using larger small coils to enhance sensitivity (NMR is the lowest sensitivity, spectroscopic technique.). Consequently, the lock coil is on the border of the inhomogeneous region of the field limiting the stability and resolution of the instrument. However, a new 1.3mm rotor diameter for a Magic Angle Spinning (MAS) probe will permit 1H detection and hence much higher sensitivity. The smaller rotor and stator that spins the rotor will allow for an advantageous position of the lock coil and better stability.

Both 1.3mm and 0.70mm MAS probes have been developed for 800MHz systems during the past year. These probes have the potential to revolutionize biological solid state NMR in much the same way that solution NMR was revolutionized in the 1980s leading to 20% of the unique protein structures deposited in the Protein Data Bank. These small rotors also mean that only small quantities of protein have to be prepared, making the sample preparation a lot easier and a lot less costly.

Major Research Activities and Discoveries

Fred Mentink-Vigier in a collaboration between Univ. Grenoble Alpes, CEA CNRS, AMRIS and NMR/MRI user facilities recent numerical approaches have profoundly improved the basic understanding of the polarization transfer mechanism used to achieve the great DNP sensitivity enhancements. The results notably highlight how the polarizing agent structure and EPR characteristics affect the shape of the DNP field profile leading to predictions of DNP enhancement factors (Mentink-Vigier et al., 2019, *Phys. Chem. Chem. Phys.* 21(4), 2166-2176).

In a second DNP facility result, Prof. Wang from the LSU working with the NMR/MRI User Facility in Tallahassee achieved remarkable spectral sensitivity and resolution for characterizing cell wall components of three agricultural crops (maize, rice and switchgrass). The interface between xylan and and lignin units rich in methyl ethers were characterized (Kang et al., *Nat. Commun*. doi.org/10.1038/s41467-018-08252-0).

Last year we reported on the characterization of waters in the gramicidin pore based on 17O spectroscopy in the Series Connected Hybrid Magnet at 35.2T. This 17O spectroscopy has continued on a new project led by Professor R. Griffin from MIT with unique resolution of all four water molecules and therefore high resolution characterization of the quadrupolar coupling constants and asymmetry parameters of the four unique waters bound in crystals of Lanthanum Magnesium Nitrate Hydrate. This led to unique insights of the electronic environment in the crystal. (Keeler et al., *JPCB*, doi.org/10.1021/acs.jpcp. 9b02277).

Professor Mei Hong from MIT has used our 800MHz spectrometers for triple solid state NMR spectroscopy on the microtubule-binding protein tau that forms filaments characteristic of many neurodegenerative diseases. Here the authors investigated the global fold and dynamics of heparin-fibrillized 0N4R tau showing a b-sheet formation in the four repeat structures at the fibril core. (Dregeni et al., www.pnas.org/cgi/doi/10. 1073/pnas. 1906839116).

Facility Plans and Directions

There will be a change in management in the coming year as Tim Cross, who designed the facility and led it for all but three years since 1991, is retiring. We are very pleased to announce the Professor Robert Schurko, now a faculty member in the Department of Chemistry and Biochemistry and an expert in materials solid state NMR spectroscopy, will be taking over the leadership of the NMR facility in May, 2020.

For the past few years we have had at 500MHz, and more recently at 800MHz, 1.3mm Fast Magic Angle Spinning (Fast MAS) probes that can achieve, depending on the samples, between 50 and 60kHz revolution rates. These probes have been built at the MagLab using Bruker MAS stators. JEOL has provided us with two 0.7mm rotors and stators that can spin up to 110kHz. In the past year we have built a probe for 800MHz that in testing appears to be very good. This capability is now well known to permit 1H detection that vastly enhances NMR sensitivity over that of 13C detection. In the 1980's for solution NMR this development made possible the characterization of protein structures in aqueous solution – today solution NMR accounts for 12,000 protein structures in the Protein Data Bank. It is entirely possible that a similar scientific result will occur for Fast MAS solid state NMR.

Outreach to Generate New Proposal-Progress on STEM and Building User Community

Our primary mechanism for recruiting new users involves one-on-one contact with potential users at national and international meetings with follow up to bring those users here. All of our staff scientists go to important national and international meetings annually, and one of their tasks at these meetings is to identify new users and to follow up with them when they return to the MagLab. A greater challenge that we are beginning to work on is to recruit users who are not NMR spectroscopists, but scientists that could use NMR data for the science they do. This opens the MagLab facility to a much broader and more diverse community of biological and materials scientists.

Facility Operations Schedule

The NMR and MRI facility of the NHMFL is open 24/7 52 weeks of the year for all of its superconducting magnets.

The SCH is operational for NMR spectroscopy for ~30 hours/week and for ~30 weeks or a total of 900 hours.

7. Pulsed Field Facility

The National High Magnetic Field Laboratory – Pulsed Field Facility (NHMFL-PFF) is located at the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico. The NHMFL-PFF utilizes both LANL and U.S. Department of Energy (DOE) assets and resources to provide access to world record pulsed magnetic fields to scientists and engineers worldwide. The pulsed field user program provides researchers with both the highest research magnetic fields available, as well as robust scientific diagnostic tools engineered to operate in the transient pulsed magnetic field environment. The connection between the Pulsed Field Facility and the DC Facility is strong and complementary in expertise and diagnostics; often both facilities contribute to a given user's research. This is facilitated by the use of a common application process for the two facilities, by which experiments can be requested at either location under a single overarching scientific proposal. While achieving the highest research magnetic fields possible is the core capability of the NHMFL-PFF, we strive to maintain the very best high-field research environment by providing users with support from the world's leading experts in pulsed magnet science. All of our user support scientists are active researchers and collaborate with multiple users every year. A fully multiplexed (6-output) computer controlled, 4.0mega-Joule (32mF @ 16kV) capacitor bank system is at the heart of the short pulse magnet activities. Many thousands of 20-millisecond-long magnet pulses up to 65 tesla are fired each year for the user program, which accommodates approximately 150 different users each year. In addition to the workhorse short pulse magnets, we provide users with access to the highest nondestructive magnetic fields in the world. The energy necessary – hundreds of mega-Joules – to run these highest field magnets is provided by a 1.4 Gigawatt AC generator, a truly unique pulsed power supply. The AC rectification enables control of the pulsed power waveform, allowing for the optimization of the associated magnet systems – both the 100T multishot and 60T controlled waveform (long pulse) magnets – and sample diagnostics. Beyond 100T, users have access to the semi-destructive Single Turn magnet system, which produces 6 microsecond duration magnetic field pulses up to 300 tesla.

Unique Aspects of Instrumentation Capabilities

Table 2.2.7.1: Pulsed field magnets available to users at the NHMFL-PFF.

Capacitor Driven Pulsed Magnets				
Magnet System	**Field (T)**	**Bore (mm)**	**Duration (FWHM)**	**Supported Research**
Cell 1 Cell 2 Cell 3 Cell 4	65	15.5	20 ms	Magneto-optics (IR through UV) Magnetization (susceptibility, extraction, torque) Magnetotransport (DC – MHz, GHz Conductivity) Pulse Echo Ultrasound Spectroscopy Fiber Bragg Grating Dilatometry Temperature environments from 350mK to 300K For compatible techniques: Pressures up to 9GPa and in-situ sample rotation
Optics Cell	31.5	15	1 ms	THz Magneto-optics
Single Turn	300	10	3 μs	IR and FIR transmission and FBG dilatometry
Generator Driven Magnets				
Magnet System	**Field (T)**	**Bore (mm)**	**Duration (FWHM)**	**Supported Research**
100 T Multi-shot 60 T Controlled Waveform	101 60	10 32	15 ms 100 ms (plat-eau)	All techniques listed above Magnetothermal studies (heat capacity and magnetocaloric) FIR and THz optics Larger sample volumes

Table 2.2.7.1 lists the pulsed magnets available to users of the NHMFL-PFF. The short pulse magnets serve the majority of users with maximum fields in the 65T range. The 100T multi-shot magnet is the first and only magnet in the world to successfully perform a magnetic field pulsed to 100 tesla in a nondestructive manner. The expertise in pulsed power engineering and access to world-class materials scientists at both LANL and FSU focus attention on development and characterization of the best materials for magnets. The PFF at LANL is also home to the 60T Controlled Waveform (the "Long Pulse") magnet, which has the ability to customize pulse waveforms for optimal user research. The PFF also houses the 300T single turn magnet (development and installation funding provided by LANL), which provides users with access to fields in excess of 100T; routinely pulses are to 170T with a pulse duration of 6 microseconds. While optical studies, including Fiber Bragg Grating (FBG) dilatometry are most often the tool of choice in the single turn magnet, the system has recently been updated with an inductive contactless method enabling thin (micron thickness conductors) to be studied at these extremely high magnetic fields.

Figure 2.2.7.1: The removal of the 1.4GW motor-generator rotor in preparation for a full inspection at GE in Richmond, VA.

Facility Developments and Enhancements

In 2019 the most significant facility developments have revolved around the 1.4GW motor-generator and pulsed power infrastructure as anomalous vibrations and rotor resistances were detected by LANL engineers in May 2019. This lead to the inspection and eventual removal of the generator's rotor (**Figure 2.2.7.1**) and its return to GE in Richmond, VA for a more complete inspection.

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In 2019 the most significant facility developments have revolved around the 1.4GW motor-generator and pulsed power infrastructure as anomalous vibrations and rotor resistances were detected by LANL engineers in May 2019. This lead to the inspection and eventual removal of the generator's rotor (**Figure 2.2.7.1**) and its return to GE in Richmond, VA for a more complete inspection. In December, LANL management and engineers were onsite at GE to learn more about the current status of the rotor and the potential causes of the anomalies detected. As a result, user operations on the 100T magnet have been paused since May. Upgrades to the generator that were planned before this unscheduled pause have continued with the delivery of new drive and exciter at the end of the 2019. Progress has also continued on upgrades to the 100T outsert coils 1 and 2, which experience the highest stresses during the magnet's operation. These coils are being upgraded with CuNb conductor which will have a higher strength (~50%) than the existing glid-cop AL-60 wires currently in use for the 65T short pulse magnets. The use of higher strength wire will increase the field achievable by the outsert, and is expected to increase the magnet's lifetime as it will enable a more conservative operating margin. The final steps of overwrapping the coils is expected to be completed at LANL by mid-2020. In regards to the 60T controlled waveform magnet, wire fabrication has finally been completed for coils 3 and 4, but is still in progress for coil 7. This rebuild was delayed significantly between 2018 and mid-2019 due to a conductor that did not meet the quality requirements. Coils 3 and 4 are expected to be wound as soon as the upgraded coils 1 and 2 of the 100T insert are completed.

Figure 2.2.7.2: (a) The current 75T duplex magnet made of CuNb (left), next to a standard 65T short pulsed magnet made of AL-60 (right). (b) The cryogenic and experimental platform set-up for the duplex magnet.

After a "soft failure" in excess of 2J of the prototype duplex magnet (a magnet with two separately powered nested coils) in late 2018, the next generation duplex was successfully tested to failure just past a peak field of 75T. During this phase of commissioning the cryogenics, electronics, and data acquisition systems were completed for the system in preparation for the first user-based commissioning experiments in early 2020 (**Figure 2.2.7.2**). The duplex magnet with fields up to 75 T is expected to be available for user scheduling in the fall of 2020.

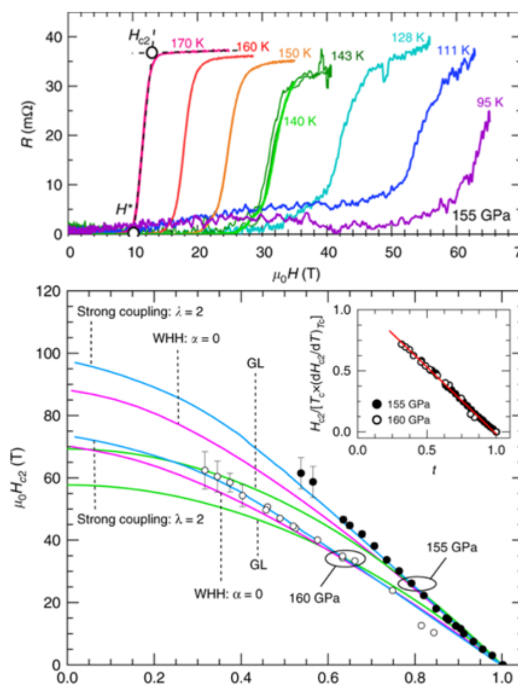


Figure 2.2.7.3: (Top) The resistance versus magnetic field behavior for the high temperature superconductor H_3S between 170K – 95K, under 155GPa of pressure, using pulsed magnetic fields up to 65T. (Bottom) The resulting phase diagram – the upper critical field H_{c2} as a function of reduced temperature t – is compared to various theoretical models.

Major Research Activities and Discoveries

The PFF continues to develop world-class experimental capabilities at the mili- to micro-second time scale necessary in pulsed magnetic fields. As part of this effort is the ability for users to measure samples under pressure in high magnetic fields. One such example of this meeting of extremes is a recent study to understand the mechanism of superconductivity close to room temperature. To do so, a team of researchers studied the superconductor H_3S, which required the application of extreme temperatures (T_c = 203K), pressures (160GPa) and magnetic fields (65T). The results of this study, which mapped out the temperature dependence of the upper critical field H_{c2} as a function of temperature using a diamond anvil cell (DAC), provides evidence that H_3S behaves as a strong-coupled, orbital-limited superconductor over the temperature and fields studied (**Figure 2.2.7.3**) – see S. Mozaffari, D. Sun, V. S. Minkov, A. P. Drozdov, D. Knyazev, J. B. Betts, M. Einaga, K. Shimizu, M. I. Eremets, L. Balicas, and F. F. Balakirev, "Superconducting phase diagram of H_3S under high magnetic fields", *Nature Communications* 10, 2522 (2019).

Research Highlights

Spin Liquid State and Topological Structural Defects in Hexagonal $TbInO_3$

Jaewook Kim, Xueyun Wang, Fei-Ting Huang, Yazhong Wang, Xiaochen Fang, Xuan Luo, Y. Li, Meixia Wu S. Mori, D. Kwok, Eun Deok Mun, V. S. Zapf and Sang-Wook Cheong, *Phys. Rev. X* **9**, 031005 (2019).

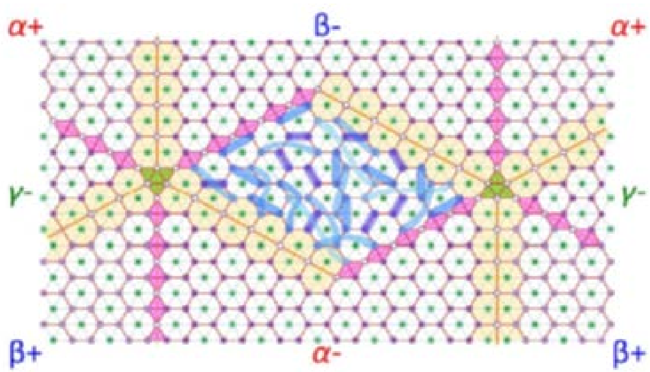


Figure 2.2.7.4: A schematic in-plane structure of $TbInO_3$ describing the structural and ferroelectric domains and domain walls. The innermost region (γ+) shows a snapshot of entangled spins (blue loops) in the spin liquid state. Other domains are shown as (α, β, γ, +, -) and they are delineated by domain walls with full and dashed orange lines, respectively. Only Tb1 and Tb2 ions are shown as green and purple circles, respectively. Dot and crossed circles denote the up and down displacements of Tb ions along the c axis, respectively. Blue and red lines are nearest-neighbor Tb1-Tb2 and Tb2-Tb2 bonds, respectively. There are two types of domain boundaries: a corner-sharing type (lines of magenta parallelograms) and an elongated type (lines of light yellow honeycombs).

$TbInO_3$ is a spin liquid candidate in which atomically thin structural-ferroelectric boundaries could create topological edge states of the spin liquids (**Figure 2.2.7.4**). Evidence for a spin liquid includes a strongly frustrated honeycomb structure of magnetic Tb ions that does not order down to 150mK in the specific heat, 100mK muon spin resonance, or up to 65 Tesla in magnetization while susceptibility and inelastic neutron scattering find exchange interactions below ~30K. Elastic neutron diffraction also does not find long-range order. A notable feature of this compound is atomically thin structural boundaries determined from our piezo force microscopy measurements and scanning tunneling electron microscopy on these single crystals. These boundaries could create edge states of the spin liquid, predicted to have topological properties and host Majorana fermions. These boundaries result from ferroelectricity. In this compound, the Indium atoms can trimerize and the Tb atoms can be displaced above or below the 2D plane, creating six different kinds of ferroelectric domains (α±, β±, γ±). The atomically sharp domain walls have different magnetic exchange interactions than the interior of the domains, creating magnetic edge states.

Record-Breaking Magnetoresistance at the Edge of a Microflake of Natural Graphite

C.E. Precker, J. Barzola-Quiquia, P.D. Esquinazi, M.K. Chan, M. Jaime, Z. Zhang, and M. Grundmann, *Advanced Engineering Materials* **21**, 1900991 (2019).

The electrical transport properties of bulk graphite, multigraphene, and single graphene layers show a variety of interesting phenomena expected to find applications in solar cells, supercapacitors, flexible transistors and sensors. Many of these applications derive from the unique band structure. Indeed, stacked graphene layers can lead to the formation of flat bands, opening the possibility of triggering high-temperature superconductivity or magnetic order. In their work, researchers from the Bloch Institute at Leipzig University, Germany, studied graphite samples formed by graphene layers held together by weak Van der Waals forces. The stacking order of the layers occurs naturally in either a hexagonal fashion, (Bernal-type with the graphene layer order ABABA), or a rhombohedral type (ABCABCA). Recently published work on the magnetoresistance of graphite samples of different thicknesses revealed that this property is directly related to the existence of 2D interfaces between crystalline regions with Bernal or rhombohedral stacking order. These 2D interfaces are also responsible for the metallic-like behavior of graphite. By placing several electrodes at the edge of a micrometer-sized Sri Lankan natural graphite sample at distances comparable to the size of the internal crystalline regions (**Figure 2.2.7.5**), the group led by Professor Esquinazi found record values for the change of the resistance with magnetic field. At low temperatures and at $B \sim 21$T, the magnetoresistance defined as MR(%) = 100%[R(B)-R(0)]/R(0) where B is the applied magnetic field reaches MR $\approx 10^7$%, exceeding by far all earlier reports for graphite, and comparable or even larger (at $T > 50$K) than the largest reported in any solid including the Weyl semimetals. The origin of this large MR lies in the existence of highly conducting 2D interfaces aligned parallel to the graphene planes. **Figure 2.2.7.5:** Sample preparation sketches: (a) mesoscopic graphite sample placed on a silicon substrate with a 150nm Si_3N_4 insulator layer on the top; (b) part of the graphite sample covered with a 200 nm thick SiN_x layer; (c) during the RIE exposure, only the uncovered area of the sample is removed; (d) sputtered chromium/gold electrodes were placed at different parts of the sample using electron beam lithography. The electrodes labeled "I" were used to apply the electrical current through the sample, and the other three electrodes were selected in pairs to measure the potential difference at different regions of the sample, being AB=5.7μm, AC=13.3μm, and BC=4.6μm; (e) 3D sketch of the sample with its electrodes at the edge, parallel to the c-axis of the graphite structure; (f) scanning electron microscopy image of part of the sample labeled U11 with part of its electrodes.

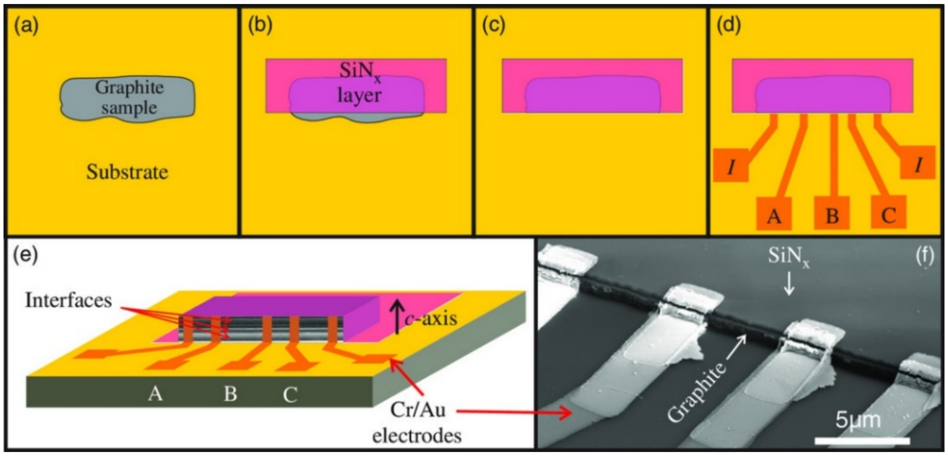


Figure 2.2.7.5: Sample preparation sketches: (a) mesoscopic graphite sample placed on a silicon substrate with a 150nm Si3N4 insulator layer on the top; (b) part of the graphite sample covered with a 200nm thick SiN_x layer; (c) during the RIE exposure, only the uncovered area of the sample is removed; (d) sputtered chromium/gold electrodes were placed at different parts of the sample using electron beam lithography. The electrodes labeled "I" were used to apply the electrical current through the sample, and the other three electrodes were selected in pairs to measure the potential difference at different regions of the sample, being AB=5.7μm, AC=13.3μm, and BC=4.6μm; (e) 3D sketch of the sample with its electrodes at the edge, parallel to the c-axis of the graphite structure; (f) scanning electron microscopy image of part of the sample labeled U11 with part of its electrodes.

Spin-lattice and electron-phonon coupling in 3d/5dhybrid Sr_3NiIrO_6

K. R. O'Neal, A. Paul, A. al-Wahish, K. D. Hughey, A. L. Blockmon, X. Luo, S.-W. Cheong, V. S. Zapf, C. V. Topping, J. Singleton, M. Ozerov, T. Birol, and J. L. Musfeldt *npj Quantum Materials* **4**, 48 (2019).

Sr_3NiIrO_6 displays one of the highest-known coercive magnetic fields: up to 55 Tesla is needed to switch the magnetization of this material between different branches of the magnetization vs magnetic field hysteresis loop. This material contains magnetic Ni^{2+} and Ir^{4+} in oxygen cages that alternate along chains. These spins order in a frustrated, partially disordered antiferromagnetic state that acquires a net magnetization with strong hysteresis in applied magnetic fields. Little is known about the physics behind this high coercivity, such as the importance of the lattice, domains or interchain interactions. The Ir^{4+} magnetic ion in this and similar materials exists in an unusual strongly spin-orbit coupled state that has been proposed to play an important role in the coercivity in this compound. In other magnets with high coercivity, spin-lattice coupling also usually plays a key role in pinning magnetic domains to particular directions. Thus, an important step towards achieving an understanding of coercivity in Sr_3NiIrO_6 is to determine the interplay between magnetic ordering, the Ir^{4+} spin and the lattice. We explore these here with magneto-optical measurements. By probing the optical absorption as a function of magnetic field up to 35T we can probe which vibrational modes of the lattice are sensitive to the magnetic fields. We identify the particular intra and inter-chain lattice modes that evolve with magnetic field and those that involve the Ir^{4+} ion and its oxygen octahedra. This knowledge takes us one important step closer to a full understanding of coercivity in this material.

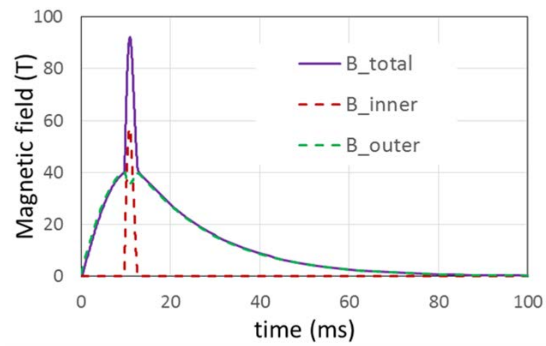


Figure 2.2.7.6: The magnetic field profile as a function of time planned for the inner and outer coils of the next duplex design which is intended to provide fields of up to 88T for user experiments.

Facility Plans and Directions

The Pulsed Field Facility, in concert with management at LANL and engineers at GE, will determine in the first half of 2020 the course of action for returning the motor-generator to service and bringing generator-driven magnet operations back online. Meanwhile, the exciter and rotor which were delivered at the end of 2019 will be installed by the end of 2020, and will be tested once the rotor is back on-site and operational.

In the absence of the generator driven magnets, focus has shifted to duplex magnets, one of which will continue with commissioning experiments throughout the first half of 2020. In addition to this 75T duplex magnet, which is anticipated to be available for user scheduling in the fall, a second duplex magnet is under design that will provide users with fields up to 88T, with a bore size (10mm) identical to that of the current 100T magnet. See **Figure 2.2.7.6** for the magnetic field profile as a function of time. Although this magnet will operate with a dB/dt that is four times higher than the 100T magnet, it will provide an alternative option for fields above 80T with a lower ripple and a much faster cooling time (one hour) than what is currently available at the NHMFL-PFF. This higher field duplex will be operated by a new low energy, high voltage 30kV, 1.2MJ capacitor bank that is anticipated to arrive in Q4 of 2020.

Additional improvements to the user program are anticipated to begin in Q2 with the redesign of the 65T short pulse magnet user cells, with the end goal being a more standardized experimental set-up that will increase the efficiency of experiments and provide for a more productive user experience. Aligned with this focus on a more productive user experience, is the planned installation of a glove box that will enable the mounting of air sensitive samples for experiments in pulsed magnetic fields, thereby increasing the diversity of materials capable of being studied in the high field environment of the pulsed field facility.

Outreach to Generate New Proposal-Progress on STEM and Building User Community
During 2019, the pulsed field facility staff took part in numerous outreach events, including the third annual Los Alamos National Laboratory Summer Physics Camp for Young Women, a free camp that introduces young women from Northern New Mexico communities to STEM disciplines via hands-on experiments and lectures (of which PFF-scientist Vivien Zapf participated in) and through tours of research facilities. The NHMFL-PFF tour was given by PFF-scientist Scott Crooker. Scott Crooker also gave electricity and magnetism demonstrations throughout the year at the local Bradbury Science Museum as part of the "Scientist in the Spotlight" Scientist Ambassador Academy, and gave a number of lectures at Penn State's Quantum Science Summer School on Monolayer Semiconductors, which seeks to train graduate students and postdocs in condensed matter physics and other related fields. As in years past, PFF scientists also visited local elementary and middle schools, providing presentations on the physics of magnetism and electricity.

Facility Operations Schedule
The Pulsed- and DC-Field Facilities solicit proposals through a common call three times a year to streamline the application process and ensure availability of resources (both staff scientist and magnets). Hours of operation for the large generator driven magnets as well as the new duplex magnet are from 8:00 a.m. to 5:00 p.m., Monday through Friday, while the 65T capacitor bank driven magnets are in use Monday through Friday 8:00 a.m. to 6:00 p.m., with extended after-hours of 6:00 p.m. to 11:00 p.m. upon request. Maintenance is scheduled each Monday from 8 a.m. to 10 a.m., or on an as needed basis. Generally, no more than three of the four short pulse magnet cells are scheduled for user experiments in a given week to enable rapid turnaround and continuation of an experiment following a magnet failure.

3. EDUCATION AND OUTREACH

3.1. EDUCATION AND OUTREACH

In 2019, the Education and Outreach efforts of the MagLab continued to reach thousands of students and members of the general public at all three sites and across the nation through outreach demonstrations including the National Science Teachers Association Conference and our website. The Center for Integrating Research and Learning (CIRL) conducts the K-16 educational activities for the MagLab as well as facilitates mentoring and professional development for undergraduates, graduate students and postdocs. Public Affairs focuses on community outreach and helping scientists communicate their research.

Diversity and Inclusion in Education and Outreach

Diversity and inclusion is a focal point of all of the MagLab's educational and outreach activities. **Table 3.1.1** highlights the demographics for our long-term programs (e.g. one week or longer).

Table 3.1.1: Diversity of Education Programs

2019	Total	% Women	% African American	% Hispanic	% American Indian/ Native Hawaiian
Research Experiences for Undergraduates (REU) summer	19 undergraduates	47%	5%	11%	0%
Research Experiences for Teachers (RET) summer	10 K-12 teachers	60%	10%	20%	10%
Middle School Mentorship (fall)	21 middle school students	48%	33%	14%	5%
Internship	34 (high school and college)	56%	12%	12%	0%
Camp TESLA (Two weeklong camps)	47 (middle school students)	45%	26%	6%	2%
SciGirls Coding Camp (One weeklong camp)	13 (middle school students)	100%	23%	NA	0%
SciGirls Discover Summer Camp (Two weeklong camps)	40 (middle school students)	100%	30%	10%	2%
SciGirls Quest Summer Camp (One two weeklong camp)	23 (middle school students)	100%	35%	9%	9%

K-12 Students

On-Site and Classroom Outreach conducted through CIRL

CIRL staff and MagLab scientists conduct outreach in local K-12 schools each year. The outreach is recorded according to the school year as opposed to the calendar year. During the 2018-2019 school year, CIRL's Director of K-12 Programs, Carlos Villa, provided outreach to almost 5,000 students from school districts in North Florida and Southwest Georgia. Title I schools made up the bulk of these visits, accounting for 70.4% of all outreach. CIRL offers six different types of outreach activities. The most requested activities in 2019: Build an Electromagnet, Magnet Exploration and the Static & Current Electricity activities. (For more information on the activities listed and all of CIRL's outreach activities, please visit the outreach website.) Elementary school students represented 47% of the visits, followed by middle school students (19%) and high school students (8%). (The remaining 26% were mixed grade groups.) The evaluation surveys are given to the classroom teachers who receive the program. All responding educators indicated on their survey that they learned instructional strategies for teaching science based on the presentation. They also indicated that they believed the structure of the outreach made the content more understandable to their students.

At the MagLab's UF facility, Kelly Deurling and Amy Howe conducted and facilitated outreach efforts during the year. UF personnel reached 2,551 students through classroom outreach including classroom visits and afterschool science nights. Of these visits, 60% of these were for Title I schools. Carlos reviewed the use of the outreach materials and shared K-12 outreach documents with personnel at UF. The six outreach activities and materials were restocked at the start of the school year in August. In 2019 the "Magnet Exploration" activity repeated as the most requested lesson (36% of classroom activities) and the "Build an Electromagnet" lesson was close behind (29% of classroom activities). Approximately 63% of these lessons were presented to elementary students, 20% for middle school students and the remaining 17% of the presentations being to middle school students.

K-12 Educational Outreach efforts at LANL continued in the New Mexico community. Scott Crooker, Ross McDonald, Doan Nguyen and other LANL staff presented magnet science at local elementary schools and participated in several "Scientist in the Spotlight" programs presented by the Bradbury Science Museum. They also participated in a program aimed at increasing girls' interest in STEM careers, working with high school girls in Santa Fe.

Figure 3.1.1: A Middle School Mentorship student in the MagLab's Materials Characterization Lab testing an I-beam.

Middle School Mentorship

The MagLab Middle School Mentorship Program continues to be one of our more competitive programs for applicants. In 2019, the program included 21 students from middle schools in Leon County (**Figure 3.1.1**). These students worked with 15 MagLab scientist mentors: Ernesto Bosque, Martha Chacón-Patiño, Shalinee Chikara, Daniel S. Davis, Elizabeth Green, Lloyd Engel, Alyssa Henderson, Amy McKenna, Abiola Temidayo Oloye, Dmitry Smirnov, Hans van Tol, Bob Walsh, Kaya Wei, Chad Weisbrod and Gary White. The students met their mentors every Friday morning for the entire fall semester. The program culminates in a poster presentation session attended by the students' family, teachers, principals and mentors. A full list of the 2019 participants and their projects can be found on our website and in **Table 3.1.2** below.

Table 3.1.2: 2019 Middle School Mentorship Participants and Projects

Participant	School	Research Area	Mentor
Nicholas Echevarry Cayden Scriven	*Florida State University School* *Raa Middle School*	Sublimation Turbine	Ernesto Bosque

Participant	School	Research Area	Mentor
Navya Kommu Velan Thanasekar	*Fairview Middle School* *Fairview Middle School*	Extraction of Essential Oils through Steam Distillation and Product Characterization by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry	Martha L. Chacón-Patiño
Laxmi McGuire Angela Watts	*Fariview Middle School* School of Arts & Sciences	Metronome Synchronization	Shalinee Chikara and Elizabeth Green
Alexandria Forbes Venkat Maddipoti	*Tallahassee School of Math and Science* Maclay School	Optimus Charger: Building a Wireless Transmission Circuit	Abiola Temidayo Oloye & Daniel Davis
Azavaughn Mosley-Simpson Bereket Mulugeta	*Florida A&M University School* Swift Creek Middle School	Measurements of Tuning Fork Crystals	Lloyd Engel
Ani Hatfield Abhigna Konanur	*Raa Middle School* *Fairview Middle School*	Piezo-electric Crystals (Rochelle Salt Crystals)	Alyssa Henderson and Kaya Wei
Noah Summerlin Kavya Kadhirvelu	*Cobb Middle School* *Fairview Middle School*	Floor Vibrations in the National MagLab	Dmitry Smirnov
Annika Kolar Sarah Pagan	*Fairview Middle School* Swift Creek Middle School	Free Radicals in Different Foods	Hans van Tol
Christian Ferguson	*Woodville School*	I'm Not Afraid of Roller Coasters! Here's Why…. (A 3-Point Bend Test on Two Different Style Beams)	Bob Walsh and Kyle Radcliff
Arshiya Desai Amia Wade	*Fairview Middle School* *Fort Braden School*	Extraction and Analysis of Dissolved Organic Matter From Local Water Bodies	Chad Weisbrod and Amy McKenna
Marvin Green III Asher Kasper	*Florida A&M University School* *Maclay School*	Arduino Controlled Chiller Monitor	Gary White

Note: Schools in italics are Title-1 schools

Summer Camp Programs

In 2019, CIRL housed five middle school summer camps (Camp TESLA, SciGirls Coding, SciGirls Discover and SciGirls Quest) reaching over 120 students. Carlos Villa oversees all of the summer camps and supervises the camp teachers.

To improve the recruitment of underrepresented minorities, Villa is evaluating the marketing strategy for the summer camps to determine how to improve recruitment efforts. Villa plans to work with camp teachers to ensure that all activities connect to the camper's real life experiences.

Camp TESLA

Camp TESLA (Technology, Engineering & Science in a Laboratory Atmosphere) is a one-week coed summer camp held every June for boys and girls interested in science. The camp activities are planned by camp teachers and highlight MagLab science and engineering research and/or disciplines. There are two identical sessions offered in back-to-back weeks. In 2019, 47 students participated in one of the two one-week sessions. Post camp evaluation surveys indicated that participants cited the following activities as positively changing their views of science and engineering: liquid nitrogen investigation, exploration of human electrophysiology and the construction of an electric motor. To make the camps more equitable for youth in our community, in 2020 Camp TESLA will mimic our SciGirls camps with a weeklong TESLA Discover and a two-weeks-long TESLA Quest camp (**Figure 3.1.2)**. The former will introduce youth to careers in STEM; particularly the diverse careers at the MagLab, and the latter will provide a deeper look at the world of research so that campers gain a deeper appreciation of the STEM careers around them.

Figure 3.1.2: Camp TESLA youth working on their water towers as part of an activity.

SciGirls Coding Camp

2019 was the third year for our SciGirls Coding Camp, which introduces middle school girls to coding and computer science, fields with a low representation of women **(Figure 3.1.3)**. This year's camp included thirteen middle school girls who developed coding projects. Post camp survey responses indicated that all of the participants mentioned how the camp helped them to realize their talents and connect those to computer programming. In October of 2019, Carlos Villa and Brooke Hobbs from Florida A&M University Developmental Research School (FAMU DRS) attended a SciGirls workshop at Twin Cities Public Television in in St. Paul, Minnesota, in order to be trained in the new SciGirls coding curriculum using Microbits as the coding tool. These activities will be implemented in MagLab SciGirls coding camps in 2020. Additionally, funding from Twin Cities Public Television will allow us to host a second SciGirls Coding camp at FAMU DRS focused on underrepresented minorities in computer science.

Figure 3.1.3: SciGirls Coding Campers working hard coding in their circuit books.

SciGirls Summer Camps

In 2019, the format of our SciGirls camps were changed to create two unique programs: SciGirls Discover and SciGirls Quest. SciGirls Discover is a one-week camp that was offered twice in consecutive weeks. SciGirls Discover is a one-week camp for middle schools girls who are interested in science and want an introduction to different scientific fields. Discover allows the girls to explore new types of science. SciGirls Quest is a two-week camp for girls who are interested in science and want a summer experience to kick start their STEM careers. During these two weeks, the campers will get a deeper look at the world of research, get to interview scientists and gain a deeper appreciation of the STEM careers around them.

SciGirls Discover Summer Camp

In 2019, 40 girls participated in one of the two sessions of SciGirls Discover (**Figure 3.1.4**). We had more spots available for the two camps than applicants, so next year we will only offer one week of the camp. Based on post survey responses, the girls cited the following as the activities that positively influenced their views of STEM: a surfactants oil and water chemistry activity with MagLab scientist Dr. Amy McKenna, a crystal growing activity with MagLab doctoral candidate Alyssa Henderson and meeting women scientists throughout the camp who served as role models including many from the MagLab. Based on feedback from the post surveys, campers will not be able to repeat the same camp from summer to summer. This way teachers can repeat activities but campers will not be bored year to year. Campers can participate in Discover one year and Quest the next to engage in a deeper experience.

Figure 3.1.4: SciGirls Discover Campers running an experiment on fabrics in FSU's textiles testing lab.

SciGirls Quest Summer Camp

For the inaugural SciGirls Quest camp, 23 students participated in a number of activities covering various STEM fields (**Figure 3.1.5)**. These activities connected to the overarching theme: a mission to Mars. The campers synthesized the activities throughout the two weeks as part of a culminating project related to establishing a colony on Mars. Villa and the teachers worked to make sure that every activity had at least one female role model. The evaluation for the camp in 2019 indicated the camp needs to include role models that are more diverse for 2020 to mirror the diversity of the campers. Additionally, the girls were well aware of the stereotypes surrounding race and gender in STEM, so next year the teachers will encourage the campers to identify and challenge STEM stereotypes with the role models and in the activities.

Figure 3.1.5: SciGirls Quest Campers investigate marine biology at FSU's Coastal Laboratory.

K-12 Teachers

Leon County Schools Workshop

The Leon County Schools district continued their STEAM Bowl Challenge with teams participating from all of the districts' elementary schools. CIRL staff members, Jose Sanchez and Carlos Villa, developed a STEAM (Science, Technology, Engineering, Art, and Mathematics) workshop with the Leon County Schools office and implemented a training for the elementary school teachers designated as STEAM coaches. CIRL staff supplied classroom support in the form of classroom visits and STEAM activities for these teachers throughout the semester. As in years before, the 2019 program began with a January workshop that showed teachers how to create STEAM and problem-solving activities in their classrooms and clubs. Additionally, throughout the spring semester, Carlos and Jose were available to answer questions as each elementary school club prepared for the STEAM

Figure 3.1.6: Leon County students test their water heater designs while Judges Carlos Villa and Jose Sanchez supervise at the 2019 STEAM Bowl.

Bowl Challenge (**Figure 3.1.6**). The final challenge was a lunar water heater challenge that had been presented to the teachers during the teacher workshop in January. This provided an advantage to teachers who attended the workshop and did the activities with their students. The STEAM Bowl was a great success that involved nearly all 24 public elementary schools in Leon County. The success of the STEAM challenge is due largely in part to CIRL's dedication to education in Leon County and the surrounding area.

Research Experiences for Teachers (RET)

The 2019 RET program hosted 10 teachers (three elementary school and seven secondary school) in eight different counties from four different states. This program is run by Director of RET, REU and Internships Jose Sanchez. A large part of the success of this year's program is due to the MagLab scientists who mentor and work closely with the teachers over the 6 weeks. In 2019, 60% of the teachers came from Title I schools. A list of the participants and their projects can be found on our website and in the **Table 3.1.3** below.

Table 3.1.3: 2019 RET Participants

Participant	School*	Research Area	Mentor
Ralph Gary Boulier Shayla Lightfoot-Brown	*South Central Middle School, Emerson, GA* *Apalachee Tapestry Magnet School, Tallahassee, FL*	Linking Mass Extinction to Changes in Ocean Oxygenation	Jeremy Owens
Jacob Breman Ed Whittenburg	Community Christian School, Tallahassee, FL *Eastbrook Middle School, Dalton, GA*	Analysis of High Strength Cu-Nb Wires for High Field Pulsed Magnets	Bob Goddard
Karina Hernandez Kelli Strother	*Coral Way K-8, Miami FL* Swift Creek Middle School, Tallahassee, FL	BACTH Assay	Tim Cross
Jeannette Marks	Sarasota Military Academy, Sarasota, FL	$AlFe_2B_2$: Electrocatalytic Water Oxidation with Earth-Abundant Elements	Michael Shatruk
Gladys Ornelas	*Brackenridge High School San Antonio, TX*	Barocaloric spin-crossover compounds: $[Fe(qnal)_2]$ and $[Fe_3(bntrz)_6(tcnset)_6]$	Michael Shatruk
Thomas Sullivan Brittany Zimmerman	*Bernalillo middle school, Bernalillo, NM* Eagle Creek Elementary Orlando, FL	Effect of Time-in-Melt on Filament Merging in 1.0mm Bi-2212 Round Wire	Jianyi Jiang

**Italicized Schools are Title I*

MagLab Educators Club

The MagLab Educators Club allows CIRL to send MagLab announcements about our outreach programs and opportunities as well as other regional education related information to our local and international community events of education professionals. This year we have over 650 members, providing further evidence of the interest of educators in MagLab programs.

Magnet Academy – For Teachers
The Magnet Academy is the outreach portion of the MagLab's website. This site has a page that focuses on teachers (https://nationalmaglab.org/education-magnet-academy/teachers). This page provides lesson plans, science demonstrations and interactive activities for teachers of students of all ages and has new content added several times a year. Page views of MagLab's education page are up from the previous year and make up 50% of all traffic to the MagLab website. Of these visits, 92% went to MagLab Academy.

Public Outreach

Public Outreach is spearheaded by the Public Affairs team. In 2019, this team continued to leverage a combination of large-scale events and other broad communications tools, including news releases, the website, videos, social media and *fields* magazine, to share high magnetic field research and trends with the MagLab's diverse audiences.

More than 500 media articles reaching more than 256 million readers in *Popular Mechanics, Gizmodo, Science Daily, Scientific American* and other local and national news outlets.

Website and Social Media
In 2019, the website continued to grow with more than 1.4 million pageviews, an increase of 5.36% over 2018.

Sections of the site, by percentage of all pageviews, January to December 2019:
- Education: 51%
- User Facilities: 11%
- Homepage: 9%
- About: 6%
- News/Events: 5%
- Personnel & Publication Databases: 4%
- Staff: 4%
- Research: 4%
- Magnet Development: 3%
- User Resources: 2%

In addition, the website saw growth in sessions, users and traffic:
- Number of sessions up 10.1%
- Number of users up 14.9%
- Percentage of new users up 14.6%
- Percentage of users on mobile up 11.7%
- Organic search traffic is up 15.6%, indicating better performance of site content in search engines.
- Traffic from email up 247%
- Number of pageviews to Magnet Academy up 18%

Our social media accounts experienced steady growth as well and reached large and diverse audiences: Facebook gained 430 new followers and posts reached about 75,000 people of diverse gender and age **(Figure 3.1.7)**.

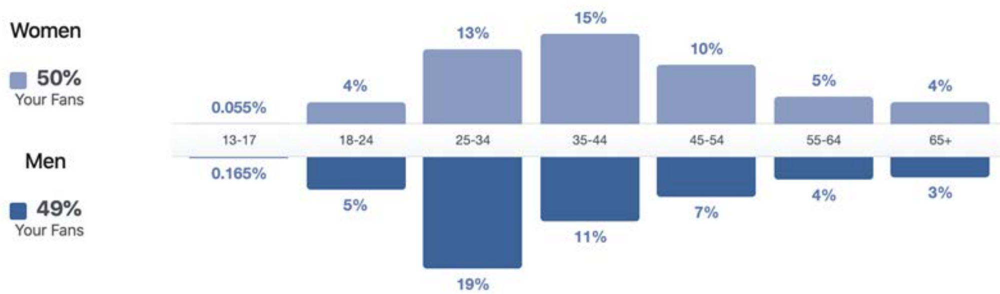


Figure 3.1.7: Breakdown of Facebook audience by gender and age

The MagLab's tweets were seen more than 408,000 times in 2019, and our Twitter account earned 327 new followers. Followers of the MagLab's twitter account are evenly split by gender (**Figure 3.1.8**).

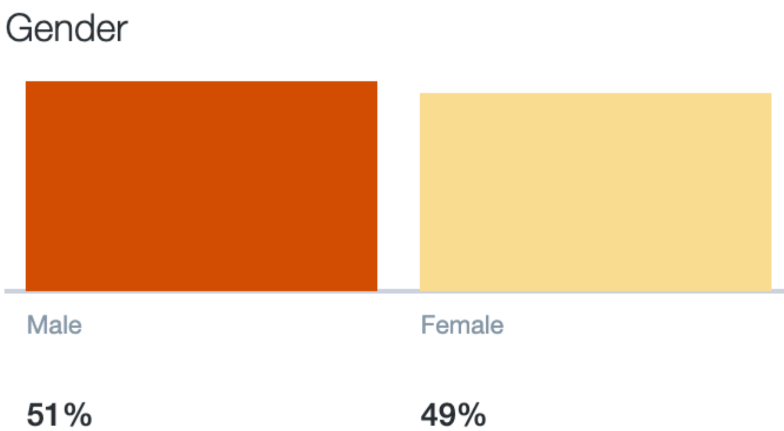
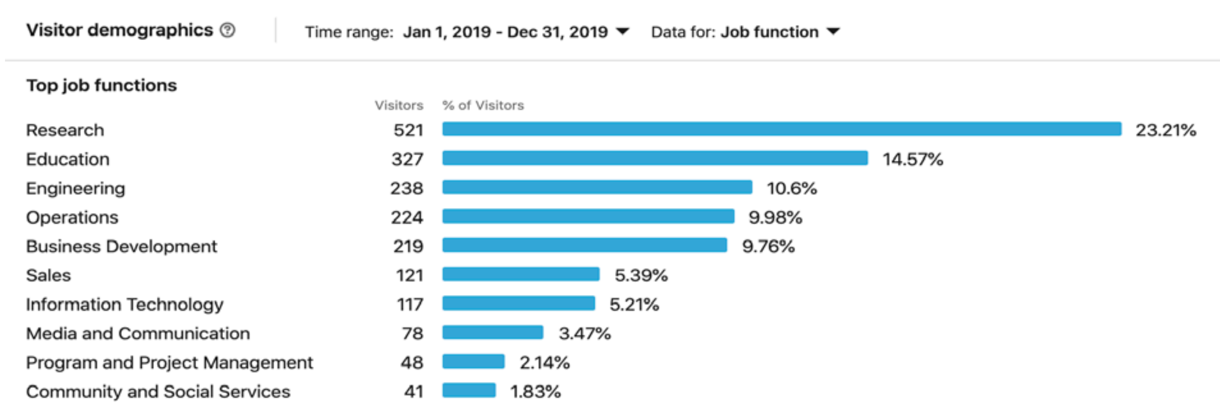


Figure 3.1.8: Breakdown of Twitter audience by gender.

LinkedIn grew substantially with 470 new followers and a reach of more than 75,500. Our LinkedIn visitors and followers are primarily located in Tallahassee and in the areas of research, education and engineering, but also reflect other diverse locations and fields (**Figure 3.1.9**).



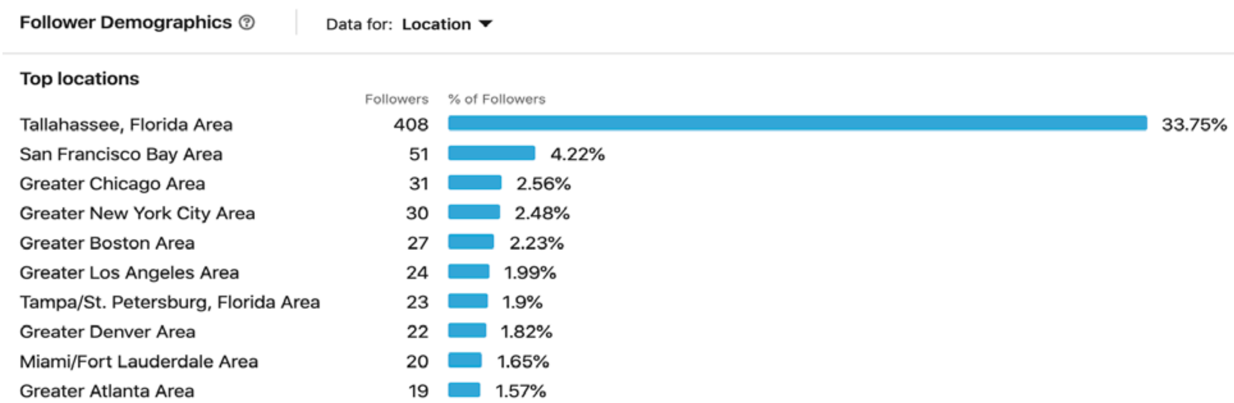


Figure 3.1.9: (Top) Charts of LinkedIn visitors and (button) followers by job function and location.

The MagLab's Instagram account also experienced substantial audience growth, gaining 28% of its total followers in 2019. The MagLab's Pinterest page also continues to be an exciting tool to spark interest in science, reaching nearly 150,000 people in 2019 around the world (**Figure 3.1.10**).

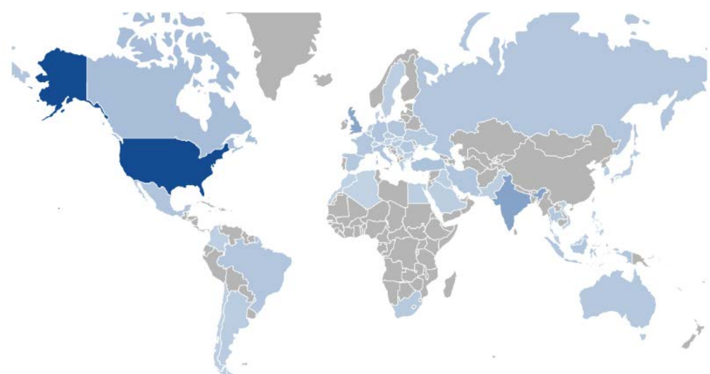


Figure 3.1.10: Map of Pinterest audience by country.

YouTube and video content also continued to perform well in 2019. Thirty new videos were added this year, including new additions to the See-Thru Science and Take 2 video series and a very popular music video about moire patterns in graphene called "That's a Moire: A Science Love Story", which has earned nearly 7,000 views alone (**Figure 3.1.11**). In total, there were 2.2 million views and audiences spent over 4.5 million minutes watching MagLab video content in 2019.

Figure 3.1.11: The *That's a Moire* video was one of our most popular videos of 2019.

YouTube growth included:

- Views - 2,171,913
- Watchtime - 4,540,386
- New Subscribers - 26,372
- Likes - 28,071
- Shares - 19,919

Events

More than 10,800 visitors came from across the Southeast to sample the 100 hands-on demonstrations on the science smorgasbord of **Open House 2019**. We wrote a recipe for science featuring 30-plus community partners including the FSU Nutrition Department, FAMU Vitaculture, Keiser University's Culinary Arts and the Florida Department of Agriculture's Food Safety Division, who helped visitors learned about the science of food. Visitors enjoyed a taste test of science with 30-plus food-themed demonstrations including Molecular Cuisine, Glowing Pickles, Easy Bike Ovens, Einstein's Ice Cream, Pitch Perfect Marshmallows and a special live performance of music from the Moire video at the world's strongest magnet – the 45T (**Figure 3.1.12**).

The MagLab also helped present the **Tallahassee Science Festival** on November 23, 2019, at Kleman Plaza in partnership with Tallahassee Community College. More than 1,500 people came to experience the festival.

Figure 3.1.12: MagLab Open House 2019 was the largest in MagLab history with 10,800 diverse and visitors taking part in nearly 100 hands-on activities.

Fields Magazine

This magazine continued to tell stories of high magnetic field research from around the world in 2019. More than 7,500 print magazines are distributed each issue and the online magazine has more than 17,000 page views, an increase of about 8 percent from 2018.

Two new issues were released in 2019 featuring collaborative content with the National Solar Observatory, National Institute of Standards and Technology, other magnet labs and universities around the world and diverse research topics and disciplines (**Figure 3.1.13**).

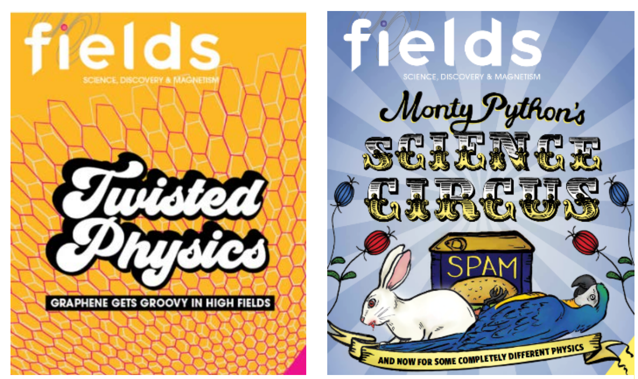


Figure 3.1.13: The two fields issues released in 2019 covered topics from materials, stroke, fracking, cancer, biochar, space, mentorship, art and even Monty Python

Undergraduate, Graduate, and Postdocs

Magnet Lab Internship Program (for students 17 years or older)

The internship program at the MagLab continues to expand. A partnership with FSU's internship program increased the number of FSU students who applied for internships at the MagLab. To maintain our commitment to diversity, Jose Sanchez, the director of the program, worked with the Diversity Committee to create internships for FAMU and TCC students each semester. Diversity will provide half of the monetary support for these interns. The formal program will begin during the 2020-2021 academic year, but we already have interns from all three universities participating in our spring internships for 2020. In order to improve the demographic

Figure 3.1.14: Intern

diversity of the internship applicant pool, Jose has formed partnerships with university groups such as the Hispanic Student Union, United Latin Society and Hispanic Graduate Student Association at each of our local universities/colleges. Also the continued partnership with Tallahassee's Community College STEM Stars group has increased our applications and participation from underrepresented groups.

In addition, CIRL has changed the internship based on multiple years of data to only include college interns **(Figure 3.1.14).** During the 2020-2021 school year, we will create a separate externship program for high school students. These programs are run through each high school in Leon County.

Figure 3.1.15: 2019 REU Participant

Undergraduate – Research Experiences for Undergraduates (REU)

The 2019 REU cohort hosted 19 undergraduates from 14 different universities including: Cornell University, Columbia University, Tuskegee University, University of Puerto Rico Humacao and University of Puerto Rico Mayaguez. All of the 2019 participants (**Figure 3.1.15**) and their projects can be found on our **website** and in **Table 3.1.5** below. Based on the post program survey, Jose plans to provide more networking activities among students and between mentors and students for 2020.

Table 3.1.5: 2019 REU Participants

Participant	School	Research Area	Mentor
Hannah Alderson	Florida State University	Evolution of Cerebral Hemodynamics with Migraine Onset and Progression	Sam Grant
Taylor Ariko	Florida State University	DTI-based Hemispheric Differences in the 3xTgAD Model of Alzheimer's Disease	Sam Grant
Rakin N. Baten	University of Florida	Kondo effect in superconductive tunneling	Wan Kyu Park
Courtney Chiu	Cooper Union for the Advancement of Science and Art	Copper-Niobium Interfaces Lose Structure and Become Increasingly Unstable as the Temperature of the System Rises	Ke Han
Kristie Dick	Florida State University	Arizona Test Dust: Purpose and Procedures	Peter Morton
Evan Dieppa Colon	University of Puerto Rico at Mayaguez	Study of Bi-2212 Microstructure Evolution (Filament Bridging) During Partial Melt Processing Heat Treatment	Imam Hossain
Christopher Mann	University of Florida	Commissioning a High Field 14T Magnet and Low Temperature Cryostat for Investigation of Quantum Materials	Dave Graf
Kelsey Marr	University of Arkansas	Monitoring Lipid Phase Transitions of Pulmonary Surfactant Mixtures	Joanna Long
Phillip Martin	Cornell University	Dimensional Reduction in $BaCuSi_2O_6$	Scott Crooker
Orion Van Oss	Columbia University in the City of New York	Microscopic Fracture Characterization in Nb_3Sn Wires on the Image Analysis Techniques Used to Collect Data on Sub-Element Fractures in Nb_3Sn Wires	Peter Lee

Participant	School	Research Area	Mentor
Christopher Kolste Rakowski	Bucknell University	Tetracycline Antibiotic Resistance Through Enzymatic Modification in Bacteriodes Strains	Yousong Ding
Hannah Revell	University of Florida	Order-Disorder Transition in the S = ½ Kagome Antiferromagnets Barlowite and Claringbullite	Alyssa Henderson
Christian H. Rodriguez	University of Puerto Rico in Humacao	Analyses of Brain Regional Volumes in Alzheimer's Disease Mouse Models Using Non-Linear Symmetric Normalization Tools in ANTs	Marcelo Febo
Benny Schundelmier	University of West Florida	Optimization of Thermoelectric Properties in f-Electron Cage-Like Intermetallic Compounds	Ryan Baumbach
Taniya Thomas	Tuskegee University	Characterization of Sulfur Components in Field Samples from Historic Oil Spills and Seeps	Amy Mckenna
Jane Wadhams	Florida State University	Towards a Vanadium Isotope Marine Redox Proxy	Jeremy Owens
Katrina Webb	The University of Texas at Austin	FEM Simulations for The New 90T Duplex Magnet	Doan Nguyen
Nicholas Weisend	The University of Edinburgh	Arizona Test Dust: Purpose and Procedures	Peter Morton
Timothy Yen	Trinity University (San Antonio)	Progress Towards Online LC-MS Analysis of Naphthenic Acids	Ryan Rodgers

Graduate Students and Postdocs

Kari Roberts is the MagLab's Postdoc Liaison. She serves as a resource for graduate students and postdocs to connect them to relevant resources at their home MagLab institutions (FSU, UF, LANL) and beyond. Postdocs and graduate students can visit her at any time to seek support and connections to outside resources. The most common requests she received in 2019 were for assistance securing travel funding, connections to the FSU career center and information related to onboarding tasks. In 2019, there were two requests from postdocs for professional development sessions, both of which were hosted at the MagLab:

- Academic Interview Workshop, facilitated by the FSU Career Center: A representative from the FSU career center came to the lab to share information on methods to prepare for academic interviews and answer any questions attendees had. Postdocs and graduate students were invited to attend this session.
- Job Searching Panel with MagLab Scientists: Two new faculty members and two faculty members who recently served on hiring committees answered postdocs' questions about their experiences with job searching and for advice. This event was exclusive to MagLab postdocs.

Additionally, MagLab postdocs had access to an online interview preparation and practice tool, *Big Interview*. All postdocs were able to access this tool at any time and could complete the modules at their own pace. Mock interviews were also offered to MagLab postdocs in 2019.

In 2018, we began utilizing a different model for our professional development sessions; high-demand organizations came to the lab at regular intervals to host "office hours" where anyone at the lab could come to meet with representatives from FSU resources one-on-one to receive tailored support. In 2019, two offices at FSU participated in office hours.

- Dirac Science Libraries came to the MagLab twice a month to assist MagLab staff and students with literature searching, citation management, data management plans, research metrics, accessing and uploading to data repositories and new tools for project management.

- The FSU Career Center came to the College of Engineering (walking distance from the lab) once per month in the fall semester to provide staff and students with support on any topic related to career development, including searching for job postings, resume and CV review and preparing for interviews.

We also offer a postdoc seminar for any postdoc who wishes to give a practice talk. These have been used to prepare for upcoming conference presentations and practice job talks.

Professional Development Resources at FSU, UF, and LANL

In addition to MagLab-specific resources, postdocs and graduate students have access to professional development resources at their affiliate campuses. FSU, UF and LANL all offer additional resources to graduate students and postdocs that connect these early career scientists to their larger campuses and to resources beyond the scope of what the MagLab can currently provide. **Table 3.1.6** lists examples of resources provided at each of the three campuses.

Table 3.1.6: Examples of resources provided

FSU	UF	LANL
• An official Office of Postdoctoral Affairs • Twice yearly postdoc workshops, including outside speakers and a poster session • Career Center • Regular professional development sessions • Travel Funding • Postdoc-level Preparing Future Faculty and Preparing Future Professionals programs • Free membership to the National Postdoc Association	• An official Office of Postdoctoral Affairs • Annual Postdoc Research Symposium • Career Center • Regular professional development sessions • Travel Funding • Free membership to the National Postdoc Association	• Regular online and in-person professional development opportunities • A matched mentorship program • Awards and recognition opportunities specifically for postdocs • Paid maternity leave

Mentoring for MagLab Postdocs

Postdocs are an important piece of the overall mentoring landscape at the MagLab, as indicated by our **Postdoc Mentoring Plan**. While at the lab, they have the opportunity to be mentored and to practice mentoring others, including graduate and undergraduate students. In 2019, 100% of postdocs surveyed reported that they had a mentor at the lab and of these, 86% felt they were being adequately mentored by this mentor. Additionally, 54% of postdocs reported that they serve as a mentor to others in the lab. Annual evaluations for postdocs are required so that postdocs get regular feedback on their performance and progress at the lab. Roberts serves as a support for both postdocs and their mentors during this process.

Annual Survey to Postdocs

The annual survey to postdocs is included each year as a section of the MagLab's annual Climate Survey. The survey helps gauge the quality of the mentoring and supervision that postdocs receive at the lab. This year, 86% of postdocs who responded to the survey said they were satisfied with their overall experience at the lab. Overall, postdocs rated their supervisors favorably. Of postdocs surveyed, 100% said that their supervisor was accessible, and 86% said that their supervisor encourages them to ask questions and supports them in their career goals.

The demographics for our Postdocs are in **tables 3.1.7, 3.1.8, 3.1.9**. These numbers are taken directly from the internal MagLab personnel system on January 8, 2020.

Table 3.1.7: Race and Ethnicity — Excluding Affiliates

Race/Ethnicity	Number	Percentage (N= 30)
Hispanic or Latino/a	2	6.7
Asian	20	66.7
Black/African American	0	0
American Indian or Alaska Native	0	0
Native Hawaiian or Pacific Islander	0	0
White/Caucasian	8	26.7
Prefer not to disclose	2	6.7

Table 3.1.8: Gender — Excluding Affiliates

Male	Female
20 (66.7%)	10 (33.3%)

Table 3.1.9: Citizenship Status — Excluding Affiliates

U.S. Citizen or Permanent Resident	Visa Holder
6 (20.0%)	24 (80.0%)

NHMFL Scientists' and Staffs' Commitment to Outreach

NHMFL Personnel Outreach

In 2018, 77 scientists and staff reported conducting outreach to communicate information about the MagLab to the community. Together, these scientists reached 7,109 people in 2019. The majority (64%) of this audience were K-12 students. Of the 77 scientists who conducted outreach in 2019, 51 conducted long-term outreach working with K-12 students, K-12 teachers or undergraduate students. These scientists mentored a total of 139 individuals this year. Of these individuals, 73 (53%) were matched with their mentor through a CIRL program. A summary of the types of short-term outreach conducted and outreach audience for each department is presented in **tables 3.1.10 and 3.1.11**.

Table 3.1.10: Short-Term Outreach

	Tour of MagLab Facility		Presentation		Visit K–12 classroom		Judged a Science Fair		Worked with K-12 group at the lab	
Department	#of scientists	# of people reached	# of scientists	# of people reached	#of scientists	# of people reached	# of scientists	# of people reached	# of scientists	# of people reached
ICR	3	107	2	826	1	365	2	100		
CMS	2	29	1	20	3	195	1	80		
ASC										
EMR			2	150						
NMR	2	64	2	173			1	75		
UF	9	236	2	901	1	1,642	1	60	1	28
LANL	1	70	2	140						
MS&T	1	12			1	30				
DC	1	20	3	1,037	1	15			1	40
Geochem			1	125	1	130	1	100		
Director's Office			1	715						
TOTAL	19	438	16	4,087	8	2,377	6	415	2	68

Table 3.1.11: Outreach Audience: Short- and Long-Term Outreach

Department	# of Scientists	Number of People Reached				
		Elementary Students	Middle/High Students	Undergraduate and Graduate Students	General Public	K–12 Teachers
ASC	6		4	2		2
NMR	5	161	41	19	87	2
EMR	3		2	97	15	
ICR	8	437	501	132	389	
CMS	16	180	67	12	50	2
UF	16	2,292	273	38	121	
DC	5		403	140	678	
Geochem	4	100	132	15	80	49
MS&T	6	30	2	13		2
Director's Office	3			3	215	100
LANL	3	50	30	42	90	

Research and Evaluation

Evaluation

Evaluation for all education programs at the MagLab is conducted by Roberts. She stays up to date on the best practices in evaluation as outlined by experts in evaluation and the social science, and the National Science Foundation. All education programs at the lab are evaluated, and results are shared with program managers every year to allow for data-driven decision-making in planning programs for future years. Primary metrics for each program are determined based on the program's goals and mission and measured using appropriate methodology. Evaluation methodology for each program is described in **Table 3.1.12.**

Table 3.1.12: Evaluation methodology for each program

Outreach	Form of Evaluation
Classroom outreach	Post-survey to teachers after outreach conducted (formative evaluation), post-survey to students who come to the lab for outreach.
RET/REU/Internship	Pre-/post-survey measuring attitudes toward STEM careers, perceptions of STEM careers and self-efficacy in STEM (for teachers in teaching STEM). Regular tracking of past participants to determine persistence over time.
Summer Camps/Middle School Mentorship	Pre-/post-survey measuring STEM Identity, STEM Self-Efficacy, perceptions of scientists and science careers. Regular tracking of past participants to determine how their interest in STEM evolves over time.
Graduate Student/Postdoc Professional Development	Annual survey to current postdocs to determine professional development needs and assess mentoring and annual tracking of graduate students and postdocs to determine career trajectories.
MagLab Users Summer School	Pre-/post-survey assessing perceived value of program on their career trajectories.
Winter Theory School	Post-survey assessing participants perceived value of the Winter Theory School and how they will apply what they learned in the program.
Open House	Post-experience surveys and brief interviews given to attendees of the annual Open House to assess perceived benefits of the annual Open House and provide feedback for future years.

Research

In 2019, Roberts was selected as one of thirty participants in the National Center for Education Statistics (NCES) **Data Institute**. Participants came from research institutions across the United States and were placed into small groups based on shared research interests. As a part of this program, Roberts received six weeks of training on federal secondary and postsecondary educational datasets and how to use the data sets in education and social science research. Over the next six months, she then worked with her small group under the direction and mentorship of NCES affiliated staff on research related to the role of self-efficacy and values beliefs on persistence in STEM degree programs. At the conclusion of the project, the group presented findings to a group of statisticians and education policy experts from NCES, the Association for Institutional Research, the Association of Public Land-Grant Universities, the Institute of Higher Education Policy, the American Association of Community Colleges and the American Council on Education. The results of this work include two papers, which have been accepted for publication at the American Educational Research Association conference in 2020, an invited presentation at the 2020 Association for Institutional Research Forum, and an invited Association for Institutional Research webinar.

In 2019, Hughes continued to lead the research efforts that focus on the impact of informal STEM education programs on participants' STEM identity. In 2019, her work with Roberts resulted in two publications that focus on STEM identity changes in participants over 5 years of summer camps.

- *Roberts, K. & Hughes, R. (2019). The Role of STEM Self-Efficacy on STEM Identity for Middle School Girls After Participation in a Single-Sex Informal STEM Education Program, Journal of STEM Outreach, Vol 2, 1-9.*
- *Hughes, R. & Roberts, K. (2019). STEM Identity Growth in Co-Educational and Single-Sex STEM Summer Camps, International Journal of Gender, Science, and Technology, 11(2), 232-311.*

Hughes and Roberts submitted an article to the *Journal of Women and Minorities in Science and Engineering* that focused on the impact of a women-only STEM living and learning community at a research-intensive university on women's persistence in their STEM major. Hughes, Roberts and FSU postdoc Jennifer Schellinger also completed a revise and resubmit article for the *Journal of Research in Science Teaching* on the coding identity work of middle school girls based on data from our MagLab SciGirls Coding Camp.

In 2019, Hughes continued efforts as co-PI on the NSF AISL grant SciGirls CONNECT2 resulted in an article submission to the Journal of Research in Science Teaching that summarized the literature review that informed the updated SciGirls' Strategies for culturally relevant informal STEM education programs. The team of Hughes, Roberts and Schellinger also had two submissions accepted to the 2020 Annual American Educational Research Association Conference on research related to the SciGirls CONNECT2 grant.

3.2. CONFERENCES AND WORKSHOPS

Throughout the year, the MagLab hosts or sponsors a variety of workshops and conferences related to our science (**Table 3.2.1**).

Table 3.2.1: List of 2019 sponsored workshops and conferences

Date	Name	Location	About
Jan 7–11	Theory Winter School	Tallahassee, FL	This year, Theory School focused on several challenges in modern condensed matter physics. Recent computational advances and new analytic insights suggest the need for multifaceted approaches to bring together the study of model Hamiltonians, ab-initio approaches and experiments to gain new understanding of quantum materials. This synergy between communities will impact endeavors where theory is guiding new discoveries. The themes of the school are: strongly correlated and quantum spin liquid physics; Weyl and topological physics; and new computational techniques and machine learning.

Date	Name	Location	About
April 28–May 2	2019 North American FT MS Conference	Key West, FL	The FT MS Conference is held every two years and is the premier conference of its kind in the field of Fourier Transform Mass Spectrometry and its applications. Presentations range from instrumentation to technique development in the biological/biomedical sciences ranging from pharmaceutical metabolism to proteomics, environmental analysis and petroleomics, with special emphasis on new developments. As in the past, partial support for several contributed posters for graduate students and postdocs will be offered.
May 13–17	User Summer School	Tallahassee, FL	The weeklong summer school features tutorials on measurement techniques, practical exercises and plenary talks from experts in the field of condensed matter physics.
June 10–14	RF Coil Building Workshop	Gainesville, FL	The AMRIS Facility will hold its fourth annual RF Coil Building Workshop in Gainesville, Florida, from June 10-14, 2019. The purpose of the workshop is to train graduate and post-doctoral students in building RF coils for magnetic resonance imaging and spectroscopy.
October 22–24	DNP-Enhanced MAS ssNMR Workshop	Tallahassee, FL	The DNP workshop focused on practical aspects of MAS-DNP NMR, including technical details of instrumentation, maintenance, theory and best practices for ssNMR spectroscopy, and sample preparation strategies for optimal DNP. Significant time will be spent in lab working with the 600 MHz MAS-DNP instrument, a benchtop X-band EPR instrument, preparing samples, and collecting DNP data. The content was designed for graduate students, postdoctoral researchers and staff scientists who are pursuing MAS-DNP measurements in their studies.
October 25–27	48th Southeast Magnetic Resonance Conference (SEMRC)	Gainesville, FL	SEMRC is held every year and rotates among various locations in the southeastern United States and has a long history of bringing together leading scientists to discuss the latest developments in NMR, EPR and MRI. The focus of the conference is the exchange of ideas and recent magnetic resonance research highlights, including new applications and technique development. Particular emphasis is placed on activities in the region. Traditionally, the SEMRC puts a special emphasis on the participation of young scientists (students and postdocs) and provides excellent opportunities to exchange new exciting results with their peers as well as with the leaders in the field.

3.3. BROADENING OUTREACH

In addition to the Diversity and Education sections, which speak to the MagLab's work in broadening outreach through education and underrepresented groups, the Lab's staff are regularly presenting new research and sharing information about our user program at national and international conferences, workshops and seminars. Each presentation, poster or abstract opportunity offers the chance for scientists around the world to learn more about the Lab's research capabilities and broaden our user program to appeal to new scientists from varying levels – from graduate students and postdocs to seasoned scientists.

In 2019, MagLab staff gave 317 lectures, talks and presentations across 23 countries and 33 states. **(Fig.3.3.1., 3.3.2)**, including APS March Meeting, American Chemical Society National Meeting, MT26 International Conference of Magnet Technology, ISMRM, EUROISMAR 2019, International Conference on Quantum Fluids and Solids 2019, 32nd European Crystallographic Meeting (ECM32), Workshop on Strongly Correlated Quantum Materials, The International Society for Magnetic Resonance in Medicine Workshop, 14th European Conference on Applied Superconductivity, 2019 International Conference on Advanced Materials Science and Engineering, 2019 Gulf of Mexico Oil Spill & Ecosystem Science Conference, 60th Experimental Nuclear Magnetic Resonance

Conference, 67th ASMS Conference on Mass Spectrometry and Allied Topics, Neuroscience 2019, The 14th Joint MMM-Intermag Conference, The 60th Annual Rocky Mountain Conference on Magnetic Resonance, and more.

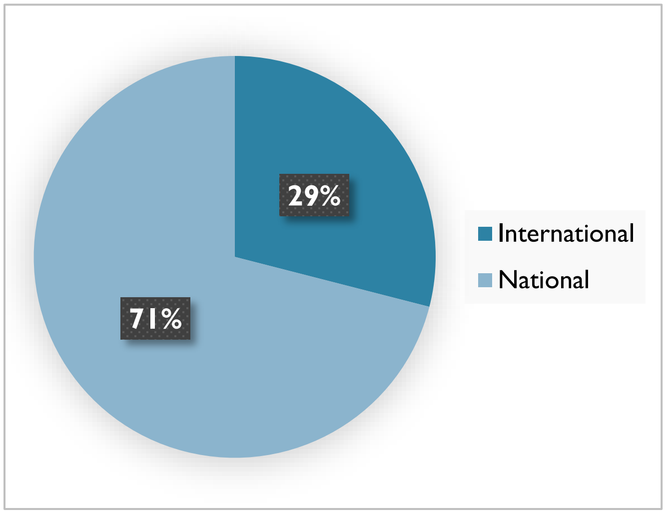


Figure 3.3.1: Geographic Distribution of 2019 Presentations

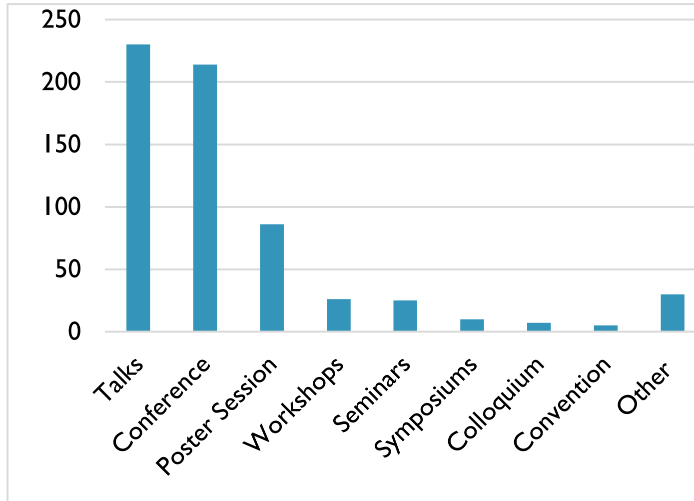


Figure 3.3.2: 2019 Presentation Types

4. IN-HOUSE RESEARCH

4.1. GEOCHEMISTRY

The facility primarily investigates natural processes, both recent and ancient, through the analysis of trace element contents and isotopic compositions.

Introduction

The Geochemistry Program's main funding is through grants from the geoscience directorate at NSF, NASA and the USGS. On average the program has about fifteen active grants with average budget per grant of $100,000/year. All tenure-track faculty have their appointments in FSUs' College of Arts and Sciences.

The facility has seven mass spectrometers, which are available to outside users. Three instruments are single collector inductively coupled plasma mass spectrometers for elemental analysis, one of which is dedicated to in-situ trace element analyses on solid materials using laser ablation. The other two are dedicated to elemental analyses of solutions. The facility has four mass spectrometers dedicated to determination of isotopic compositions. One is a multi-collector inductively coupled plasma mass spectrometer (NEPTUNE) used for determination of isotopic abundances of metals. A second is a thermal ionization multi collector mass spectrometer, which is mainly used for Sr-isotopic compositions. The third mass spectrometer is designed for the measurement of the light stable isotope compositions (C, N, O). A fourth mass spectrometer is dedicated to sulfur isotope analyses.

Publications and Outreach

The program members have published 34 peer-reviewed publications and an even larger number of presentations at meetings and invited presentations at other institutions. The program involves a large number of undergraduate students in their research as well as through the REU summer interns.

Science Highlights

The evolution of life and the rise of oxygen in early Earth history have been significant questions that the community strives to better understand. Another important but unanswered question is if the oceans or atmosphere became oxygenated first. It has been suggested that there were punctuated atmospheric "whiffs" of oxygen prior to the first significant rise in the atmosphere. Research published by Owens and colleagues in *Nature Geoscience* utilizes thallium and molybdenum isotopes to suggest there were significant and widespread oxygenation events that were persistent from the ocean all the way to sediments prior to evidence of atmospheric oxygen and oxidative weathering. This work documents that the ocean was likely dynamic with many redox vacillations during the early anoxic Earth.

For years, geoscientists struggled to connect a mechanism to the late Silurian (~ 423 million years ago) mass extinction, one of the 10 most dramatic ever recorded in Earth's history. A new study published in *Geology* by Young and colleagues suggests that this stepwise extinction event, first coincided with widespread ocean deoxygenation and was followed by more severe and toxic ocean conditions with sulfide in the water column. Geoscientists have long been aware of this major marine extinction, as well as a related disruption in Earth's global carbon cycle, but this study provides the mechanistic link and explanation of timing between these two associated events. This study provides another line of evidence that initial deoxygenation in ancient oceans coincides with the start of mass extinction events.

A third highlight is a study on the role of climate change in the evolution and diversification of hominoids, a hotly debated issue. Stable isotope analyses of fossil mammals that coexisted with the hominoids can provide insights into hominoid palao-environments and shed light on this debate. Graduate student Fajun Sun analyzed the carbon and oxygen isotope compositions of fossil tooth enamel samples from a variety of Pleistocene (~2.6 million years ago to 12,000 years ago) mammals including pandas, deer, elephants, pigs, rhinos and bovids from two hominoid fossil caves in South China. The isotope data suggest that the regional climate became colder and/or wetter, with increased seasonality, from the Early Pleistocene to the early Late Pleistocene, likely related to intensified glaciation. The change in climate to colder conditions may be responsible for the extinction of the Gigantopithecus in this region. This finding was published in the journal *Palaeogeography, Palaeoclimatology, Palaeoecology* (Sun et al., 2019).

A fourth highlight is a publication on the composition of basalts that erupted at the East Pacific Rise. To accommodate linear features, like mid-ocean ridges, on a sphere (globe), the ridges are segmented. The segmentation has been attributed to shallow level forces in the newly formed plate. Our study (Mallick et al, 2019) in the journal *Geochemistry, Geophysics, Geosystems* argues based on stepwise chemical and isotopic variation across ridge discontinuities. These abrupt changes indicate that segmentation is at least partly caused by deeper processes and likely related to differences in rheology of the rising subridge mantle.

Progress on Stem and Building the User Community: The facility is open to users of all disciplines, and we have a long-time collaboration with the USGS and the South Florida Water Management District. During the summer we hosted one undergraduate student from the REU program; eighteen undergraduate students are involved in research throughout the year. In the last year, 72 users, of which 52% are female, used our analytical facilities. Graduate student users are 65% female. Within the area of Geosciences, the faculty has collaborations with researchers throughout the U.S., Europe as well as Asia. The disciplines for which we do service analyses at a more local level range from magnet science to pharmacy.

4.2. CRYOGENICS LABORATORY

The Cryogenics Laboratory, located at the National High Magnetic Field Laboratory, is a fully developed facility for conducting low temperature experimental research and development. A number of specialized experimental equipment are available in the lab, which include the Cryogenic Helium Experimental Facility (CHEF) for horizontal single and two-phase heat transfer and flow research, the Liquid Helium Flow Visualization Facility (LHFVF) for high Reynolds number superfluid helium (He II) flow visualization research, the Laser Induced Fluorescence Imaging Facility (LIFIF) for high precision molecular tagging velocimetry measurement in both gaseous and liquid helium and the Cryogenic Magnetic Levitation Facility (CMLF) for studying cryogenic fluid hydrodynamics in microgravity. The laboratory supports in-house development projects as well as contracted scientific work directed by Professor Guo of the Mechanical Engineering department at Florida State University. The major research focus of the cryogenics lab currently includes: 1) fundamental turbulence and heat transfer research in cryogenic helium; 2) quench spot detection for accelerator cavities; 3) catastrophic loss of vacuum in liquid helium cooled pipes. These research activities are supported by external funding agencies including the National Science Foundation, the Department of Energy, the Army Research Office and our industrial partners.

*Turbulence Research with He II***:** Many flows in nature have extremely high Reynolds (Re) or Rayleigh (Ra) numbers, such as those generated by flying aircraft and atmospheric convection. Better understanding of these flows can have profound positive impacts on everyday life, such as improving the design in energy efficient applications and our understanding of climate change. To achieve large Re values in laboratory, a common route is to increase

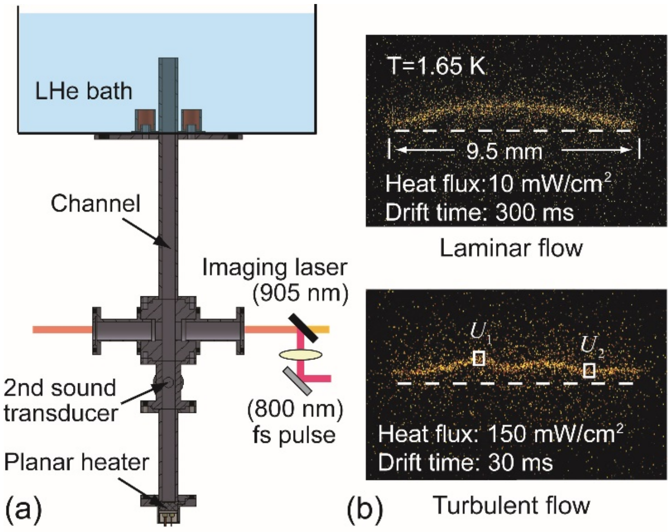


Figure 4.2.1: (a) Schematic diagram of the experimental setup for flow visualization using He_2 molecules. A high intensity femto-second laser (red beam) through the windows ionizes helium atoms and creates a tracer line of He_2 excimer molecules. Then the imaging laser at 905nm (yellow beam) drives the tracers to produce fluorescent light (640nm) for the imaging. (b) Typical images of the tracer line in thermal counterflow generated by an applied heat flux in He II. The deformation of the tracer lines provides quantitative information about the velocity field in He II.

the characteristic length of the flow, which normally requires the construction of expensive and energy-consuming large-scale flow facilities and wind tunnels. An alternative method is to use a fluid material with very small kinematic viscosity. At the cryogenics lab, we adopt helium-4 as the working fluid.

Helium-4 has extremely small kinematic viscosity (three orders of magnitudes smaller than that for air), which enables the generation of highly turbulent flows in compact table-top equipment. Furthermore, when helium-4 is cooled below about 2.17K, it undergoes a phase transition into a superfluid phase (He II), which consists of two miscible fluid components: a viscous normal component and an inviscid superfluid fluid component. Turbulence in He II is a cutting-edge research area that is important both in fundamental science and in practical applications of He II as a coolant. In order to make quantitative flow field measurements, we have developed two powerful flow visualization techniques. One is the so-called molecular-line tagging velocimetry technique, which is developed based on tracking thin lines of He_2 excimer tracers created via femtosecond-laser field ionization of helium atoms (see **Figure 4.2.1**). Besides this technique, a particle tracking velocimetry method in He II using seeded micron-sized frozen hydrogen particles has also been developed and implemented. The application of these techniques to the study of heat induced flows in He II has revealed a novel form of turbulence (counterflow turbulence). A systematic characterization of this turbulence will be indispensable for developing a theoretical understanding that will potentially benefit the design of He II based cooling systems. This year, we have also designed and fabricated a new towed-grid system for studying turbulence in He II generated via mechanical forcing. This system has allowed us to examine both the vortex dynamics and the motion of the thermal component in He II, which has led to a number of publications in *Phys. Rev. Fluids* with one article being selected as an Editor's Suggestion:

- *B. Mastracci and W. Guo, "An apparatus for generation and quantitative measurement of homogeneous isotropic turbulence in He II", Rev. Sci. Instrum., 89, 015107 (2018).*
- *B. Mastracci and W. Guo, "An exploration of thermal counterflow in He II using particle tracking velocimetry", Phys. Rev. Fluids, 3, 063304 (2018).*
- *B. Mastracci and W. Guo, "Characterizing vortex tangle properties in steady-state He II counterflow using particle tracking velocimetry", Phys. Rev. Fluids, 4, 023301 (2019). Selected as Editor's Suggestion.*
- *B. Mastracci, S. Bao, W. Guo, and W.F. Vinen, "Particle tracking velocimetry applied to thermal counterflow in superfluid 4He: motion of the normal fluid at small heat fluxes", Phys. Rev. Fluids, 4, 083305 (2019).*

Quench Spot Detection for Accelerator Cavities **(Figure 4.2.2):** Many modern particle accelerators utilize superconducting ratio-frequency (SRF) cavities, cooled by He II, to accelerate charged particles. There is a strong demand to reach ever higher accelerating fields in these cavities so that the particles can gain higher energies over shorter distances. The prospect of shorter accelerator beamlines is very significant due to the high costs of typical accelerators. The maximum accelerating field of SRF cavities is limited by cavity quenching caused by Joule heating from tiny resistive defects near the cavity surface (i.e., quench spots). By locating and subsequently removing the defects, the maximum accelerating field can be significantly improved. Therefore, a long-standing research effort in the accelerator field is to develop reliable methods to detect those sub-millimeter defects. Our lab is active in developing novel technologies for surface quench spot detection based on molecular tagging flow visualization in He II. We have conducted a proof-of-concept experiment using a miniature heater to simulate a quench spot and have demonstrated hot-spot detection with an unprecedented resolution of a few hundred microns, far superior to other existing methods. Our work is expected to significantly advance the state of the art of accelerator cavity diagnostics. A recent paper has been published in *Phys. Rev. Applied:*

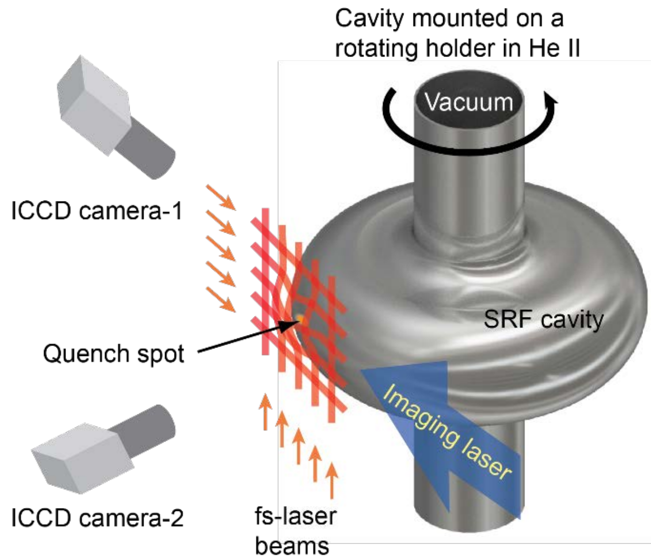


Figure 4.2.2: A schematic diagram showing quench spot detection for real SRF cavities in 3D using a tracer-line grid.

- *S. Bao and W. Guo, "Quench spot detection for superconducting accelerator cavities via flow visualization in superfluid helium-4", Phys. Rev. Applied, 11, 044003 (2019).*

Our postdoc, Dr. S. Bao, who conducted the work, was awarded the Peter Kapitza Award from International Institute of Refrigeration.

Loss-of-Vacuum Heat and Mass Transfer: SRF cavities in linear accelerators are operated with high vacuum on their inside, while being immersed in a bath of LHe (typically He II around 2K). A string of SRF cavities housed in a cryomodule essentially forms a long LHe cooled vacuum tube (i.e., the beamline tube) **(Figure 4.2.3**). An accelerator can experience a catastrophic breakdown if the cavities accidently lose their vacuum to the surrounding atmosphere. To understand this vacuum break process and to aid the development of accelerator cryogenics safety protocols, our lab has launched a project to study nitrogen gas propagation in a purposely designed helium-cooled tube system and has developed a theoretical model to interpret the gas dynamics and the heat transfer process. These experimental and theoretical work has resulted a number of publications:

- N. Garceaua, S. Bao, and W. Guo, "Heat and mass transfer during a sudden loss of vacuum in a liquid helium cooled tube - Part I: Interpretation of experimental observations", *Int. J. Heat Mass Tran*., 129, 1144-1150 (2019).
- N. Garceaua, S. Bao, W. Guo, and S.W. Van Sciver, "The design and testing of a liquid helium cooled tube system for simulating sudden vacuum loss in particle accelerators", *Cryogenics*, 100, 92 (2019).
- S. Bao, N. Garceau, and W. Guo, "Heat and mass transfer during a sudden loss of vacuum in a liquid helium cooled tube - Part II: Theoretical modeling", *Int. J. Heat Mass Tran*., 146, 118883 (2020).

On the education side, our research projects have allowed us to support both undergraduate and graduate students. We have also been able to engage postdoctoral researchers, interns, visiting students and scholars. These students have been trained and gained valuable experiences in fluid dynamics, cryogenics, advanced laser technologies, electronics and data analysis techniques. These skills are applicable to nearly all STEM related fields, giving these students the technical dexterity necessary to excel in today's science- and technology-dominated market. Our cryogenics lab is also involved in various outreach activities, such as contributing science demonstrations for the annual open house event at the NHMFL.

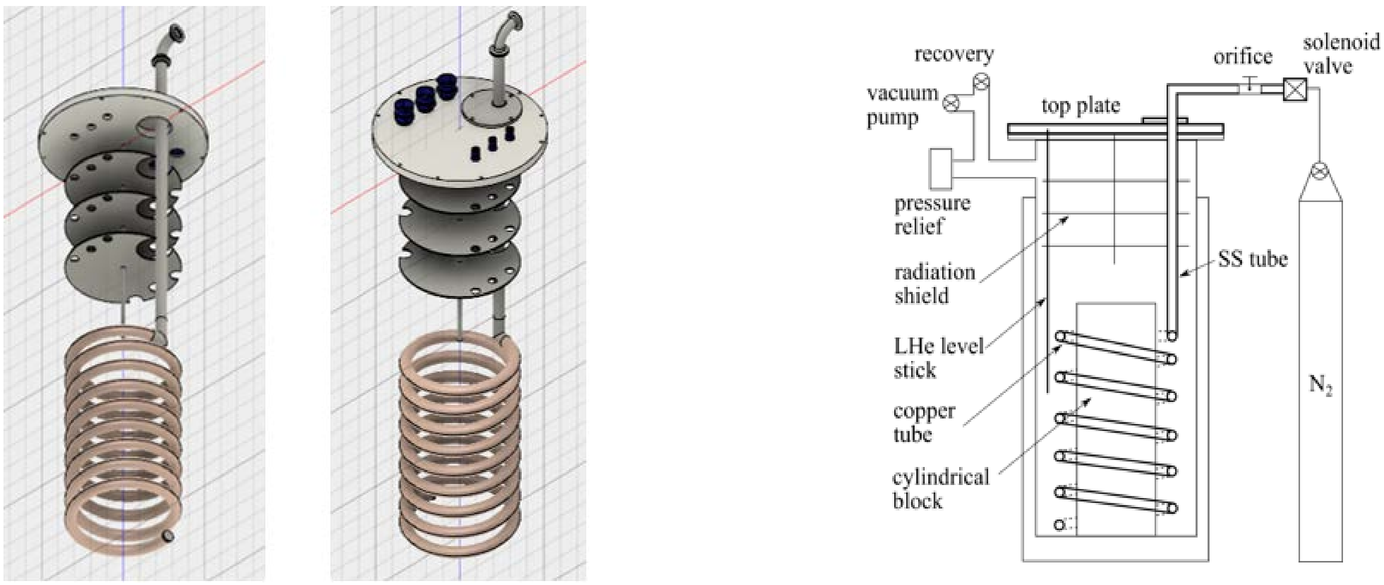


Figure 4.2.3: (a) Schematic of the helix tube and the top flange of the cryostat. (b) Schematic diagram of the vaccum break experiment in He II.

4.3. CMS/UF PHYSICS/UF CHEMISTRY

Here we present a few exciting research discoveries from both our teaching and research MagLab faculty that are not driven by our users but by our faculty themselves. We present this because the strength of our MagLab faculty's in-house science is crucial to the success of our user facility. Our faculty are internationally known for their front-line science, which leads to a world-class scientific environment, which drives innovation for our user program. Our international acclaim brings new users and stresses the eminence of our MagLab. There are many more examples of exciting in-house research than shown here – these were chosen for impact and breadth, as decided by our chief scientist.

We start with some theory examples encompassing graphene, the fractional quantum Hall effect, frustrated magnetism, novel algorithms for quantum computation and strongly correlated electron systems, including spin-ladder systems and a novel composite paring mechanism for unconventional superconductors. We then present experimental works that cover a variety of topological materials and strongly correlated electron systems, light-switchable magnetic systems, the discovery of a topological quantum phase transition and the discovery and elucidation of novel properties of 2D semiconductors.

Strong Coupling Phases of the Twisted Bilayer Graphene near Magic Angle

The recently discovered correlated phases in the twisted bilayer graphene near the magic angle have opened a new field in condensed matter physics and sparked an intense activity among both experimentalists and theorists. To understand the correlation in this system, Kang (NHMFL postdoc) and Vafek projected the Coulomb interaction onto previously constructed Wannier states. They then studied the ground states at the commensurate fillings. Their calculation demonstrated that the projected interaction goes beyond the description of any extended Hubbard model. The interaction has an emergent SU(4) symmetry in the spin-valley space and favors SU(4) ferromagnetism. Furthermore, their work has identified the origin of the "exotic" terms in the interaction, and revealed the profound connection between the nontrivial topological band structure and the ferromagnetism – subsequently observed experimentally -- in the strong coupling limit. As a consequence, their work has unified the ferromagnetism found in QHE as well as other topological systems with flat bands. While the ground states of the interaction only are largely degenerate due to SU(4) symmetry, the kinetic energy lifts this degeneracy and selects the spin-nonmagnetic state with the intervalley coherent order. This work also provides a starting point to study the Cooper pairing mechanism in this system **(Figure 4.3.1)**.

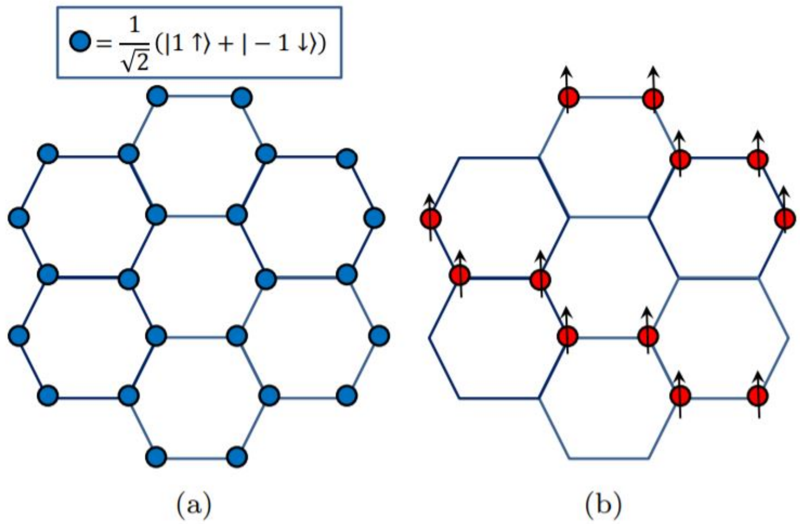


Figure 4.3.1: The predicted ground state at the filling of (a) v=2 and (b) v=3. When v=2, each site has exactly one particle with the same spin and valley state. The kinetic energy then forces this state to be the intervalley coherent one, when v=3. Kang and Vafek proposed that the system is in the ferromagnetic stripe phase with translation symmetry breaking.
J. Kang and O. Vafek, *Phys. Rev. Lett.* 122, 246401 (2019).

3D and Half Integer Quantum Hall Effect

In "Three-dimensional Quantum Hall effect and metal-insulator transition in ZrTe5" and "Surface chiral metal in a bulk half-integer quantum Hall insulator", Kun Yang collaborated with two separate experimental groups and contributed to the observation and understanding of Quantum Hall effect in anisotropic 3D and quasi-2D bulk systems respectively. In particular, in the first work the 3D Quantum Hall effect is due to interaction-driven charge-density wave formation, while the second work observed the long-anticipated chiral surface state in such bulk Quantum Hall systems. These discoveries significantly expanded the realm of topological phases of matter.
F. Tang et al., *Nature* 569, 537 (2019)
J. Y. Liu, et al., a*rXiv:*1907.06318

Equilibrium and Non Equilibrium Dynamics of Geometrically Frustrated Magnet

Changlani's group has been actively researching geometrically frustrated magnets. A big motivation to look at models and materials in this area is to find quantum spin liquids (QSLs); enigmatic phases of matter that arise out of strong correlations and those that are characterized by the absence of symmetry breaking and conventional quasiparticles. QSLs are potentially useful for quantum computation, and doping them may lead to superconductivity. Certain QSLs show dynamical signatures that hint at their presence in inelastic neutron scattering (INS). For example, the Coulomb phase is characterized by "pinch points" and "bow-tie" like features. This requires modeling materials using computational resources at the research computing center (RCC) at FSU. Changlani group's focus is on looking for QSLs in frustrated triangular, kagome and pyrochlore geometries in spin-1 materials. While there have been significant efforts to synthesize quantum spin liquid materials in spin-1/2 systems in two dimensions (e.g., herbertsmithite) and study them theoretically, fewer efforts have been devoted to three dimensions and higher spins. Recent work by them and their collaborators suggest both these search criteria may be too restrictive.

Over the past year, Changlani's group completed work on computing the dynamical spin structure factor of the nearly idealized S=1 pyrochlore Heisenberg antiferromagnet $NaCaNi_2F_7$, with collaborators at Johns Hopkins, Brown and Max Planck Dresden using a combination of classical and semiclassical techniques [1]. The computational strategy was used to explain INS features of another QSL candidate in a spin-orbit coupled system, $Yb_2Ti_2O_7$ (see **Figure 4.3.2**, left-top panel and right panel) [2], our work addresses many long-standing questions on it. The agreement between Changlani's simulations and experiment is remarkably good, and hints at the existence of multiphase magnetism in this material. Two works have been posted on the arXiv in December 2019 and are under review in PRX and PRB [2, 3]. Finite temperature quantum dynamics in the S=1 ferromagnetic chain NiNb2O6 was also studied and explained, which led to a PRL this year [4].

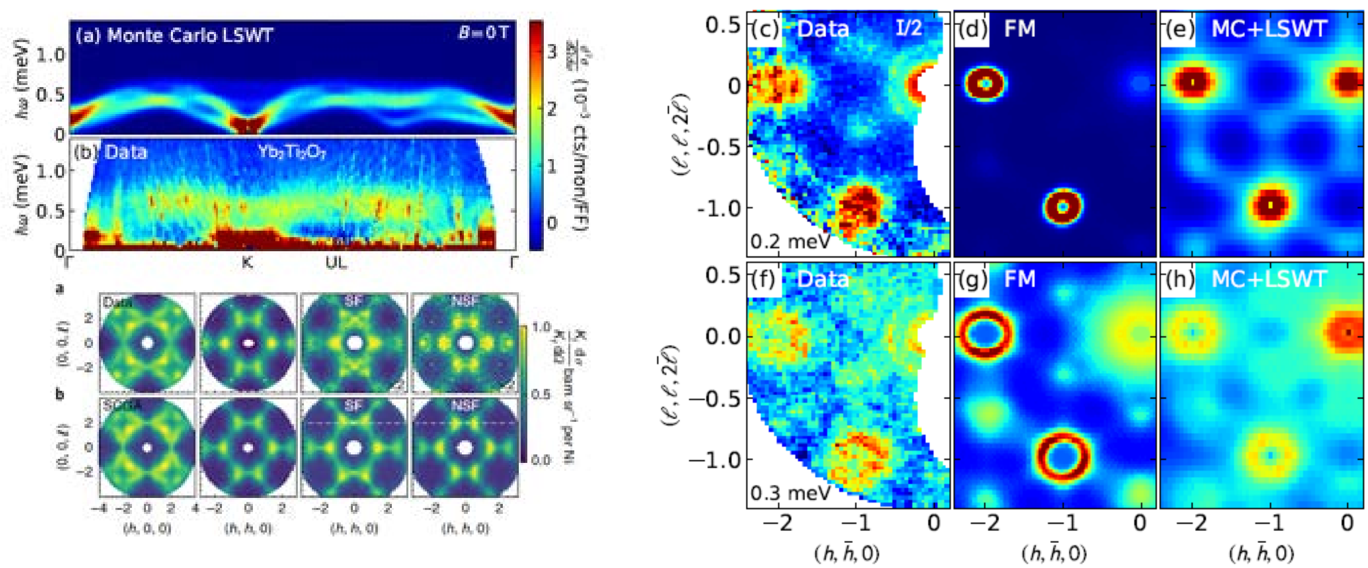


Figure 4.3.2: Left-top panel shows the comparison between theory (semiclassical + Monte Carlo) and experiment for the dynamical structure factor along a one dimensional pathway in momentum space. The right panel shows the momentum dependence at constant energy, which supports the picture of multiphase magnetism. Left-bottom panel shows comparisons of the static structure factor (integrated dynamical structure factor), which was used to obtain the effective Hamiltonian parameters.

Additionally the results of our older theory work (before FSU) have found recent support in experiments on $Na_2Ti_3Cl_8$, a candidate S=1 kagome material, synthesized and studied by McQueen at Johns Hopkins. Two phases, a structurally perfect kagome and one with a large trimerized distortion, driven by spin lattice coupling were observed. Encouraged by these observations, Changlani's group (in collaboration with Professor Turan Birol and Dr. Arpita Paul at U Minnesota) used a combination of DFT-downfolding and quantum many-body method such as exact diagonalization and DMRG, to understand the mechanism of trimer formation. This paper is under review in PRL [5].

While explaining experiments and real materials is a priority for the group, Changlani et al, are also taking concrete efforts in the conceptual development of a framework to understand non-equilibrium dynamics. One such effect is that of "quantum scars," which lead to unusual macroscopic quantum revivals of the many body quantum state for certain carefully selected initial conditions. Inspired by their efforts in the area of frustrated magnetism, they have recently developed a new model for understanding such scar states [6]. **Figure 4.3.3** demonstrates, that depending on the starting state there can be robust quantum revivals of the Loschmidt echo in a coherent state (which is athermal in nature) — here, the system remembers its history, or there can be thermalization if one starts with a purely random state.

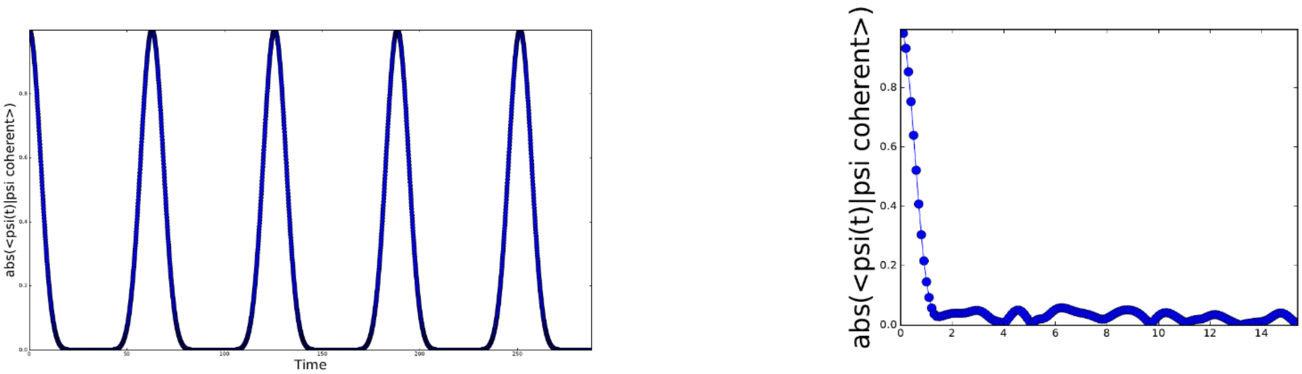


Figure 4.3.3: Loschmidt echo for two starting states when time evolved by the XXZ Hamiltonian: (left) coherent state, (right) random state in a model of a frustrated magnet invented by the PI. This model is a simple two body Hamiltonian on the kagome lattice with staggered FM-AFM interaction strengths. It provides one of the first examples of this phenomenon in two and higher dimensions.

[1] S. Zhang, H.J. Changlani, K. Plumb, O. Tchernyshyov, R. Moessner, *Phys. Rev. Lett.* 122, 167203 (2019)
[2] A. Scheie, J. Kindervater, S. Zhang, H. J. Changlani, G. Sala, G. Ehlers, A. Heinemann, G. S. Tucker, S. M. Koohpayeh, C. Broholm *arXiv:*1912.04913, under review (2019)
[3] S. Säubert, A. Scheie, C. Duvinage, J. Kindervater, S. Zhang, H.J. Changlani, G. Xu, S.M. Koohpayeh, O. Tchernyshyov, C.L. Broholm, C. Pfleiderer, *arXiv:*1912.11058, under review (2019)
[4]P. Chauhan, F. Mahmood, H. J. Changlani, S. M. Koohpayeh, and N. P. Armitage, *Phys. Rev. Lett.* 124, 037203 (2020)
[5] A. Paul, C-M. Chung, T. Birol, H.J. Changlani, *arXiv*:1909.02020, under review (2019)
[6] K. Lee, R. Melendrez, A. Pal, H. J. Changlani (in preparation)

Designing Pulse Sequences for Exchange-Based Quantum Computation

Introduction

Semiconductor quantum dots with trapped electrons are promising systems for manipulating spin-1/2 particles for quantum computation. For a recent state-of-the-art experiment on a so-called three-spin qubit realized in this way, see [1].

To use such qubits for quantum computing it is necessary to find pulse sequences in which the exchange interaction between pairs of spins are turned on and off in particular patterns that realize desired quantum gates. Designing such sequences is straightforward for single-qubit gates but poorly understood for two-qubit gates. The difficulty comes from the no-leakage constraint combined with the large search space of operators acting on six spins (corresponding to two three-spin encoded qubits). Not surprisingly, the most efficient known two-qubit gate sequence, due to Fong and Wandzura [2], was found by a numerical brute force search that offered little insight into its derivation or degree of optimization. Furthermore, existing analytic derivations of less optimal sequences are lengthy and complicated (see, e.g., [3, 4]).

Results and Discussion

Building on earlier work [4] in which the numerically obtained optimal pulse sequence of [2] was "reverse engineered" in order to understand its structure, we have developed a set of analytic tools that allows us, for the first time, to explicitly design two-qubit gate pulse sequences for exchange-based quantum computing [5]. These new sequences can be used to carry out arbitrary controlled-rotation gates, not just CNOT gates, which are useful for a number of quantum algorithms, and can, in some cases, be shown to be "optimal" in a certain sense. Two of these new sequences are shown in **Figure 4.3.4**. See [5] for details.

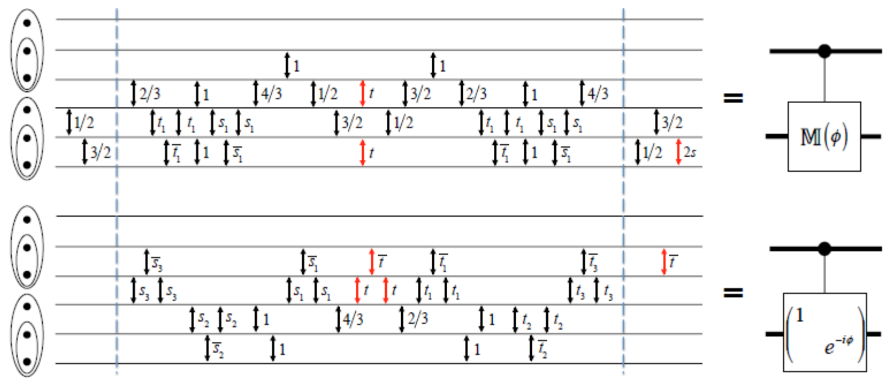


Figure 4.3.4: Two pulse sequences acting on six spin-1/2 particles encoding two qubits. Time flows from left to right. Double arrows indicate exchange pulses and are labeled by pulse duration in units of π/J. (For values of some durations not given, see [5]). By varying the red pulses arbitrary controlled-rotation gates can be performed. Unlike previous such sequences, these sequences were constructed analytically and in the case of the top sequence can, in at least some well-defined sense, be shown to be optimal.

Conclusions

We have developed new analytic tools for designing efficient pulse sequences for spin-based quantum computing using the exchange interaction. As the quality of spin qubits continues to improve it is likely these and related sequences will become useful in the actual implementation of simple quantum algorithms in these systems in the near future.

[1] Andrews, R.W., et al., *Nature Nanotechnology* 14, 747 (2019).
[2] Fong, B.H. and Wandzura, S.M., *Quantum Information & Computation* 11, 1003-1018 (2011).
[3] Zeuch, D. and Bonesteel, N.E., *Physical Review A (Rapid Communications)* 93, 010303(R) (2016).
[4] van Meter, J.R. and Knill, E., *Physical Review A* 99, 042331 (2019).
[5] Zeuch, D. and Bonesteel, N.E., *arXiv*:2001.09341, Submitted to Physical Review B. (2020).

Connection between Mott Physics and Crystal Structure in a Series of Transition Metal Binary Compounds

Predicting the ground-state structure of crystalline materials, initially thought to be an unsolvable problem, became an active area of research with the advent of efficient numerical implementation of computational total energy methods. Various approaches to exploring potential energy surface of solids (PES) from first principles (ab- initio thermodynamics) have been developed, leading to exciting discoveries such as superconducting dense hydrogen sulfide, new and intriguing forms of matter at elevated pressures and new functional materials. The space of strongly correlated electron systems, on the other hand, represents a virtually untapped territory for finding new materials exhibiting potentially ground-breaking physical properties. However, exploring the PES of these materials (usually d- or f-electron systems) poses significant challenges. This includes both the "choice" of the ground-state structure and the energy ordering of different PES local minima. In order to investigate these fundamental questions, here we study [1] the influence of strong electronic correlations present in six transition metal binary oxides and chalcogenides (CrO, MnO, FeO, CoO, CoS, and CoSe) in four common crystal structure types shown in **Figure 4.3.5** (rocksalt, NiAs-type, zincblende, and wurtzite). To perform the necessary quantum simulations we combine the local density approximation (LDA) with the rotationally-invariant slave-boson mean-field theory (RISB) [2]. for all Mott systems considered we found that the main qualitative features inherent in the influence of the strong electron correlations on the crystal structure can be understood in terms of a simple electrostatic model [3] based on the sole knowledge of the d- electron occupations. In particular, these results indicate that one of the key physical effects to be simulated accurately for predicting the energy ordering of these materials is the variation of charge transfer induced by the strong d-electron correlations around the Mott point.

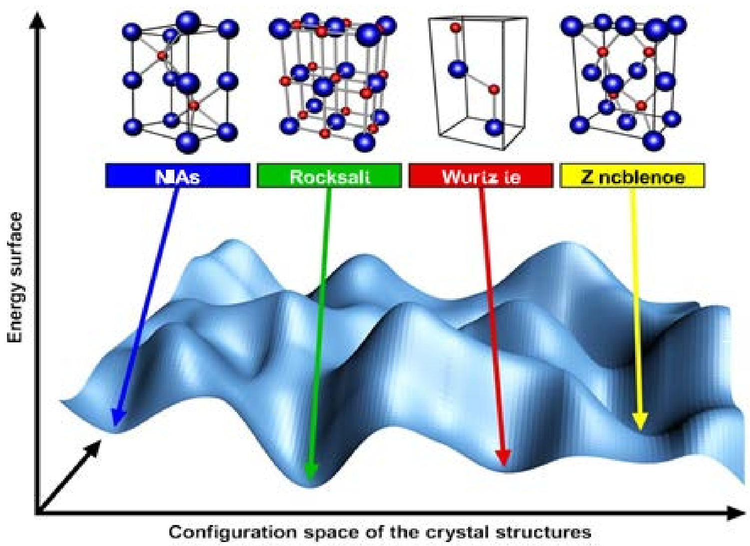


Figure 4.3.5: Representation of generic energy profile as a function of the crystal configuration. Crystal structures considered in this work: NiAs-type, rocksalt, wurtzite and zincblende.

[1] N. Lanatà, T.-H. Lee, Y.-X. Yao, V. Stevanović, and V. Dobrosavljević, *NPJ Computational Materials (Nature)* 5, 30 (2019).
[2] N. Lanatà, Y.-X Yao, X., Deng, V. Dobrosavljević, and G. Kotliar, *Phys. Rev. Lett.* 118, 126401 (2017).
[3] V. Stevanović, M. d'Avezac, and A. Zunger, *Phys. Rev. Lett.* 105, 075501 (2010).

Density Functional Theory Calculations of the Temperature Dependence of Nuclear Quadrupole Resonance Parameters

One of the more interesting aspects of bosonic physics of molecular magnet systems was the observation of magneto-electric effects in the spin ladder compound dichloro-tetrakis-thiourea-Ni. The Ni spins have spin 0 ground state and a $S_z = \pm 1$ excited state. Ordering of the Ni spins occurs at high fields and low temperatures. One possible probe of the magnon excitations at low temperatures was identified as the 14N nuclear quadrupole resonance (NQR), but the resonance absorption frequency was unknown. Graduate student Allen Majewski developed a first principles method for calculating the temperature dependent quadrupole resonance spectra using density functional theory (DFT). The results were compared favorably with known NQR measurements for paradichlorobenzene and β-octahedral-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (or HMX). *arXiv*:1903.10097

Publication

Ph.D. Thesis, "Density Functional Theory Calculations of Temperature Dependent NQR Parameters in Solid Crystalline Materials," Allen Majewski, August 2019, Supervisor: N. S. Sullivan.

Strong-Coupling Study of Interlayer Pairing in Bilayer Composite Fermion Metals

Introduction

The ν=1/2+1/2 Quantum Hall bilayer system can, at large enough layer spacing, be viewed as two decoupled ν=1/2 composite fermion metals. This bilayer system allows for a description in terms of two species of composite fermions coupled to two singular bosonic gauge fields, one attractive and one repulsive in the interlayer BCS channel, whose strengths can be controlled by changing the ratio of the layer spacing to the magnetic length.

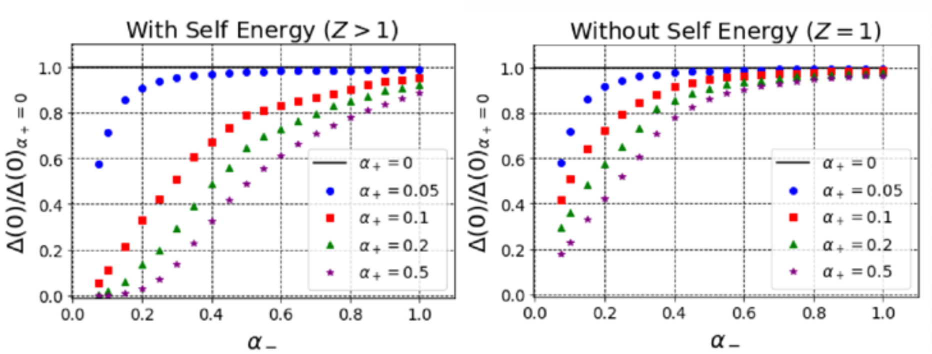


Figure 4.3.6: T=0 energy gap plotted vs α - (coupling constant for the singular attractive interlayer pairing interaction) for different values of α+ (coupling constant for the singular repulsive interlayer pairing interaction). Results are shown both for the case of ignoring self-energy effects (left) and including them (right).

Results and Discussion

We have studied the T=0 Eliashberg equations for this system in order to better understand the interplay between the attractive and repulsive interactions, and the breakdown in Fermi liquid theory due to the singular nature of these interactions [1].

Our solution of the T=0 Eliashberg equations includes, for the first time as far as we can tell, both the pairing and pair-breaking effects of the two bosonic fields and self-energy effects. We compare our results both with previous Eliashberg results which do not take the self-energy effects into account [2], and results obtained using a renormalization group approach [3]. One key result of our work is illustrated in **Figure 4.3.6,** which shows the ratio of the energy gap in the presence of a singular pair breaking interaction (with different values of the dimensionless repulsive coupling α +) to its value when there is no singular pair breaking, plotted versus the dimensionless coupling constant governing the singular "pair making" interactions, α -. Results are shown both for the cases that the self-energy effects are ignored and included. The former was studied [2], and in that case our results agree with this previous work. The results with self-energy effects are new and show that while including these effects enhances the suppression of the gap, the gap still never closes, even as the pair breaking effects are turned up by increasing α +, in agreement with the RG analysis of [3] (although there is some question whether this RG approach adequately treats self-energy effects).

Conclusions

The bilayer ν =1/2+1/2 system provides an interesting theoretical (and potentially experimental) laboratory to study pairing in non-Fermi liquids. Our hope is that our Eliashberg results will help elucidate this still poorly understood interplay between pairing, pair-breaking and non-Fermi liquid physics due to singular, long wave length bosonic fluctuations.

[1] Mendoza, L., and Bonesteel, N.E., In preparation.
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[3] Sodemann I., Kimchi I., Wang C., and Senthil T. *PRB* 95, 085135, (2017).

Multiple Dirac Nodes and a Symmetry Protected Dirac Nodal Line in Orthorhombic α-RhSi

Owing to their chiral cubic structure, exotic multifold topological excitations were predicted, and recently observed, in transition metal silicides like α-RhSi [1,2]. Nevertheless, we report that the topological character of RhSi is preserved in its orthorhombic α-phase, which displays multiple types of Dirac nodes very near the Fermi level (ε_F) with the near absence of topologically trivial carriers (**see Figure 4.3.7**). We discuss the symmetry analysis, band representations, the band structure and the nature of the Dirac points occurring near ε_F. The de Haas-van Alphen effect (dHvA) indicates a Fermi surface in agreement with the calculations **(Figure 4.3.8)**. We find an elliptically shaped nodal line very close to ε_F around and near the S-point on the k_y - k_z plane that results from the intersection of two upside-down Dirac cones. Each of the participating bands are Kramers degenerate, hence an accessible magnetic field might induce a crossing between the spin-up partner of the upper band and the spin-down partner of the lower band, explaining perhaps anomalies observed in the magnetic torque.

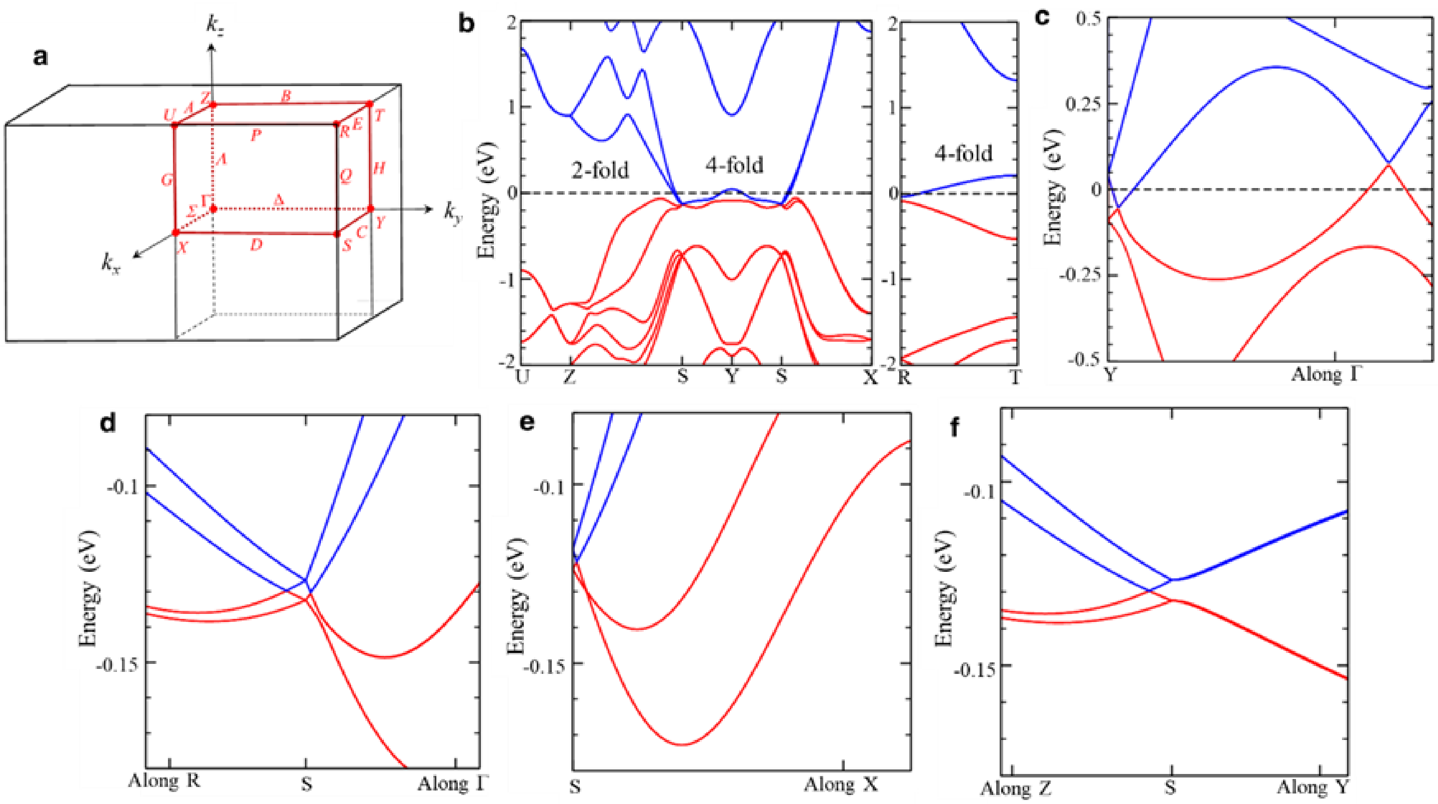

Figure 4.3.7: (a) High-symmetry points on the orthorhombic BZ. (b) Electronic band structure along various high symmetry directions where the 4-fold high-symmetry BZ boundary lines are indicated. (c), (d), (e), (f) Band structure along the various high-symmetry directions starting from the S point, i.e., along the *Y*Γ, *SR* and *S*Γ, *SX*, *ZS* and *SY* directions, respectively. According to our group-theory analysis regarding the connectivity of the *S* point, there are band crossings along the *SR* and *SX* directions. While we cannot analyze the connectivity along the *S*Γ direction, there seems to be a band crossing also along this direction.

Single crystals of α-RhSi were obtained using a molten tellurium flux. Conventional magnetotransport experiment were performed in a physical property measurement system (Quantum Design-PPMS) under magnetic fields up to $\mu_0 H$ = 9T and temperatures as low as 2K using a conventional four terminal method. The angular dependence of the de Haas-van Alphen (dHvA) effect under continuous fields up to $\mu_0 H$ = 31T were performed in a resistive Bitter magnet at the National High Magnetic Field Laboratory (NHMFL) in Tallahassee, FL, using a piezoresistive microcantilever technique. A 3He cryostat where the samples were immersed in liquid ^{3}He, in combination with a rotating probe was used for high field experiments at temperatures down to 0.35K.

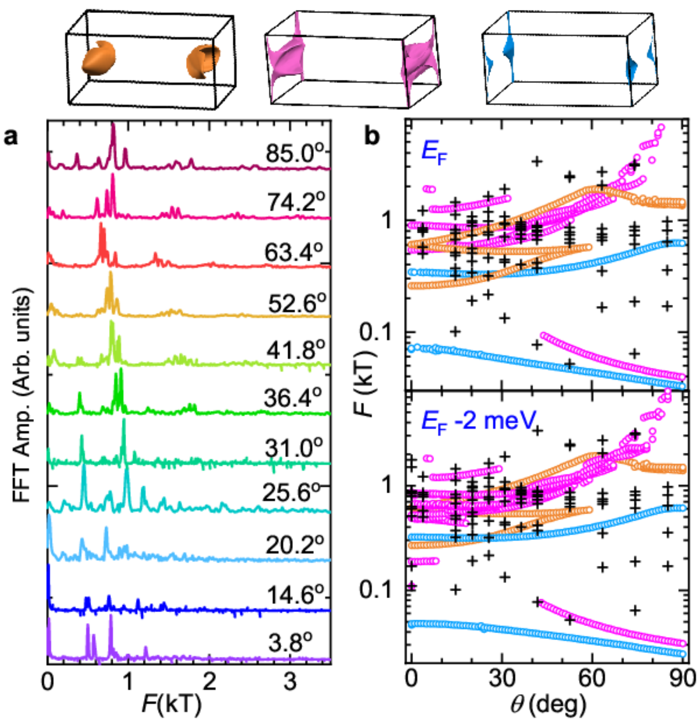

Figure 4.3.8: (a) Fast Fourier transform spectra of the oscillatory component superimposed onto the magnetic torque t for four different angles between the external field and the crystallographic (110)-direction. The oscillatory data was collected at T=350mK and is displayed in Figure S3. (b) Angular dependence of the dHvA frequencies $F(\theta)$ for the position of the Fermi energy ε_F yielded by the DFT calculations (upper panel) and with ε_F displaced by just -2 meV (lower panel). Colored markers represent the dHvA frequencies obtained from the DFT calculations. Black crosses depict the position of the peaks observed in the FFT spectra. Notice the slightly better agreement between the experimental data and the frequencies resulting from the shift of ε_F. Top panels display the Fermi surface sheets according to DFT. Their color is chosen to match those of the markers depicting the associated dHvA frequencies.

[1] P. Tang et al., *Phys. Rev. Lett.* 119, 206402 (2017); G. Chang et al., *Phys. Rev. Lett.* 119, 206401 (2017).
[2] D. S. Sanchez et al., *Nature* 567, 500 (2019).

Origins for Gap-Like Behaviors in URu_2Si_2 – A Combined Study via Quasiparticle Scattering Spectroscopy and Resistivity Measurements

Despite decades of intensive research [1], a key question still remains: whether the HO is primarily associated with itinerant or localized electrons. Quasiparticle scattering spectroscopy (QPS) applied to heavy fermions enables to detect a hybridization gap in the bulk [2,3]. The group led by Dr Wan Kyu Park has performed QPS studies on URu_2Si_2 containing P [4] and Fe [5] substituents, whose phase diagrams are shown in **Figures 4.3.9(a) and (b)**, and has also advanced an interpretation of gap-like behavior in electrical resistivity, an alternative to Fermi surface gapping. The extracted hybridization gaps are plotted in **Figures 4.3.9(c) and (e-g)**, for P- and Fe- substituted series of compounds, respectively. The hybridization gap opens regardless of the emergent ordering, indicating that the hybridization is a general process in these compounds instead of being strongly associated with the phase transition. Because QPS detects quasiparticle scattering around the Fermi level, the absence of an abrupt change in the conductance spectra upon the onsets of phase transitions suggests that these transitions originate from localized electrons rather than itinerant ones. Furthermore, as an alternative way to understand gap-like behaviors, they show that gapped bosonic excitations [6] in an ordered state are responsible for both the resistivity jump-decay behavior and the E1 gap in inelastic neutron scattering. Their analysis also provides a natural explanation for the Hall effect without invoking the Fermi surface gapping.

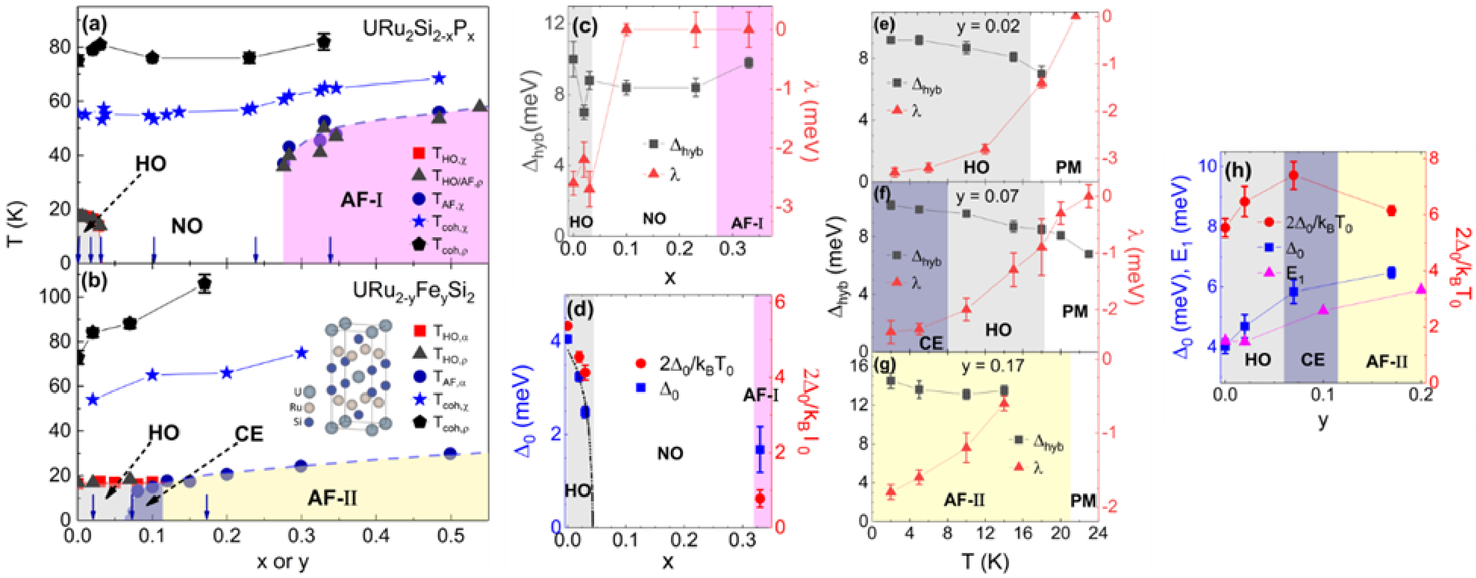

Figure 4.3.9: (Unpublished) (a) Temperature vs. P-content (T-x) phase diagram of $URu_2Si_{2-x}P_x$, (URSP) adapted from the literature based on the measurements of magnetic susceptibility (χ) and electrical resistivity (ρ). AF-I stands for antiferromagnetic order and NO for no-order. T_{coh} denotes the coherence temperature. (b) T-y phase diagram of $URu_{2-y}Fe_ySi_2$ (URFS) constructed based on thermal expansion coefficient (α) and resistivity, and magnetic susceptibility measurements. AF-II stands for antiferromagnetic order and CE for coexisting orders. The inset depicts a unit cell of URu_2Si_2. In both panels, vertical arrows along the horizontal axis indicate substituent concentrations studied in this work. (c), (e-g) Hybridization gap (Δ_{hyb}) and renormalized f-level (λ) extracted from an analysis of the QPS data on URSP and URFS, respectively. Labels denote different regions in the phase diagram. (d), (h) The extracted gap value at zero temperature (blue squares) from an analysis of the resistivity data on URSP and URFS, respectively. The dashed line is a guide to the eye. Red circles represent the gap ratio, $2\Delta_0/k_BT_0$, where T_0 is the ordering temperature. The E1 gap for URFS shown in (h) is cited from Ref. [7]. Solid lines are a guide to the eye.

[1] J. A. Mydosh and P. M. Oppeneer, *Rev. Mod. Phys.* 83, 1301 (2011).
[2] W. K. Park, P. H. Tobash, F. Ronning, E. D. Bauer, J. L. Sarrao, J. D. Thompson, and L. H. Greene, *Phys. Rev. Lett.* 108, 246403 (2012).
[3] W. K. Park, S. M. Narasiwodeyar, E. D. Bauer, P. H. Tobash, R. E. Baumbach, F. Ronning, J. L. Sarrao, J. D. Thompson, and L. H. Greene, *Philos. Mag.* 94, 3737 (2014).
[4] A. Gallagher, K.-W. Chen, C. Moir, S. Cary, F. Kametani, N. Kikugawa, D. Graf, T. Albrecht- 6 Schmitt, S. Riggs, A. Shekhter, and R. E. Baumbach, *Nat. Commun.* 7, 10712 (2016).
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[6] E. Jobiliong, J. Brooks, E. Choi, H. Lee, and Z. Fisk, *Phys. Rev. B* 72, 104428 (2005).
[7] T. J. Williams, A. A. Aczel, M. B. Stone, M. N. Wilson, and G. M. Luke, *Phys. Rev. B* 95, 104440 (2017).

Publication

S. Zhang, G. Chappell, N. Pouse, R. E. Baumbach, M. B. Maple, L. H. Greene, W. K. Park, submitted to *Phys. Rev. Lett.*

Enhanced Thermoelectric Performance of Heavy-Fermion Compounds $YbTM_2Zn_{20}$ (TM = Co, Rh, Ir) at Low Temperatures

The f-electron state is a main driver of the chemistry and physics in actinide-based intermetallics and influences properties ranging from the functional (e.g., crystal structure/density, melting temperature, and thermal conductivity) to the exotic (e.g., unconventional superconductivity and magnetism). This is due at least in part to the remarkable flexibility of the f-electron valence. In the current study we extend our ongoing investigation of f-electron materials that feature (1) cage-like and large unit cell crystalline structures and (2) are robust against high temperatures, corrosion, etc., to include an additional family of materials: those with the chemical formula AB_2C_{20} (A = lanthanide and actinide, B = transition metal, and C = Al or Zn). We have previously proposed that these types of materials may be useful as environments for storing radioactive elements. Here we focus on $YbTM_2Zn_{20}$ (TM = Co, Rh, Ir) in preparation for an upcoming effort to replace Yb with transuranic elements. During this effort, we unexpectedly found that these compounds exhibit attractive thermoelectric properties.

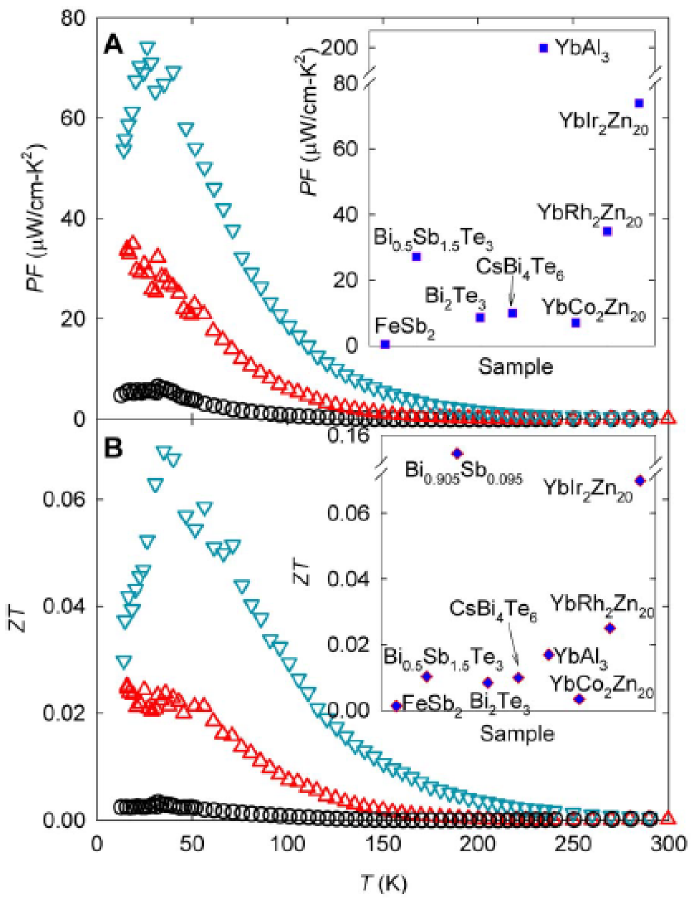

Figure 4.3.10: Temperature dependent power factor (PF) and thermoelectric figure of merit (ZT) for $YbTM_2Zn_{20}$. Temperature dependent (a) PF and (b) ZT of $YbCo_2Zn_{20}$ (circle), $YbRh_2Zn_{20}$ (up-triangle) and $YbIr_2Zn_{20}$ (down-triangle). The insets in (a) and (b) are the PF and ZT values of several well-known thermoelectric materials at 35K plotted together with parent compounds.

Thermoelectric materials hold tremendous promise for advances in fundamental science and future applications, including electricity generation in extreme and remote environments (e.g., using waste heat from a nuclear reactors or a radioactive heat source on a satellite), precision cooling of microscopic circuits, and even in wearable thermoelectric fabrics for environmental monitoring, medical, biometric, and other purposes. This is because the thermoelectric effect allows direct conversion between heat and electricity. Despite these advantages, for most materials the energy conversion efficiency is limited by the tendency for the electrical and thermal conductivity to be proportional to each other and the Seebeck coefficient to be small. Here we report counter examples, where the heavy fermion compounds $YbTM_2Zn_{20}$ (TM = Co, Rh, Ir) exhibit enhanced thermoelectric performance including a large power factor (PF = 74 mW/cm-K^2; TM = Ir) and a high figure of merit (ZT = 0.07; TM = Ir) at 35 K (**Figure 4.3.10**). The combination of the strongly hybridized electronic state originating from the Yb f-electrons and the novel structural features (large unit cell and possible soft phonon modes) leads to high power factors and small thermal conductivity values. This demonstrates that (1) with further optimization these systems could provide a platform for the next generation of low temperature thermoelectric materials and (2) that intermetallics that are attractive as potential radionuclide waste forms are also deep reservoirs for novel physics.

Funding
This work was performed at the National High Magnetic Field Laboratory, which is supported by NSF Cooperative Agreement No. DMR-1644779 and the State of Florida. The synthesis of single crystals was supported by the Center for Actinide Science and Technology (CAST), an Energy Frontier Research Center funded by the U.S. Department of Energy, Office of Science, Basic Energy Sciences under award no. DESC0016568. K.W. acknowledges the support of the Jack E. Crow Postdoctoral Fellowship. J.N.N. and T.S. acknowledge support from the NSF under award NSF DMR-1606952. G.S.N. acknowledges support from the NSF (grant no. DMR-1748188). G.S.N. and D.H. also acknowledge support from the II-VI Foundation Block-Gift Program

Light-Switchable Exchange-Coupled Magnet
Divya Rajan, John M. Cain, Tatiana Brinzari, Caue F. Ferreira, Nicholas G. Rudawski, Ashley C. Felts, Mark W. Meisel and Daniel R. Talham, ACS Appl. Electron. Mater. 1, 2471-2475 (2019), DOI:10.1021/acsaelm.9b00520

A novel light-switchable hard magnet/soft magnet core-shell composite was generated and identified, where visible light irradiation breaks the exchange coupling between the two components. Specifically, heterostructure composites composed of nanometer scale particles of the hard magnet cobalt ferrite with the soft magnet manganese ferrite possess a coherent response in magnetization versus applied field measurements, consistent with exchange coupling, which is disrupted upon illumination, causing an inflection at low fields corresponding to the soft magnet manganese ferrite, as shown in the figure. The light-induced decoupling of the exchange-coupled magnets can be attributed to the selective demagnetization at the surface of the ferrite nanoparticles, breaking the interferrite coupling, as described in work published by the Meisel-Talham collaboration in 2018 [1].

Funding
NSF funded cited: DMR-1405430 and DMR-1904596 (D.R.T.), DMR-1202033 and DMR-1708410 (MWM), and DMR-1157490 and DMR-1644779 (National High Magnetic Field Laboratory).

[1] "Light-induced magnetization changes in aggregated and isolated cobalt ferrite nanoparticles", T.V. Brinzari, D. Rajan, C.F. Ferreira, S.A. Stoian, P.A. Quintero, M.W. Meisel, D.R. Talham, *J. Appl. Phys.* 124, 103904 (2018); DOI: 10.1063/1.5040327

Quantum Fluids (Hydrogen) in Nanotubes
Currently there is broad international interest in the behavior of quantum fluids and solids in confined geometries where the physical dimensions are smaller than the de Broglie wavelength or the Fermi wavelength. In addition to their fundamental intertest in terms of quantum properties there are potentially important applications in terms of hydrogen storage, catalysis and CO_2 sequestration.

We have used NMR techniques to investigate the low temperature dynamics of HD molecules adsorbed as a monolayer on the internal surface of MCM-41, which consists of honeycomb arrays of hexagonal nanotubes with internal dimensions of 21-25Å. We studied HD rather than H_2 to avoid the effects of ortho-to-para H_2 conversion.

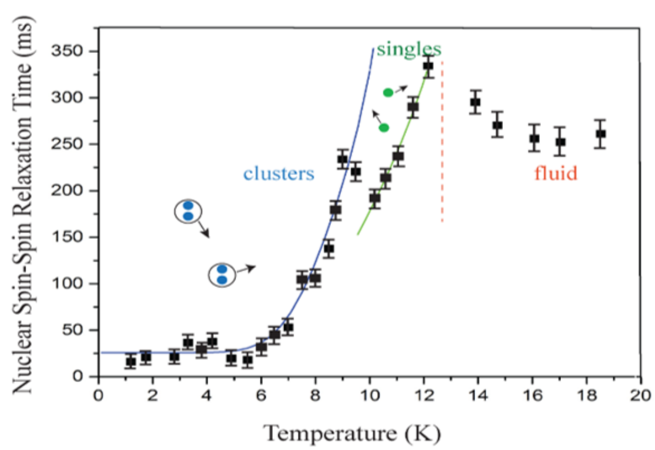

Figure 4.3.11: Temperature dependence of the nuclear spin-lattice relaxation of HD molecules inside MCM-41 nanotubes.

The NMR relaxation rates measure the rates of motion of the HD molecules and in the temperature range explored, 1.5-19K, and are expected to depend on the thermal diffusive motion of the molecules. The results shown in the **Figure 4.3.11**on the right reveal a sharp jump in the rate at 8.8 K and this is attributed to the formation of small bi-molecular clusters for T<8.8K as predicted by N. Wada *et al.* The thermal activation for the cluster motion was 56K with a local "jump" rate of 4.1×10^{-10}s.

Publication

C. Huan, J. A. Hamida and N. S. Sullivan, *J. Micro. & Meso. Materials*, 294,109921 (2020).

Possible Pressure-Induced Topological Quantum Phase Transition in the Nodal Line Semimetal ZrSiS

ZrSiS has gained interest due to unusual electronic properties: nearly perfect electron-hole compensation, anisotropic magnetoresistance, which can be as high as 1.4 × 105% at 2K and 9T, multiple Dirac nodes near the Fermi level, and an extremely large range of linear dispersion of up to ~2 eV. In recent work [1], we report measurements of Shubnikov-de Haas (SdH) oscillations in single crystals of ZrSiS under applied hydrostatic pressure. We find a clear change in the phase of the quantum oscillations between 0.16–0.5GPa, which is accompanied by an abrupt decrease in the oscillation frequency **(Figure 4.3.12)**. These changes are consistent with a pressure-driven topological quantum phase transition in which a bulk band gap is introduced. Higher pressure measurements to 20GPa show no evidence for the pressure-induced superconductivity that is observed in some other compressed topological materials. The apparent topological transition in ZrSiS occurs under modest pressures below 0.5GPa. This very low pressure makes it possible to study the transition using a variety of probes that are unavailable at higher pressures.

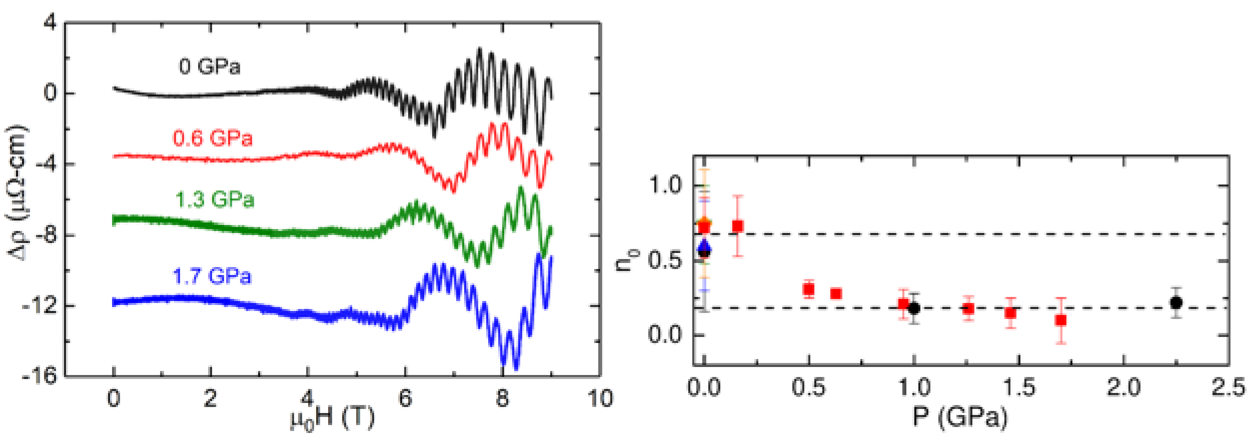

Figure 4.3.12: (Left) Oscillatory part of the resistivity versus magnetic field at various pressures for ZrSiS (H//c) measured at 2K. Two oscillation frequencies are observed, corresponding to ~16T and 245T. (Right) Between 0.16 and 0.5GPa, the phase of the low frequency oscillations (n_0) abruptly drops, consistent with a pressure-driven topological transition. The different colored points correspond to different samples.

[1] "Possible pressure-induced topological quantum phase transition in the nodal line semimetal ZrSiS," D. VanGennep, T. A. Paul, C. W. Yerger, S. T. Weir, Y. K. Vohra, and J. J. Hamlin, *Phys. Rev. B* 99, (2019)

Revealing Fundamental Properties of Novel Monolayer Semiconductors with High Magnetic Fields

Scientific Achievement

First experimental measurements of optoelectronic material parameters across the entire family of novel 2D semiconductors (MoS_2, $MoSe_2$, WS_2, WSe_2, etc.,) (**Figure 4.3.13**).

Significance and Impact

These parameters are essential ingredients for any rational design of future ultrathin optoelectronic and quantum devices incorporating 2D semiconductors.

Research Details

Historically, semiconductor properties relevant for opto-electronics (masses, dielectric parameters, etc...) have been revealed via optical spectroscopy in large, magnetic fields.

For the new family atomically-thin "transition-metal dichalcogenide" semiconductors such as MoS_2 and WSe_2, the required fields are huge (of order 100 Tesla) due to their 2D nature and very strong light-matter coupling.

Until now, many of these parameters were assumed from theory; these experiments up to 91 T provide quantitative values and, moreover, reveal gaps in existing models.

Publication

M. Goryca, J. Li, A. V. Stier, T. Taniguchi, K. Watanabe, E. Courtade, S. Shree, C. Robert, B. Urbaszek, X. Marie, & S. A. Crooker, *Nature Commun.* (in press, Sept. 2019) DOI: 10.1038/s41467-019-12180-y

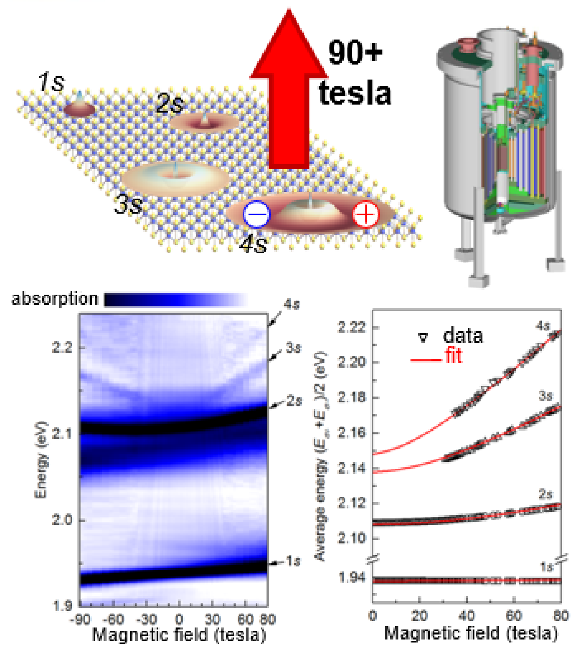

Figure 4.3.13: A one-monolayer-thick semiconductor with electron-hole pairs in their ground (*1s*) and excited (*2s*, *3s* ,..., *ns*) Rydberg states. Bottom: Optical absorption spectra showing how these states evolve with magnetic field, which reveals fundamental parameters such as mass & dielectric properties.

Magneto-Optics of Monolayer Semiconductors: Access to Fundamental Material Parameters

We measure the optical absorption spectrum of single monolayers of the "transition-metal dichalcogenide" semiconductors (MoS_2, WSe_2, etc.). In very high-quality samples, not only is the ground state (1s) exciton observed, but also its excited Rydberg states (2s, 3s, … ns). By measuring their diamagnetic shifts in very high magnetic fields, fundamental material parameters such as the exciton mass, the free-particle bandgap, and the 2D dielectric constant can be determined, independent of any model. To date, these properties have not been experimentally measured. However, knowledge of these fundamental material parameters is obviously necessary for rational design of future (opto) electronic devices comprising 2D materials. Whereas 20T was sufficient in conventional semiconductors (e.g., GaAs) to determine these parameters, in these new monolayer semiconductors the relevant field scales are much higher due to heavier carrier masses and 100x larger exciton binding energies. For example, in monolayer WS_2, 65T is just enough to observe and track Rydberg excitons (**Figure 4.3.14 b,c**), while for monolayer MoS_2 – due to larger mass – over 90T is needed to observe and track these states over a sufficient range (see **Figure 4.3.14 d**). Other 2D materials with larger masses and/or in less-screened dielectric environments will require fields in the 100T range.

Publication

M. Goryca, J. Li, A. V. Stier, T. Taniguchi, K. Watanabe, E. Courtade, S. Shree, C. Robert, B. Urbaszek, X. Marie and S. A. Crooker, "Revealing exciton masses and dielectric properties of monolayer semiconductors with high magnetic fields" *Nature Commun.* **10,** 4172 (2019). https://doi.org/10.1038/s41467-019-12180-y

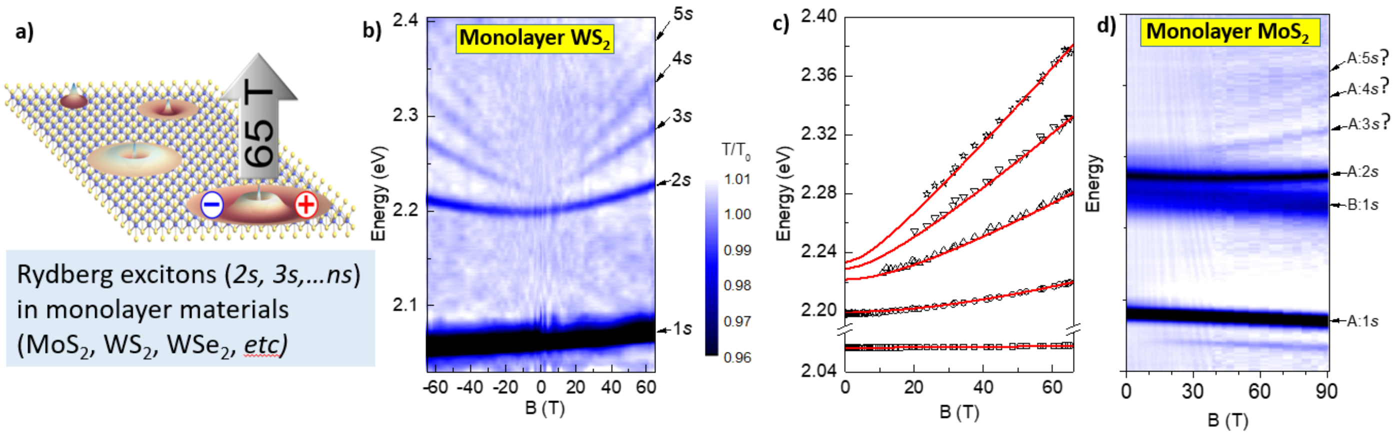

Figure 4.3.14: a) Diagram of experimental configuration; b, c) For monolayer WS_2, 65T is just enough to observe and track Rydberg excitons; d) for monolayer MoS_2 – due to its larger mass – over 90T is needed to observe and track these states over a sufficient range.

Magnetoelastic Coupling in URu_2Si_2: Probing Multipolar Correlations in the Hidden Order State

Time-reversal symmetry and magnetoelastic correlations were recently probed by means of high-resolution volume dilatometry in URu_2Si_2 at cryogenic temperatures and magnetic fields sufficient to suppress the hidden order state at H_{HO}(0.66K) ≈ 35T. A significant magnetoelastic volume expansion at and above H_{HO}(T), and even above T_{HO} was reported, possibly a consequence of field-induced *f*-electron localization. The authors investigated in detail the magnetostriction and magnetization as the temperature was reduced across two decades in temperature from 30K, where the system is paramagnetic, to 0.5K in the realm of the hidden order state. They found a dominant quadratic-in-field dependence $\Delta L/L$ proportional to H^2, a result *consistent with a state that is symmetric under time reversal*. The data shows, however, an incipient yet unmistakable asymptotic approach to linear ($\Delta L/L \propto 1 - H/H_0$) for 15T < H < H_{HO}(0.66K) similar to 40T at the lowest temperatures. The team interpreted these results in the framework of a Ginzburg-Landau formalism that proposes a complex order parameter for the HO phase to model the (H, T, p) phase diagram (**Figure 4.3.15)**.

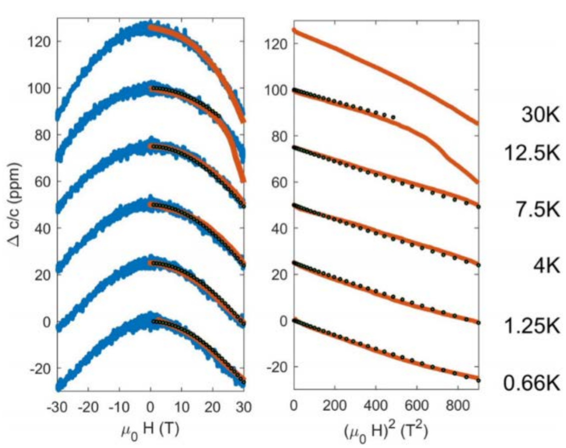

Figure 4.3.15: Waterfall plots of axial magnetostriction Δc/c versus magnetic field for linear (H) and quadratic (H^2) scales. Data taken in pulsed fields is displayed in blue, steady magnetic fields in red and values computed with a hyperbolic function are green circles. The high temperature magnetostriction follows a clear H^2 dependence. The low-temperature data (T < T_{HO}) follows a hyperbolic-like behavior that becomes more pronounced at 0.66K. No remanence or hysteresis, such as observed in piezomagnetic UO_2, is observed near or around H = 0. M. Wartenbe, RE Baumbach, A Shekhter, GS Boebinger, ED Bauer, CC Moya, N Harrison, RD McDonald, MB Salamon, and M Jaime *Phys. Rev. B* 99, 235101 (2019).

Enhanced Hybridization Sets the Stage for Electronic Nematicity in $CeRhIn_5$

High magnetic fields induce a pronounced in-plane electronic anisotropy in the tetragonal anti-ferromagnetic metal $CeRhIn_5$ at H* ≥ 30T for fields ≈20° off the *c*-axis. NHMFL scientists investigated the response of the underlying crystal lattice in magnetic fields to 45T via high-resolution dilatometry. At low fields, a finite magnetic field component in the tetragonal *ab* plane explicitly breaks the tetragonal (C4) symmetry of the lattice revealing a finite nematic susceptibility. A modest *a*-axis expansion at H* hence marks the crossover to a fluctuating nematic phase with large nematic susceptibility. Magneto-striction quantum oscillations confirm a Fermi surface change at H* with the emergence of new orbits. By analyzing the field-induced change in the crystal-field ground state, they concluded that the in-plane Ce 4*f* hybridization is enhanced at H*, in agreement with the in-plane lattice expansion. They, additionally, revealed that the nematic behavior observed in this prototypical heavy-fermion material is of electronic origin, and is driven by the hybridization between 4*f* and conduction electrons which carries the *f*-electron anisotropy to the Fermi surface **(Figure 4.3.16).**

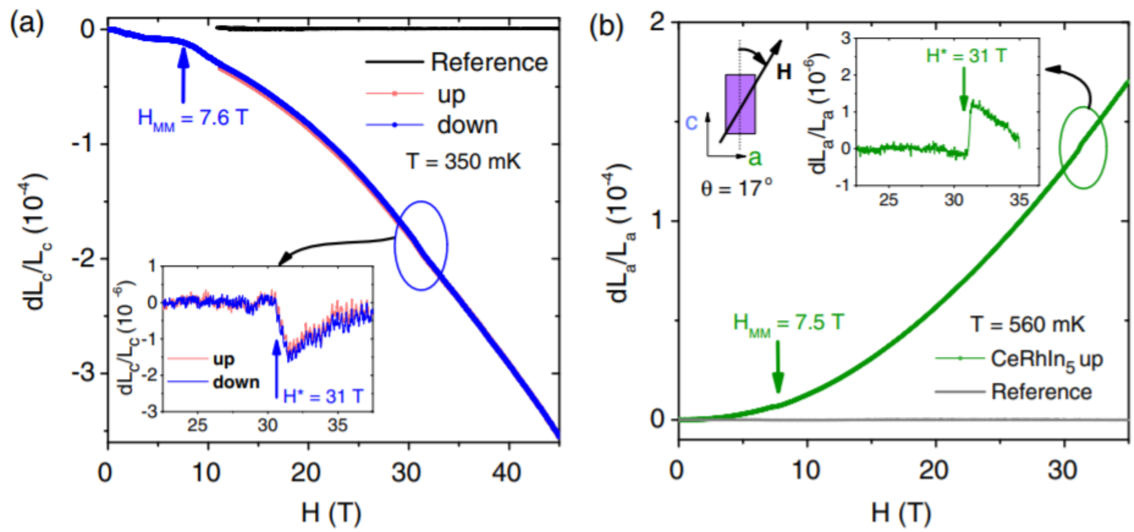

Figure 4.3.16: Magnetostriction of $CeRhIn_5$ along (a) the c-axis at T = 350mK and (b) the a-axis at T = 560mK for fields applied ≃20° off the c-axis. Here θ is the polar angle between the applied field and the c-axis. The azimuthal angle is set to φ = 90°. Insets show the data after a background subtraction. P.F.S. Rosa, S.M. Thomas, F.F. Balakirev, E.D. Bauer, R. Fernandes, J.D. Thompson, F. Ronning, and M. Jaime. *Phys. Rev. Lett.* 122, 016402 (2019).

4.4. MAGNETS AND MAGNET MATERIALS

Introduction

A central part of the MagLab's Mission is to develop, operate and maintain the new magnet systems that enable a world-leading high-magnetic-field user program. One of the MagLab's science drivers is to develop the materials and other technologies required to enable these and other state-of-the art magnets. While the MagLab's existing user facilities are based on copper alloys and low-temperature superconductors (LTS materials), tremendous potential for higher-performance magnets for most of the MagLab's facilities and science drivers lies in the development of magnets based on high-temperature superconductors (HTS materials). Our report describes continued development of magnet technologies based on REBCO (rare earth barium copper oxide $REBa_2Cu_3O_7$), Bi-2212 ($Bi_2Sr_2CaCu_2O_{10}$) and Bi-2223 ($Bi_2Sr_2Ca_2Cu_3O_{14}$). The world's first 32T superconducting magnet is now being commissioned at the MagLab, and we have initiated development of a 40T superconducting magnet. While these first two HTS magnets are for condensed matter physics and will reside in the millikelvin building in the DC Field facility, HTS magnets show tremendous potential to enable higher field NMR and ICR magnets as well. Our report also describes conductor research incorporating multiple suppliers. Because ambitious test coils create the necessary tortuous conditions that expose risks and limitations of HTS magnet technology, the magnets and materials science driver operates as an integrated program of conductor development, coil modeling and design and sub-scale coil construction and testing. In addition, our report describes advances in pulsed magnet technologies and high-strength high-conductivity conductor development. Collaborations with leading industry, academic and government groups are synergistic with the materials and magnets science driver, and our report describes work in this broader context as well.

In 2019 the installation of the 32T all-superconducting (32T SC) magnet system was completed and commissioning is beginning. This involved completing and connecting the power, instrumentation, control and protection sub-systems. While early tests required the protection sub-system engineering team to be directly involved, the completed sub-systems are much more autonomous to remove necessity of dedicated staff during user operation. Commissioning of the magnet system will continue into early 2020. We intend to bring this worldwide highest field superconducting magnet into routine operation to provide sustained high field environments at low dc power, with lower field ripple and electronic noise than for our resistive and hybrid magnets that each require tens of MW of dc power.

The newest magnet development project is the 40T all-superconducting (40T SC) magnet that began in late 2018. The first quarters of 2019 continued technology development toward 40T using all of the materials listed above. In mid-2019 new budget and schedule guidelines from NSF led to us down-selecting to only coil technologies based on REBCO conductor. Bi-based technologies were continued as general research not focused on 40T.

Collaboration with the high-energy physics community continues, particularly regarding development of higher current-density superconductors. We recently demonstrated that the properties of Nb_3Sn can be improved by adding Hf to the Nb-4Ta alloy typically used for the conductor fabrication. In a 2019 Jan Evetts-award-winning paper published in *Superconductor Science and Technology*, we showed that the layer J_c of a monofilamentary wire fabricated with Nb-4Ta-1Hf alloy can reach 3,710A/mm^2 at 4.2K and 16T thanks to the decrease of the A15 grain size (~50-60nm versus the typical 90-150nm) and the addition of point pins. Such high-layer J_c could lead in a Restacked-Rod-Process-like design to a non-Cu J_c of 2,230A/mm^2, exceeding by 50% the requirements for the Future Circular Collider.

HTS Magnets and Materials

HTS magnet technologies have general advantages and challenges indicated in **Table 4.4.1.** REBCO is a single-filament tape conductor, which becomes susceptible to deformation at the conductor edge due to forces created by screening currents. Since cracks are caused by the slitting process during conductor manufacture, there might be vulnerability to propagating these cracks under effects of screening currents, either by single excessive events, as revealed by after-quench damage in the MagLab's 45.5T test coil, or by cyclic loading at moderate stress. During 2019 great progress was made to understand screening currents that can be induced in tape-wound magnets, the resulting stress-strain state and the impact on fatigue life. This involved extensive electro-magnetic-structural modeling and benchmarking against results from coils tested in previous years at the MagLab and conductor scans using our unique Yates Star tool. New coils were designed and built based on our computational results, and our tests validate our methods, including a new record of 4,800 cycles to high strain for one coil.

Table 4.4.I. Advantages and challenges associated with different HTS magnet technologies

Technology	Advantages and Status	Primary Challenges
I-REBCO (1)	REBCO magnets can be wound with as-received conductors. Very high current density when thin substrate (normally 50 μm Hastelloy, minimum 20μm) and copper (normally 40μm thick, minimum 5μm) are specified. Used in the MagLab's 32T superconducting magnet which provided extensive engineering database and procedures. Multiple conductor sources.	(1) Need to understand the effects of screening currents and conductor's intrinsic anisotropy on the strain state of coils; (2) need to mitigate risks of crack propagation and understand fatigue limits of conductor and coils; (3) conductor properties vary from batch to batch and supplier to supplier, with hidden unknowns that undermine modeling and magnet engineering.
NI-REBCO (2)	Omission of insulation between turns enables copper stabilizer to be shared between multiple turns resulting in very compact coils. Mitigates risk of crack propagation by allowing current to bypass defects. Employed in MagLab's 45.5T test coil.	In addition to challenges (1)–(3) for I-REBCO: (4) need to develop reliable quench protection system (mitigate risks for over-current and over-stress during quench).
Bi-2223	Filamentary conductor, made in large quantities with uniform and predictable properties. Magnets can be wound from as-received conductor. Used in 24.5T magnet in Sendai, Japan, highest field SC magnet presently in routine service worldwide.	Low current density makes windings inefficient, leading to large and expensive coils. Conductor might be used in an intermediate coil between low-temperature superconducting coils and REBCO or Bi-2212 coils.
Bi-2212	The only twisted, multifilament round-wire HTS conductor, much like low-temperature superconducting magnet conductors. Besides insulated strand, cables are available. The MagLab is the only location worldwide with an over-pressure coil reaction facility, used to achieve 34.5T test coil and 5T accelerator insert magnet.	(1) Coils must be heat treated at ~900 °C and 50 bar pressure to achieve best properties; (2) need to achieve coils of moderate size and stored energy to validate increments of technology maturation.

(1) REBCO tape with insulation between turns.

(2) REBCO tape without insulation between turns. Two versions of this were being pursued: the "standard" approach using single-strand double pancakes and a novel "integrated coil form" approach involving layer-winding of multiple tapes.

Bi-2223 is a multifilamentary tape conductor solely available from Sumitomo Industries in Japan. The DI-BSCCO NX version comes laminated with stainless steel for strengthening and is ready to wind into magnets. Winding cannot take place over a small bend radius due to the brittle nature of the superconducting material. Our present assessment is that this material may best be used as an intermediate material between high current-density REBCO or Bi-2212 and low-temperature superconducting (LTS) coils.

Bi-2212 is a round wire technology much like LTS. Bi-2212 has made significant strides as a high field magnet technology through a progression of test coils. Activities in 2019 included two industry collaborations, with Cryomagnetics Inc. and Oxford Instruments — Nanoscience. The LTS-like architecture of Bi-2212 make it a desirable candidate for high field magnets that adapt proven LTS designs. Magnets for high energy physics and solenoids for nuclear magnetic resonance are the two major technology pushes. Fine-filament conductors could be important to high field inserts with high homogeneity and field stability. In our high pressure furnace Bi-2212 coils can be processed to achieve reliable transport properties. Controlled high pressure processing has enabled systematic R&D work on Bi-2212 wire and coils for us and our collaborators at LBNL.

40T Magnet

The period from 2018 to 2019 marked the initial year (R&D Phase) of the 40T SC Magnet development project, which included all the technologies listed in the table above. In March 2019, we received budgetary guidance from NSF that prompted a decision to remove work based on Bi-2223 from the project. In May 2019, we received additional schedule guidance from NSF that prompted a decision to remove project approaches based on the Integrated Coil Form and Bi-2212. This first year's work led to the development of a proposal for the second year (Conceptual Design) which has now been funded.

Following down-selection in mid-2019, the approach to 40T SC considers two alternatives: a primary "standard" approach using insulation between turns (I-REBCO) like the 32T SC magnet, and a second approach without insulation between turns (no-insulation or NI-REBCO). As described above, the NI-REBCO approach can result in more compact coils and shows potential to be less sensitive to defects in the conductor. However, the behavior of NI-REBCO coils during quench is much more complicated than traditional coils with insulated conductors and a system to reliably protect large-scale NI-REBCO magnets has not yet been demonstrated. A major part of the effort for 2019 was to start developing such a system.

It will not be possible to build and test a full-scale model of the 40T HTS coils prior to building the real user magnet. Hence, the final design will need to be based heavily on numerical models that allow us to scale up from reduced-scale test coils. However, this extrapolation is not reliable without extensive benchmarking against results from test coils that push the envelope of the technology. Consequently, the magnet development program requires hand-in-glove development of software and testing of sub-scale and mid-scale coils. Intuition and experience generate design principles, which are tested via the numerical models. These computational results guide sub-scale coil design. Test results either confirm the design principles and numerical algorithms or reveal new unknowns that lead to new design principles for simulation and testing. Once there is good agreement between numerical and physical models on the sub-scale level (50 to 200m of conductor) we can move on to the mid-scale level (>500m of conductor) and repeat the process.

Some highlights from the 2019 R&D effort are presented in the subsequent paragraphs:

1) The MagLab had been working to understand the distribution of screening currents in REBCO-wound magnet for several years [1, 2, 3]. In 2019, the first paper worldwide with preliminary results on the mechanical strains due to screening current was published by a MagLab-led collaboration [4]. In 2018, a major breakthrough was made in computation time by another of our collaborators that allowed finite element modelling of screening currents in coils with >10,000 turns of conductor. Computation time dropped from weeks to hours for some examples [5]. In 2019 we proceeded to perform more complete calculations for the 32T magnet, various test coils and to draft designs of the 40T magnet [6, 7]. Comparing the computed results to strains measured in test coils as well as measured degradation of critical current, I_c, in the tape after unwinding of test coils suggests the algorithm over-estimates the strain in the coils. Designs using this algorithm are therefore conservative and can be the basis of the 40T magnet project. Additional work is being performed to include more subtle effects in the strain model and reduce uncertainty further. Additional coil testing is planned for 2020 to continue to refine our ability to predict the performance of the eventual 40T magnet.

2) Closely related to predicting the strain in a coil during operation is predicting its fatigue life. The 40T SC magnet is expected to cycle to full field 50,000 times over its lifetime. While some fatigue testing of REBCO and stainless steel tape and joints was performed for the 32T project, we are performing more testing of REBCO tape, including background field as well as fatigue testing of coils in the 40T project. A recent test included cycling an NI-REBCO coil to high strain 4,800 times, well beyond the few hundred cycles other ultra-high field HTS coils have attained in recent years worldwide.

3) Simulation of quench in NI-REBCO coils showed that controlling contact resistivity in the coils is critical for their protection during quench. In 2015, we were the first to show numerically that low contact resistance

in NI-REBCO coils would result in large forces and stresses during damage. Coil tests at a number of institutions since then have confirmed this prediction [8, 9, 10]. This year we published computational results that indicated too high a contact resistance in small coils would also result in damage during quench [11]. We have subsequently verified this via a test coil in 2019. We are now working to develop a variety of controlled contact resistances suitable for the various sections of a 40T SC magnet based on NI-REBCO technology.

4) All the conductor for the 32T magnet was provided by SuperPower, Inc (USA). At the time conductor was ordered for that magnet, there were no other viable alternatives. At this point there are several companies worldwide producing REBCO tape. We felt it was important to qualify an alternate supplier for the 40T project to be less dependent on a single firm. We ordered 100 meter standard conductors from Theva (Germany), S-Innovation (Korea), Shanghai Superconductor (China) and Fujikura (Japan) and characterized their transport properties [12].

5) The 32T magnet operates at a relatively low fraction of I_c, ranging between 10% to 30% in different regions of the coil. Computational work indicates that operating at a higher fraction of critical current will have three important benefits in future magnets: a) it will limit the amount of screening current that can be carried, thereby reducing the resulting strain; b) it will reduce the temperature margin in the conductor and then the heater energy required for quench protection; c) in NI-REBCO coils, it will reduce the peak transient current that is induced during quench. In the past year, we explored the possibilities with the vendors to develop graded I_c conductors. Test coils are being built to confirm all of the proposed benefits.

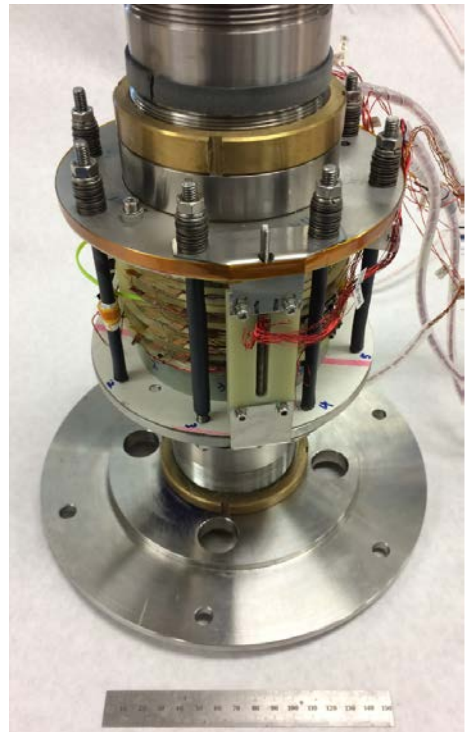

Figure 4.4.1: Photo of typical Petten Insert Coil. Three different ones were built and tested in 2019 to explore fatigue life in REBCO coils.

As indicated above, test coils are central to our approach to technology development. **Figures 4.4.1 and 4.4.2** below shows examples of two types of test coils we have built: Petten Insert Coils, which are tested in a 6.9T, 170mm bore superconducting magnet for fatigue testing and Little Big Coils, which are tested in a 31T, 50 mm warm bore resistive magnet to explore transient effects during quench of NI-REBCO coils.

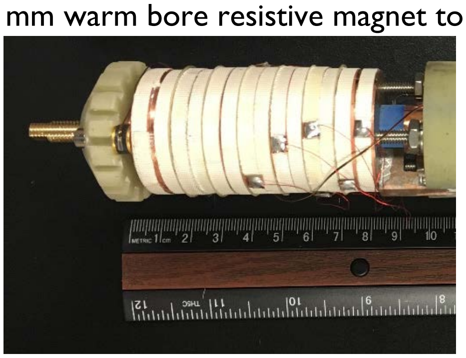

Figure 4.4.2: Photo of typical Little Big Coil. Two different ones were built and tested in 2019 to explore the quench dynamics in NI-REBCO coils.

We also tested two Bi-2212 coils in a 14T, large bore magnet built by Cryogenic, Ltd. The engineering current density reached a new record of 440A/mm^2 under a maximum strain of 0.39%. We planned two Bi-2223 test coils, and the first coil was designed. We did not continue the tests since we down-selected Bi-2223 technology and resources were re-assigned. We ordered a total of 6km of REBCO conductors for test coils in the past year, of which 3250 meters have been received and are currently being characterized.

The project has a monthly meeting of its Technical Advisory Committee as well as a monthly video conference with the program manager at NSF. We submitted a proposal for funding for the second year of the 40T project in June 2019. A video Site Visit was held in October 2019 and funds were awarded in Dec. 2019.

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Coil Development Based on Insulated REBCO Conductors

In 2017, the MagLab tested the world's first SC magnet to exceed 25T, a 32T system using two coils based on I-REBCO technology that were developed in-house and five LTS coils provided by Oxford Instruments. Since then the magnet was partially disassembled, modified and fully reassembled. We expect to be operating routinely in 2020 providing the stable, low noise magnetic field characteristic of SC magnets at the highest intensity world-wide.

In addition to that we made significant progress improving the technology to enable a reliable 40T SC magnet to be constructed. It has been known for many years that superconductors with a broad tape topology can have screening currents induced in them during charging (Lenz' Law or Meissner effect). The MagLab was first to present results computing the mechanical strain associated with these currents [1]. More recently, the MagLab performed a survey of state of the art screening current calculations suitable for magnets with >10,000 turns of conductor and reinitiated a collaboration with the Universidad Nacional Autonoma de Mexico and the Karlsruhe Institute of Technology. The MagLab now has software based on the T-A formulation capable of computing the induced screening currents orders of magnitude faster than what was possible a few years ago. This enables explicit integration of the differential equations possible for a large coil for the first time. We are also able to compute the Lorenz forces and resulting stress and strain. This software has been used to re-examine test coils from the 32T project as well as other coils built at the MagLab. Furthermore, insight developed from these analyses have allowed us to design new magnets including these effects. Because the REBCO tape fabrication process has advanced greatly in the past 10 years, it is now possible to control the critical current of the tape much more precisely than it was at the time the 32T was being designed. Consequently, new designs operating at a higher fraction of critical current with smaller design margins appear to be feasible. Optimization software has been developed that allows us to specify not only critical current separately for each tape in the magnet but reinforcement as well. This results in coils with higher overall current density than the approach used in the 32T magnet, hence higher fields from more compact systems. A conceptual design of a new magnet for the free electron laser facility at the University of California at Santa Barbara was developed as well as notional designs of the 40T magnet. Prior to completing the 40T conceptual design based on I-REBCO technology, we need to build test coils that operate in the design regime we now intend to use to verify that protection works as we expect as well to confirm fatigue life.

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Coil Development Based on No-Insulation REBCO Conductors

The 40T NI Coil Technology Development was advanced in 2019 through improvements in numerical modeling of the complex current flow in tape superconductors to compute the true non-uniform current distribution across the width of a superconducting tape developed from the changing magnetic fields. These "screening currents" calculations are coupled with structural finite element models that efficiently predicts the stress-state of coils at the conductor level. Accurate deformations and strains are predicted using contact elements, which can even detect when separation between conductor turns occurs. Winding tension, constant or variable, can also be included in the simulations. Additionally, studies have been performed on NI coils with varying levels of contact resistance between conductor turns to show its importance in reducing induced quench currents. **Figure 4.4.3** is a numerical example showing suppressed currents with higher turn-to-turn resistivity. This has been demonstrated on a small 10.5T test coil in a 25T background field that was co-wound with Hastelloy tape and intentionally quenched. It was shown that the coil was not damaged from induced quench currents.

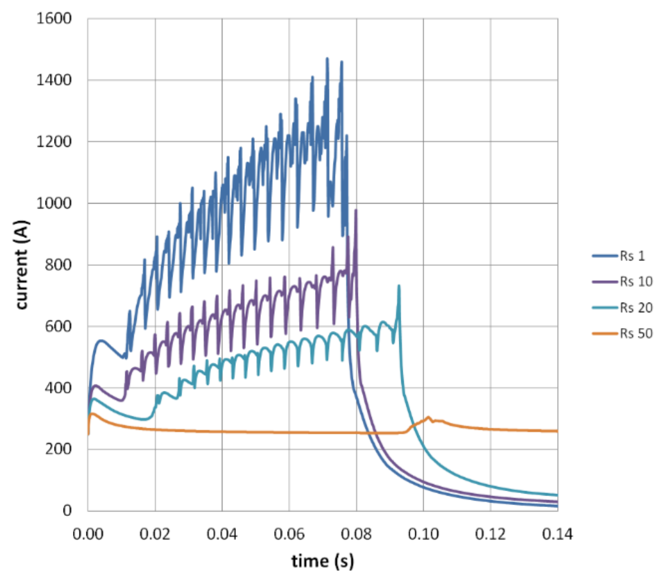


Figure 4.4.3: Quench Transients showing a Decrease in Magnitude with Increased Contact Re-

There are more commercial firms producing REBCO tape presently than at the start of the 32T project. Their performance has been assessed this past year through procurement of production lengths of superconductor and measurements, primarily critical current as a function of magnetic field. We are also continuing to determine the fatigue limit at various strain levels through 77K uniaxial measurements and more recently at 4.2K followed by critical current measurements for evaluation.

A superconducting magnet testbed was setup for testing small REBCO coils (Petten magnet). It provides a background field of up to 6.9T in a 170mm cold bore. Three NI coils were tested in 2019 with the primary objective being the study on the effects of electromagnetic fatigue (see **Figure 4.4.4**). All coils were wound with SuperPower tape nominally 4mm wide but varying in thickness and surface condition. The coils had inner radii of 50mm and outer radii of 55mm and consisted of six double pancakes.

The conductor of the first test coil had an oxide surface layer formed from Ebonol as a means of prescribing a higher turn-to-turn contact resistance. The measured resistivity at 77K was 80mΩ·cm^2 but when cooled to 4.2K it dropped to 62μΩ·cm^2. This coil was only cycled 110 times because a quench of the testbed magnet caused damage in a pancake. However post-test analysis showed that the coil did experience relatively high peak strain. **Figure 4.4.5** shows the complex results of computation of current density distribution caused by the screening currents. A finite element analysis of the associated strain computes a maximum of 0.54% including bending from winding.

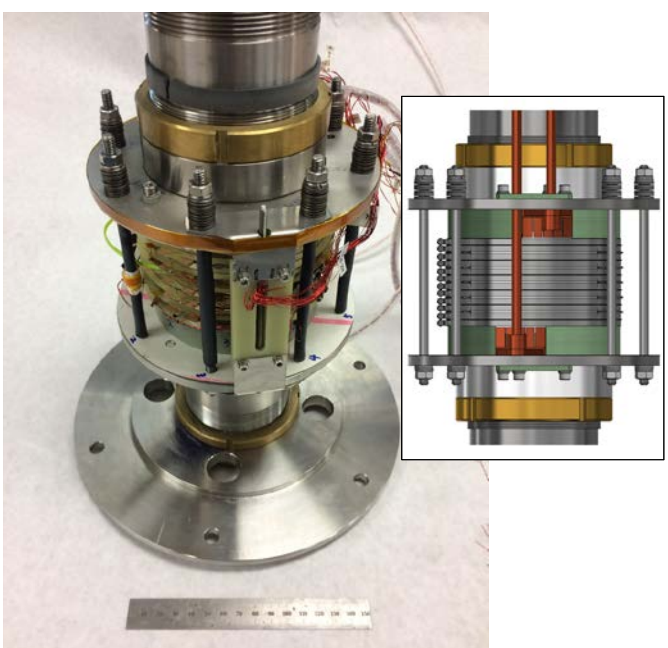


Figure 4.4.4: Petten insert fatigue test coil (left) and design (right).

The second insert test coil contained stainless steel co-wound reinforcement as a means of creating increased

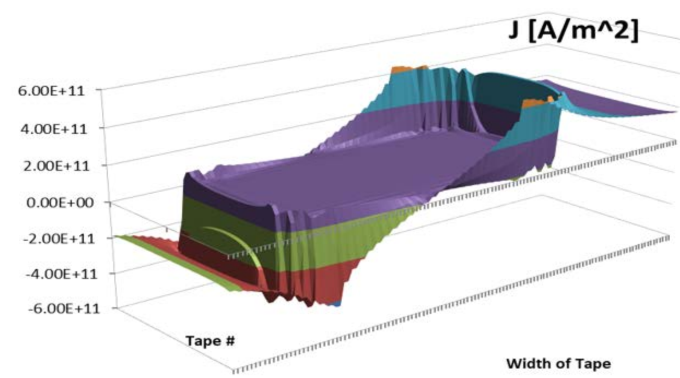


Figure 4.4.5 (left): Current density distribution through Petten Insert Test Coil 1 at 230A in 6.3T.

contact resistivity (the conductor surface was as-received) and to provide structural reinforcement. This coil was cycled 500 times and all measurements and observations are that the conductor was not damaged from the fatigue cycles. The contact resistivity however did reduce from 13.7mΩ·cm^2 to 3.8mΩ·cm^2.

The third insert test coil also contained stainless steel co-wind and its conductor surface was not oxidized. Strain gauges were attached to the outermost turn of a few pancakes. This test coil was cycled 4,800 times without fail. The conductor was processed through Yatestar which confirmed that no damage occurred in the superconductor. **Figure 4.4.6** shows strain gauge results of the final 1,400 load cycles. Surprisingly, the measured strain is about 50% less than what calculations predict and there is a curious behavior where strain reduces with cycles, as if the screening current strain is diminishing. These results are still being interpreted.

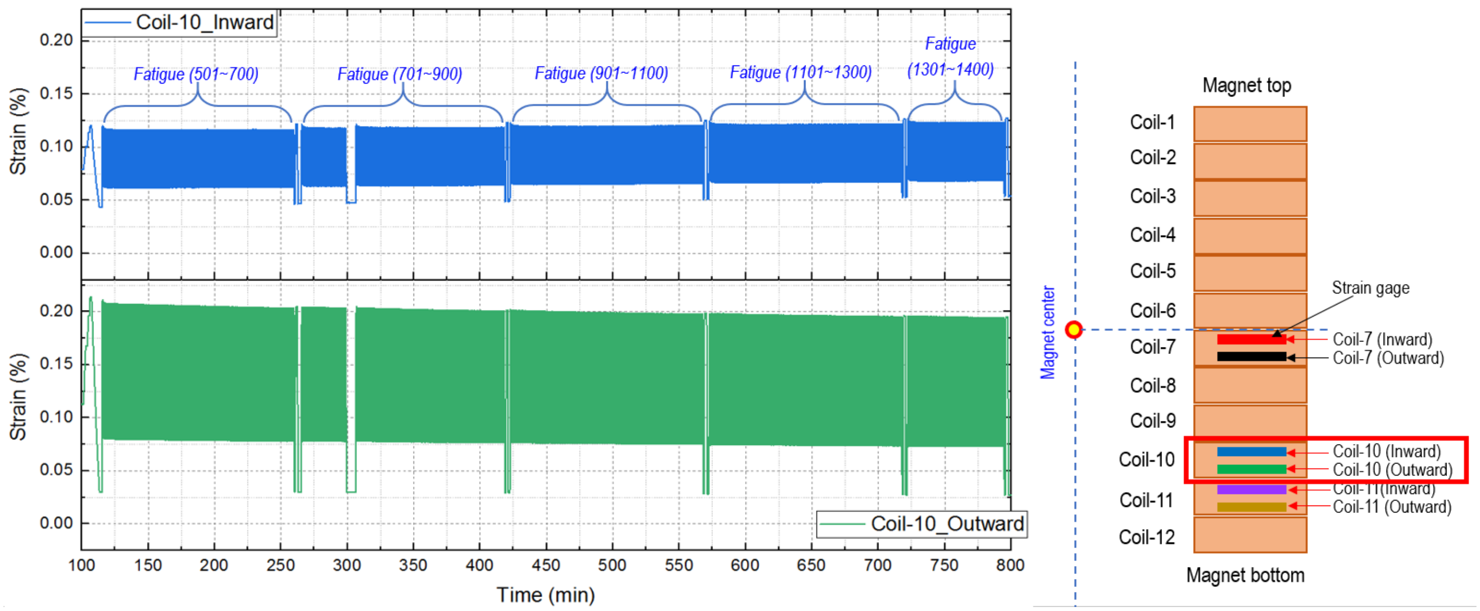


Figure 4.4.6: Strain in cycle 3,400 to 4,800 of pancake 10 showing slight increase of the inboard gauge and decrease of the outboard gage.

Coil Development Based on Bi-2212 Conductors

Bi-2212 round wire consists mainly of a brittle ceramic cuprate core embedded in a Ag-alloy sheath with low strength and high strain sensitivity similar to that of the Nb_3Sn wire used in high field NMR magnets. Considering as a hypothetical very high field magnet design it becomes readily clear that conductor and coil reinforcement becomes a very important task to master in 2212 coil manufacturing, as shown in **Figure 4.4.7**. Though Bi-2212 does not incorporate a high strength alloy, as is the case in REBCO based superconducting tape, various choices of reinforcement are available.

Several coils have been built and tested in 2019, of which a few are highlighted here. With the 160mm cold bore 14T Cryogenic magnet having been put into commission at the

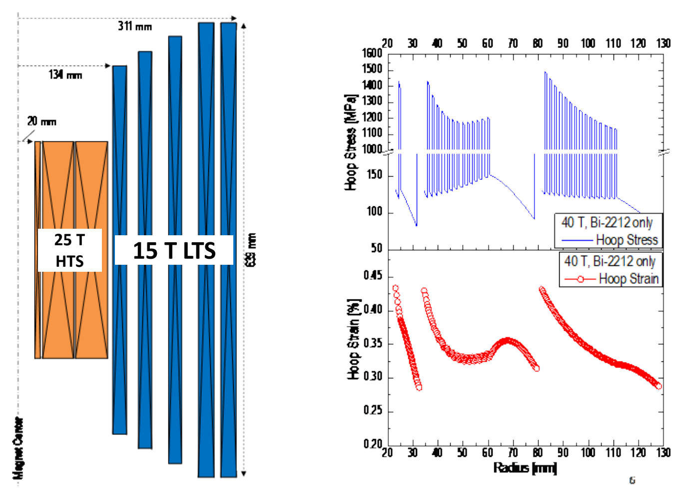


Figure 4.4.7: A hypothetical 40T magnet design with a 25T Bi-2212 insert. The stresses to be mitigated in such a coil are exceptionally high.

end of 2018, all of these coils could now be tested in a significantly higher background field compared with the 140mm cold bore 8T magnet, which was previously the only available magnet at the NHMFL with a substantial bore size to accommodate test coils. A coil built and tested in the 8T magnet earlier that did not show any signs of mechanical degradation was re-tested in the Cryogenic magnet. The coil is shown in **Figure 4.4.8**. This coil used slightly aspected conductor with a ratio of 1.5 to preserve the electromagnetic isotropy of the round wire, while increasing the packing density and accommodating the reinforcement. A high strength alloy tape, Inconel X-750, was used as a co-wind. The coil reached a critical current of 360A at 14T background field. FEA analysis clearly indicates that at this transport current, and resulting mechanical loads, the coil reached the limit of the reinforcement used. A peak stress on the reinforcement of 889MPa reaches well above the yield stress of Inconel X-750, as can be seen in **Figure 4.4.9**.

Figure 4.4.8: Test coil made with aspected conductor co-wound with high strengths alloy tape. This coil was strain limited when it exceeded the efficacy of the Inconel X-750 co-wind.

These results provided validation of the numerical model and showed yet another viable option for Bi-2212 coil reinforcement. A series of test coils made with Bi-2212 round wire using high strength fiber reinforcement (international patent application pending) continued with two more coils dubbed Pup-6 and Pup-7. While both coils shared the same geometry, Pup-6 had a small additional terminal installed at its bottom flange at about half the winding thickness. This "mid-tap" was installed to conduct quench initiation experiments using a recently built hardware that operates on the basis of inducing a quench by generating AC-losses in the coil (coupling loss induced quench, CLIQ). However, in-field testing of the coil confirmed the presence of mechanical degradation in the coil section that includes the mid-tap assembly. At 14T background field, coil quenched at a current of 245A repeatedly without further signs of mechanical degradation. Except the section including the mid-tap, the other coil sections did not show any significant voltage rise. It was decided that the Pup-7 coil would not have a mid-tap and that further coils including a mid-taps would require a design change of the mid-tap terminal assembly. In a background field of 14T, Pup-7 generated a total field of 16.25T. In general Pup-7 performed very well.

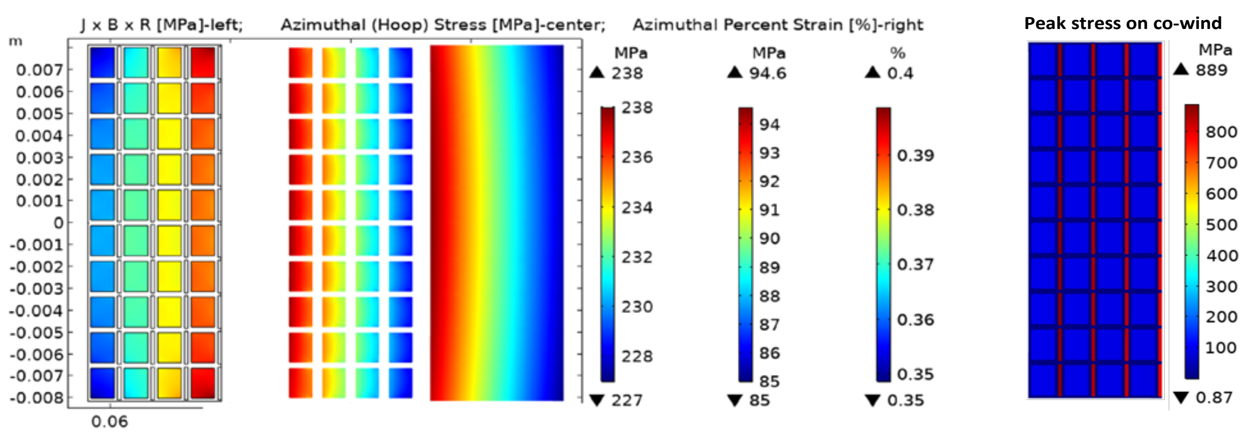


Figure 4.4.9: Numerical model of the coil wit aspected wire and co-wind. Shown are source stress, coupled stress, resulting conductor strain, and peak stress on the co-wind. At 889 MPa, the stress on the co-wind exceeds the yield stress of 800 MPa. Expectedly the coil showed signs of mechanical degradation under these operating conditions.

Coil Development Based on Bi-2223 Conductors

High-temperature superconducting magnet coils made with Sumitomo Type HT-NX conductor are complex composite structures of Bi-2223 conductor filaments, silver matrix, solder, nickel-alloy laminations, polymer insulation, and epoxy or wax. In order to fully model the response of a coil to its magnetic and thermal loadings during normal operating and fault modes, the mechanical stiffness matrix must be determined.

A set of mechanical test specimens were fabricated and then fitted with strain gauges. The specimens were made by cutting and stacking a 20 X 3 array of conductors into a mold, then vacuum impregnating the assembly in NHMFL Mix 61 epoxy. Tensile specimens, shown in **Figure 4.4.10** left were cut to 200mm. Compressive specimens, shown in **Figure 4.4.10** right, were cut to 12.7mm length.

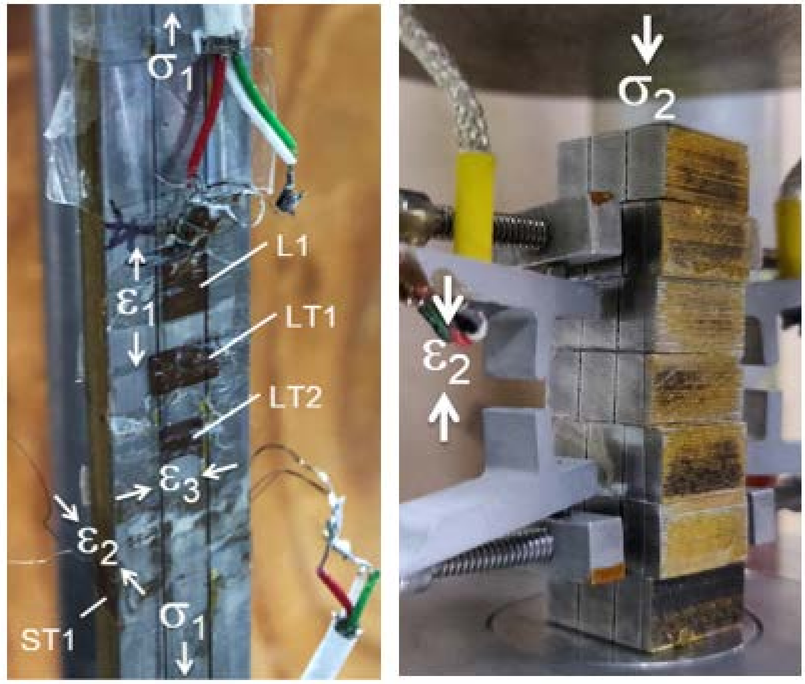


Figure 4.4.10: HT-NX composite specimens configured for mechanical testing. (Left) 200 mm length tensile specimens, fitted with strain gauges and mounted in grips; (Right) Compressive specimens, stacked prior to fitting with extensometers and strain.

Table 4.4.2: Elastic moduli and Poisson's ratios from tensile and compressive stress-strain measurements.

	Units	295K	77K	4K
E11	GPa	93.5	98.3	105
E22	GPa	4.4	10.2	11.1
ν12		0.5	0.51	0.46
ν13		0.35	0.35	0.37

Specimens were tested at room temperature, 77K and 4.2K, and loaded in tension in the hoop (1) direction, and in compression in the axial (2) directions in separate tests. Normal and transverse strains were measured with strain gages or extensometers. Young's moduli and Poisson's ratios, reported in **Table 4.4.2**, were determined by computing the slopes of the measured stress-strain curves.

Results were compared against estimates computed by the rule of mixtures and with a finite element analysis. Work is ongoing, to determine the modulus E_{33} (radial direction), and to determine the remaining Poisson's ratio.

Development of Bi-2212 Superconductors

We continued our collaborations with Engi-Mat (formerly nGimat) and MetaMateria on Bi-2212 powder development. Our goal is to develop a reliable understanding of powder properties to ensure that Engi-Mat and

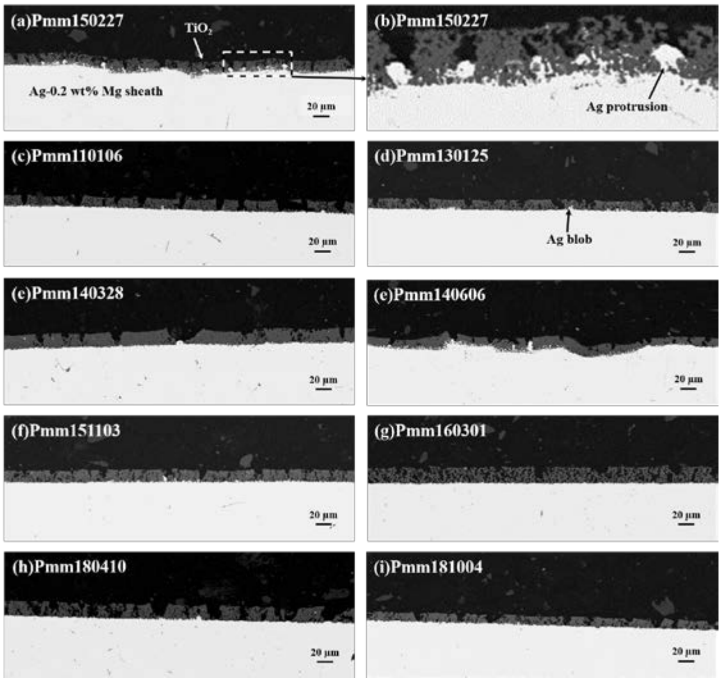


Figure 4.4.11: Longitudinal cross sections of nine different wires that underwent standard OPHT. The wire used in the coil that shorted out due to protrusions is shown in (a) and (b). A section of (a) is magnified in (b) to highlight the Ag protrusions. In (d), an arrow points to a so-called Ag blob, which is different in nature from Ag protrusions.

MetaMateria can both produce high quality powder. We analyzed almost all the powders Engi-Mat and MetaMateria made in 2019 using SEM and DTA to identify the amount of hard particles, impurity phases and contamination before the companies shipped their powders to Bruker OST for wire fabrication.

We conducted over-pressure heat treatments (OPHT) on the wires Bruker OST made from these powders to evaluate the wire performance, and provided feedback to Bruker-OST and the powder manufacturers to further improve their processing.

Critical current density J_c of Bi-2212 wire varies strongly with processing conditions, particularly the maximum heat treatment temperature (T_{max}). Increasing T_{max} results in longer time-in-the-melt (defined as the time between when Bi-2212 melts on heating and when Bi-2212 begins to form on cooling), more bridging between the filaments, lower J_c and higher ac losses. Widening the processing window (i.e., a large range of T_{max}) that has a nearly constant J_c is desired for processing large coils such as large solenoids and particle accelerator magnets that are several meters long, because their large size and large thermal mass can cause a delay of the desired temperature and also large temperature gradients during the heat treatment. Possible ways to broaden the T_{max} window are controlling the melting property of Bi-2212 powder or modifying the wire architecture. We investigated performance variation with T_{max} of wires made by Bruker OST with powders produced by Engi-Mat and MetaMateria. The filament size was varied by changing the wire diameter and the filament configuration. Reducing the wire diameter results in smaller filament size and shorter distance between the filaments. We found that wires with smaller filament size (< 9 µm) showed a peak J_c at the low end of T_{max} and their J_c was more sensitive to T_{max} than larger filament size. Thus, better control of the precursor powder properties, filament size and filament configuration is important to develop large Bi-2212 coils.

The TiO_2 insulation for Bi-2212 wires developed at the MagLab was deemed to be a suitable insulation that offered a high winding current density due to its relative thinness compared to other available insulation materials. However, while this dip-coated TiO_2 insulation worked well in short samples, when we used it in a large coil several years ago, the coil had severe electrical shorting after the overpressure heat treatment (OPHT). We found that Ag protrusions through the TiO_2 layer caused this unexpected shorting. As a result, we changed the insulation strategy for Bi-2212 coils, and now use two insulation layers: first the dip-coated TiO_2 layer in direct contact with the Ag(Mg) sheath and then an alumino-silicate braid that prevents shorting if protrusions occur.

This past year we investigated whether Ag protrusions form in all Ag(Mg)-sheathed Bi-2212 wires with TiO_2 insulation. We studied nine different wires produced between 2011 and 2018. We found that the vast majority of the wires used in this study did not show any significant Ag protrusions (**Figure 4.4.11**). From this we concluded that forming Ag protrusions through the TiO_2 is not universal and the Ag protrusions that shorted the large coil were related to the quality of the Ag(Mg) alloy used in that particular wire. Even though we now know that there is only a small probability of forming Ag protrusions, we plan to continue using TiO_2 plus the alumino-silicate braid because the braid helps epoxy penetrate the coil and strengthens it after curing.

Development of Iron-Based Superconductors

One of the major concerns about the inter-grain connectivity of $BaFe_2As_2$ (Ba122) Fe-based conductors (FBS) is the extrinsic current blocker that is caused by the segregation of oxide and second phase impurities. Our preliminary microscopic studies indicated that barium and potassium segregation and FeAs wetting can appear at grain boundaries (GBs) along with oxide impurities in the final polycrystalline K-Ba122. We must critically evaluate the sample preparation environment in all preparation stages. In order to eliminate the impurity segregation, we established the clean synthesis in which the oxygen and water level is maintained below 0.005 ppm and 0.06 ppm, respectively. Our effort to eliminate oxide impurities started with establishing a controllable oxygen-free and moisture-free environment by using a high performance glovebox, an energy controllable planetary ball-mill and high purity elements that are commercially available. Also, compared with the shaker style, the planetary milling mechanism allowed us to systematically study how milling energy affects phase uniformity and inter-grain connectivity. After all the improvements were applied, the later synthesis stages needed to be reoptimized.

The optimum heat treatment temperature was revisited so as to set the optimum synthesis condition in our very clean environment. Starting from 600°C, four different temperatures were studied for the first heat treatment temperature: 600°C, 675°C, 750°C and 825°C. Using the clean synthesis (high purity elements and high performance glovebox), the current-blocking FeAs and oxide byproduct at the GBs were significantly suppressed. The self-field J_c of 2.3 x 10^5A/cm^2 was obtained by the first HT of 750°C and high purity Ba and K; however, the nanostructural analysis still revealed signs of poor intergrain connectivity due to imperfect densification. Nevertheless, as figure 1 represents, combining the high purity starting elements of Ba and K, we successfully reduced the oxygen segregation at the grain boundaries in polycrystalline K-Ba122 samples, improving the inter-grain critical current density J_c ~250%.

The superconducting transition temperature T_c is 3 to 4K lower than the single crystal value which is 38K, and it might be due to the small grain size (smaller than London penetration depth) of the system (~200nm). To prove the grain size effect on T_c, we explored a range of powder sizes obtained after a second milling method that varied from ball milling to hand grinding using mortar and pestle. Milling energy applied during the milling process is around 80 to 100MJ/kg, which is large enough to amorphize the product and bring the grain size down to ~15nm. On the other hand, hand grinding using agate mortar and pestle can give grain size down to micron scale with minimal milling energy. A surprising result was that the hand-ground samples gave T_c at 38K regardless of their heat treatment temperature however, their critical current density dropped drastically about one order magnitude. It is clear that larger grains loosely connected (low sample density) gives lower J_c compared to fine grain samples. To compensate for the low sample density caused by large grains, hand-ground and ball-milled powder will be mixed to observe any effect on T_c and J_c of K doped Ba122.

Resistive Magnets and Materials

Pulsed Magnet Development at LANL

New "duplex" pulsed magnets employing two capacitor banks were built and tested at the pulsed Field Facility (PFF) at Los Alamos National Lab. This new user facility will partially offset the shutdown of the 100 T and 60 T non-destructive magnets due to repairs being undertaken on the generator that drives them.

Progress was made on materials for pulsed magnets partly by introducing better quality-control practices to wire made at commercial suppliers and other government laboratories but also by commissioning equipment to allow in-house fabrication of some types of wire which gives us better control of quality. Further progress was also made in developing better materials for next-generation magnets based on CuNb, Cu-Ta(W), Cu-Ag and Cu-Ag-Sc, all of which show promise of providing a better combination of strength and electrical conductivity than present materials.

The 65 T Short-Pulsed Magnets: In 2019, the four user cells of the 65T workhorse magnets delivered a total of ~ 8,200 shots, a new record for number of shots provided to users in a calendar year. We provided about 2,600 pulses higher than 60T and ~3,200 pulses higher than 50T to users. **Figure 4.4.12** summarizes the number of pulses delivered by 65T magnets over the period from 2011 to 2019. We have successfully maintained the magnets available in all four cells at all times during the year for users and always have a few spare magnets on the shelf. In 2019, six new magnets have been built and five magnets were damaged during the service to users. At the end of the year, we had three spare magnets in stock ready for replacement.

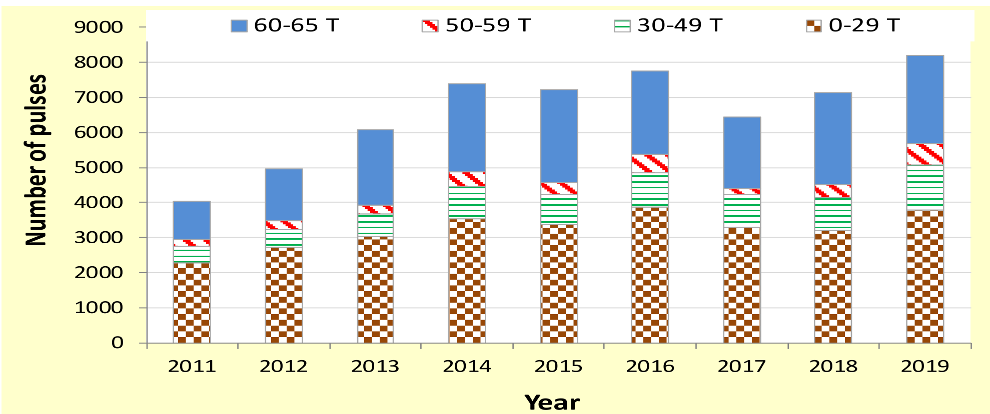


Figure 4.4.12: Number of pulses and their peak magnetic field distribution delivered by 65T magnets in period 2011-2019.

Generator Repair and Upgrade: The LANL motor-generator powering the 100T Multi-Shot (MS) and 60T Long-Pulsed (LP) magnets at the Pulsed Field Facility was offline during most of 2019 due to anomalous vibrations and rotor resistances [1, 2]. Given the impact to LANL science capabilities, and the cost and time for repairs, several alternatives were considered, both in terms of possible magnet design modifications and specific alternate power delivery technologies that are consistent with powering the 100T MS magnet. The alternate power technologies range from compact capacitor-bank-driven magnets to battery farms to direct connection to the national electric grid backbone (345kV). With the exception of repairing the generator, all alternatives are development projects with significant technological risk, have initial capital investment ranging from $20-$500 million, would take years to develop and implement and pose new safety considerations. The main conclusion is that repairing the generator is the most feasible option from all perspectives.

Figure 4.4.13: The rotor was removed from generator housing for further investigation and repair (September 2019).

Figure 4.4.13 shows the rotor being removed from the generator to be shipped to General Electric for repair. LANL actively provided technical, operational and funding support for repairing the generator as its strong commitment to the MagLab (and NSF) to sustain the national leadership in high magnetic field research. The repair of the generator started in May 2019 and the schedule for recommissioning of the generator for user support will be more predictable in early spring 2020.

In addition to repairing the rotor, LANL is also providing institutional funds to upgrade the driver and exciter for the generator. Two factory acceptance tests (FATs) for driver and exciter at ABB were completed in summer 2019, each with LANL engineering participation. The driver and exciter were delivered to LANL, and are expected to be installed and tested in 2020.

75T Duplex Magnet and Magnet Surge Project: In response to the temporary shutdown of the generator-driven 100T MS magnet, NSF provided the PFF additional funding to increase activities to deliver new science capabilities in the 70-90 tesla range (the Magnet Surge Project). The project consists of <u>increasing</u> our magnet production tempo, <u>converting</u> our current magnet-development cell to a user-science cell for 75-80 tesla experiments, <u>building</u> a new magnet-development cell with the increased explosion containment capability necessary for 80-90 tesla magnets and <u>investing</u> in key systems for 80-90 tesla magnets driven solely by capacitor banks.

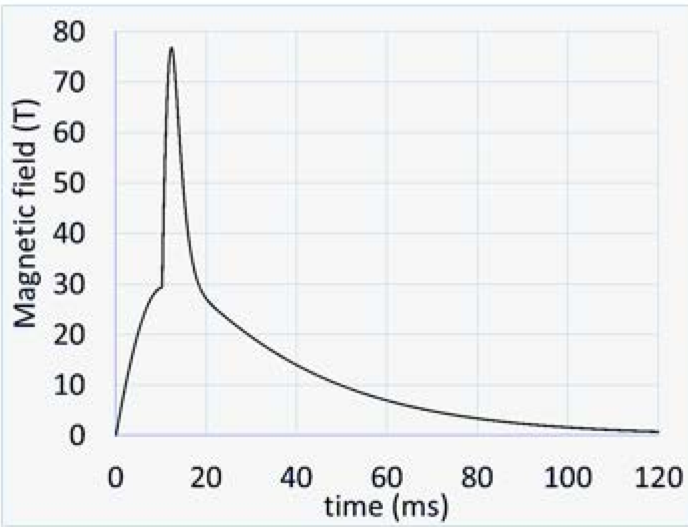
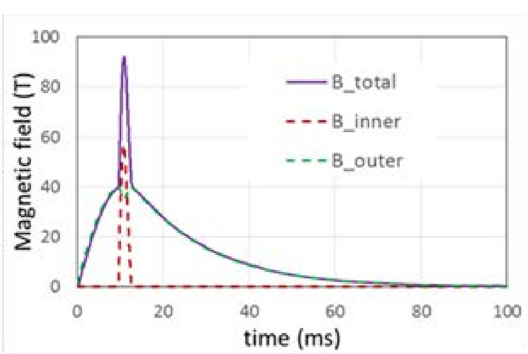


Figure 4.4.14: (Left) Measured waveform of magnet field generated by 75T duplex magnet during the commissioning phase, (Right) the picture of duplex magnet with MOV bank and containment vessel during its testing.

Thanks to the new funding, we were able to build two 75T duplex magnets, and one of them was successfully tested to 76.8 T (**Figure 4.4.14)** in September 2019 [3]. The magnet development cell was converted to the user cell and the duplex magnet served the first user in December 2019. We, however, still need to develop a more user-friendly operating procedure for that magnet before releasing it to the user program. The magnet is expected to be available for users to subscribe in the second quarter of 2020.



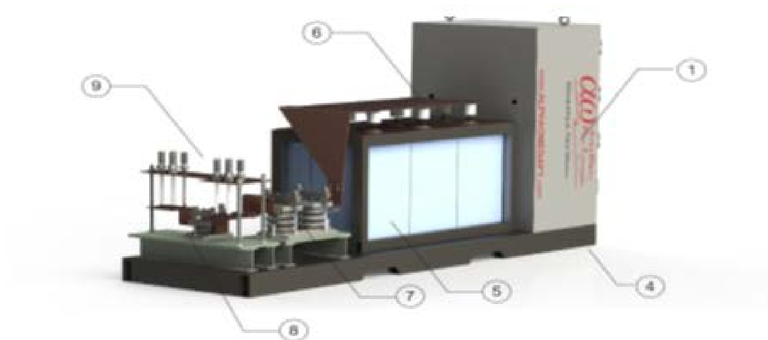


Figure 4.4.15: (Left) Measured waveform of magnet field generated by 75T duplex magnet during the commissioning phase. (Right) the picture of duplex magnet with MOV bank and containment vessel during its testing.

As part of the surge, a path to provide magnetic field up to 85T using a capacitor bank was developed. The benefits of timely investments in this capability provide near-term access to fields approaching the PFF flagship 100T MSM, while investing in future capabilities at the forefront of high-magnetic field science. The capacitor-bank driven 85T design does not rely on any 100T MSM infrastructure. We therefore expect to operate this magnet in the long term as an alternative to the 100T MSM program for user-science conducive to the fast magnet rise-times. The key systems are a higher-voltage capacitor bank and a smaller-bore duplex magnet. With our available capacitor-banks and magnet wire, it is challenging to reach magnetic fields above 80 tesla without intolerable heating of the magnet windings. However, higher fields can be achieved without severely increasing energy input at the expense of decreasing the magnet pulse width. To do this, we will use a new capacitor bank (cap-bank) with lower capacitance but rated for operation at higher voltage, 30kV. The PFF has recently worked with an industrial vendor to produce a preliminary design for a compact, engineered and integrated 1.2MJ-30kV cap-bank (**Figure 4.4.15**). This cab-bank is a modular, extensible design and has a compact footprint. The cab-bank and all the necessary electronics including the charging power supply, SCR switching, fuses for current overload protection and crowbar resistors will be purchased in 2020.

New Finite Element Modeling Capability for Pulsed Magnet Design: In 2019, the magnet team at the PFF developed a new coupled multi-engineering finite element method (FEM) implemented in COMSOL™ Multiphysics package for detailed and accurate calculations of the mechanical, thermal and electromagnetic performance over the entire vertical cross-section of a pulsed magnet [4]. These transient FEM simulations are performed for the entire pulse length and take into account the temperature and magnetic field dependencies of electrical conductivity and mechanical properties of all the materials to provide better accuracy. COMSOL's API feature was employed to pair with Java software to automate the construction of the model geometry, significantly reducing the necessary time to create FEM models for a pulsed magnet, which may consist of up to thousands of turns and insulation/reinforcement layers. The simulation of the magnetic diffusion during the pulse (**Figure 4.4.16)** indicates highly non-uniform current density in each turn due to the eddy current and skin effects. This feature allows us to predict the heating, complex magnetic forces and mechanical performance in the magnet winding more accurately [4].

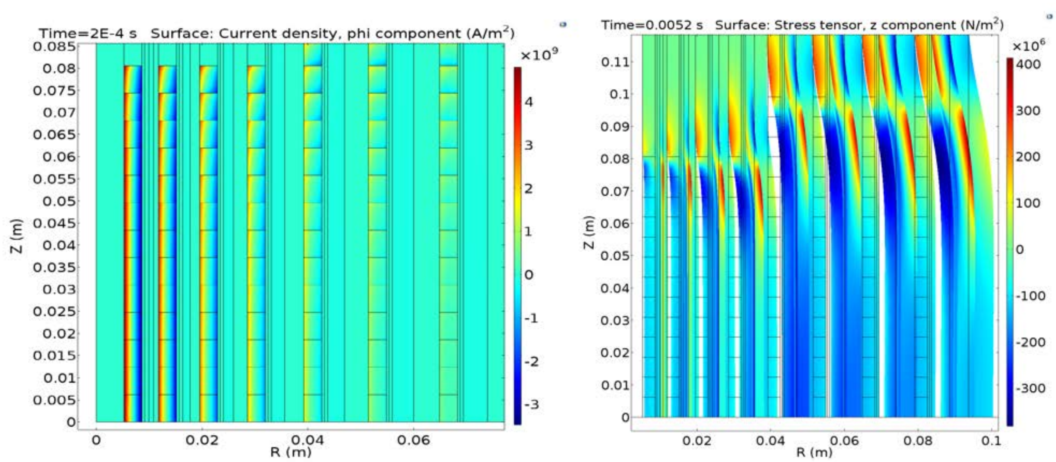


Figure 4.4.16: (Left) The current distribution in the winding of the 100T insert magnet near the beginning of the pulse (highest dB/dt) indicates that, in the inner winding layers, current flows in opposite directions near the inside and outside edges of each turn (screening currents). With that current distribution, the strong background field of the 100T oursert magnet can generate a high torque on the conductor, causing a complicated magnetic force profile on the winding. (Right) The distribution of axial stress and deformation over half of the magnet cross-section is shown at peak magnetic field. Deformation scale factor of 10 is used.

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Figure 4.4.17: Coil 2 of the outsert of the 100T Multi-Shot Magnet being inserted into its Nitronic-40 reinforcing shell.

Pulsed Magnet Development at FSU

The large pulsed magnets driven by LANL's flywheel generator (60T long Pulse and outer coils of 100T and) are being fabricated at the FSU branch of the MagLab because of the rigorous quality controls developed in the large-coil fabrication program and the ability to perform nondestructive eddy current evaluation over full conductor lengths. Prior to moving the winding operations to FSU, the conductor was not being inspected before winding. The new quality control procedures at FSU are finding microscopic flaws and inclusions in the incoming conductor. This information is being shared with the conductor manufacturer to reduce it in future shipments, which should increase the lifetime of future coils.

Coils 1 and 2 of the 100T outsert are being replaced. While the old coils were wound of GLidCop, the new ones were wound of higher strength, nano-structured Cu-Nb conductor to enable them to be driven to higher currents more often. Both coils have been wound and their external, Nitronic-40 shells machined and installed (see **Figure 4.4.17**). Epoxy impregnation has been completed for coil 1 and it has been delivered to LANL where a reinforcing sheet will be wound over the shell along with Zylon. The epoxy impregnation of coil 2 will be done in the first quarter of 2020 (see **Figure 4.4.18**).

Figure 4.4.18: Coil 2 of the 100T Multi-Shot Magnet with its reinforcing shell, prior to epoxy impregnation.

Coils 3, 4 and 7 of the 60T long pulse magnet need to be replaced. A recent order of Glidcop conductor made for coils 3 and 4 was found to have several large inclusions that forced us to reject all of the material. An existing stock of a larger cross-sectioned conductor was identified which had fewer inclusions. The locations of these inclusions were identified using the eddy-current methods and removed. A drawing line was setup in the MagLab where the replacement material was drawn down to the final specifications for coils 3 and 4. Winding of coil number 3 has been completed and its shell is presently being machined. Winding of coil 4 will commence in early 2020.

Development and Maintenance of Resistive Magnets

Conical Bore Resistive Insert for Neutron Scattering. In 2014, the MagLab finished the construction and testing of a novel Series-Connected Hybrid (SCH) magnet for the Helmholtz Zentrum Berlin (HZB) in Germany. This magnet was the first resistive-superconducting hybrid magnet worldwide to have the resistive and superconducting coils connected electrically in series, which reduces the demands on the superconducting coil when the power supply for the resistive coil trips off. The magnet includes a *unique bore with 30 degree opening angle at world record 25T central field* (*US patent no. 7,825,760*). The effective conical bore is created by stamping disks with different inner diameters and stacking them to form a series of steps. At HZB the High Field Magnet was operated as the centerpiece of the EXtreme Environment Neutron Diffractometer (HFM-EXED). The instrument enabled experiments at a unique combination of 26T at 100mK for elastic and inelastic neutron scattering as well as small angle neutron scattering.

Since 2014, the MagLab supported the HZB user program by delivering an upgraded B-Coil re-designed in 2016, which improved not only coil longevity and resulted in zero user down time for all of the years 2017 and 2018 but also increased the central field from 25T to 25.9T. As this performance had proven itself over such an extended timeframe, in 2019 the NHMFL manufactured and delivered another complete spare coil set of those improved resistive insert coils. At the end of 2019 the Berlin Research Reactor BER II had its final shutdown. This concludes the hybrid magnet development and operations collaboration with the HZB that provided uniquely high field for a variety of neutron scattering experiments.

High Homogeneity Resistive Insert for FSU-SCH. FSU's Series-Connected Hybrid magnet saw its third successful year of operation in 2019. This insert represents a brand new design including four new resistive coils, of which most operate close to the mechanical strength limits of its winding materials. The coils have now operated for over 2,740 hours, far beyond the typical runtime of resistive magnet coils at the MagLab. This is believed to be due to the magnet being primarily used for nuclear magnetic resonance (NMR), which means the magnet has acquired many fewer fatigue cycles in that time than a typical resistive magnet does.

Design Study for a new Large Bore Resistive Magnet. The MagLab operated a 19.5 Tesla, 195mm Large Bore Resistive Magnet (LBRM) from 1998 until 2016. It played a major role in testing HTS magnet technology for the 32T SC magnet that has now reached field and is in the commissioning process. The magnet was de-commissioned to re-purpose the housing and the outer coils in a new magnet providing a record field of 41.5T in a 32mm bore. The initiation of the 40T superconducting magnet project in 2018 and the desire to proceed to a 60T hybrid afterwards have brought the need for an LBRM to the fore. A number of different means of realizing such a magnet either by modifying existing magnets or building an entirely new magnet have been considered. A decision was taken in 2019 to focus on building an entirely new magnet exploiting the present power supplies. We expect to achieve 23 Tesla in 195mm room temperature bore. We hope to be able to secure funding for construction of such a magnet in the near future.

Resistive Maintenance. To support the smooth operation of the resistive magnet user program (DC Field Facility), the MagLab has completed fabrication and assembly of 11 resistive spare coils as part of the routine 2019 maintenance program and performed 15 maintenance actions (coil tightening, replacement or other major scheduled tasks) in the resistive magnet cells. Considering that this is in addition to the two spare coils delivered for the HZB resistive insert, 2019 has been another very busy and productive year for NHMFL Resistive Magnet Program.

Development of High Strength Conductors

The MagLab has conducted intensive research on various high-strength Cu-matrix conductors, which form the main coils in dc and pulsed resistive high field magnets (HFMs). One of our most important conductors is a Cu matrix composite reinforced with alumina particles (0.15-0.6 wt%). The fabrication of this conductor requires high deformation strain, which creates high densities of dislocations. Both mechanical strength and electrical conductivity can be predicted from particle spacing and dislocation density. At relatively low levels of deformation strain, mechanical strength increases as dislocation density increases, but, at high levels, dislocation density reaches a saturation value and strength increase thereafter depends mainly on the size, shape and distribution of the particles themselves. In 2019, we focused our research on the size and density of strengthening particles and of undesirable inclusions, both of which may affect drawability and performance. Internal cracks may appear in areas of high stress concentration around large particles or inclusions, especially if researchers use unsuitable dies, inappropriate drawing speed or insufficient lubrication. We found that, because large inclusions and particles are relatively rare in this material, cracks occur infrequently along the wire, so quality control often missed the problem in short samples. To solve this problem, we developed parameters for in-house nondestructive testing (NDT) using eddy current testing (ECT), ultrasonic testing (UT) and both 2D and 3D x-ray radiography. Using those methods, we were able to detect inclusions, defects, and internal cracks in short wires. For long wires, we developed an ECT wire inspection capability that allows us to find and remove large metallic inclusions before wire drawing. Based on our studies of particle size, distribution and shape in GlidCop, we developed specialized manufacturing parameters and equipment (i.e. bull-block) for deformation of these composites. Using these newly commissioned capabilities, we were able to adjust manufacturing procedures (i.e. lubrication, drawing speed and die geometry). By engineering these variations, we devised ways to optimize the properties of Cu-alumina composite conductors for use in pulsed HFMs [1]. We are now applying what we have learned to the fabrication of wires for coils #3 and #4 for our 60T long-pulsed magnet. Our recently manufactured wires that have been subjected to NDT have been found to have no detectable flaws. Our optimization has given us a better understanding of the relationship between critical properties and particle distribution in composite conductors. This paves the way for future in-house manufacture of high-strength conductors for use in other pulsed magnets.

In addition to alumina strengthened Cu, we studied Cu-Nb microcomposite wires drawn to different strain values. In collaboration with Fuzhou University, China, we used scanning electron microscopy and transmission electron microscopy to investigate microstructure. Near their interfaces, Cu and Nb showed a typical Kurdjumov-Sachs relationship with a deviation angle of 12°. This deviation accommodated slip discontinuity and internal stresses between Cu and Nb. Dislocations were mainly stored near the interface on the Cu side. Lattice distortion also occurred near interfaces, where Nb seemed to mix into Cu matrix [2, 3]. Properties were related not only to interface density but also strain-induced lattice distortion, which can produce a supersaturated solid solution [4]. Based on our current understanding of the effect of fabrication parameters on the internal structure of deformed wires, we and our collaborators at Nanoelectro in Russia succeeded in manufacturing larger cross-section Cu-Nb wires for the outer coils of the 100 +T magnet.

A synergistic outcome of superconductor wire research has benefited high-strength conductor development, leading to the development of a Cu-Ta(W), micro-composite that was fabricated in-house by a restack and draw approach. This composite showed promising ultimate tensile strength, very good electrical conductivity at room temperature and a high conductivity at 77K [5]. We also explored ways to improve the microstructure and properties of Cu-Ag. By doping with Sc, we were able to lower Ag content from 24 wt% to 3 wt%, thus strengthen Cu-Ag while keeping cost low and electrical conductivity high. After aging treatment, our doped Cu-3 wt%Ag-0.3 wt%Sc contained exclusively continuous Ag precipitates, as opposed to exclusively discontinuous Ag precipitates in non-doped Cu-3 wt%Ag. After deformation, electrical conductivity was almost the same in doped and non-doped samples, but Sc doping significantly improved hardness by suppressing the formation of coarse discontinuous Ag precipitates [6]. We plan to continue in this direction so that such composites can eventually be used in HFMs.

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LTS Magnets and Materials

Development of Low Temperature Superconductors

Commercial Nb_3Sn conductors typically employ Ta or Ti to improve the superconducting properties at high fields. Those dopants mainly enhance the upper critical field, H_{c2}, and the irreversibility field, H_{Irr}, ameliorating the loss of in-field critical current density, J_c, performance without significant changes to the grain microstructure of the A15 phase, which is the primary pinning mechanism in Nb_3Sn. However none of the commercial conductors is presently able to reach the challenging Future Circular Collider (FCC) requirements in term of J_c, i.e., non-Cu J_c(4.2K, 16T) = 1500A/mm^2. We recently demonstrated that the Nb_3Sn properties can be improved by adding Hf to the Nb-4Ta alloy typically used for the conductor fabrication. In a 2019 Jan Evetts-award-winning paper, published in Superconductor Science and Technology, we showed that the layer J_c of a monofilamentary wire fabricated with Nb-4Ta-1Hf alloy can reach 3,710A/mm^2 at 4.2K and 16T [LTS.1] thanks to the decrease of the A15 grain size (~50-60nm versus the typical 90-150nm) and the addition of point pins. Such high layer J_c could lead in a RRP-like design to a non-Cu J_c of 2,230A/mm^2, exceeding by 50% the FCC requirements.

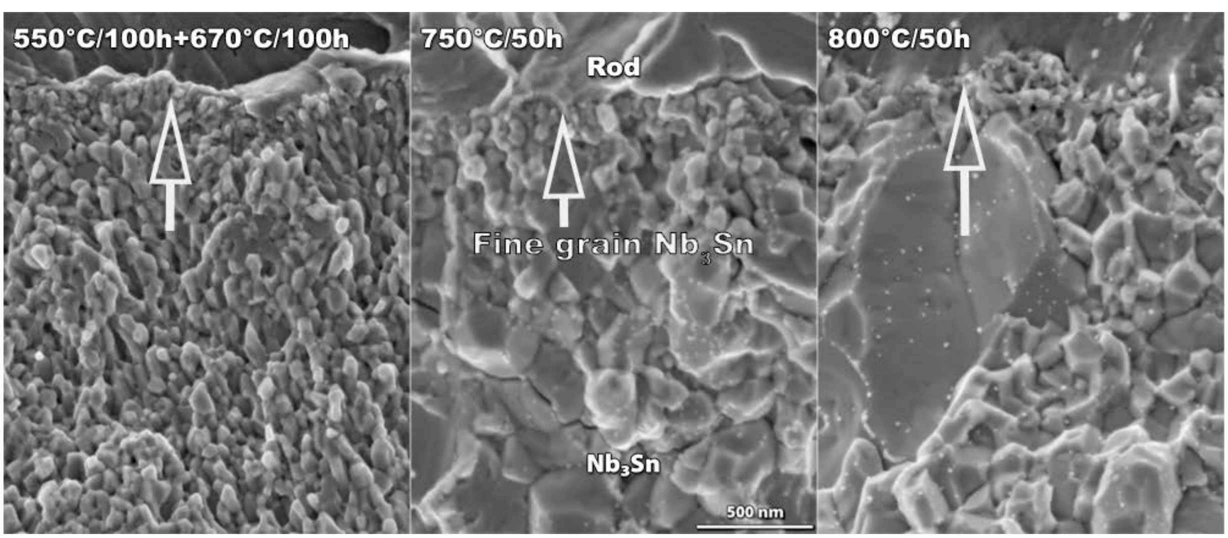

Figure 4.4.19: Fractographs of the Nb3Sn layer near the alloy-rod in Nb-4Ta1Hf monofilaments after three different heat treatments. The white arrow indicate the fine grain Nb3Sn formed at the interface of the alloy rods, last formed Nb3Sn grains. Grain coarsening is visible after the 750 and 800°C HTs. Precipitates in the A15 layer cannot be distinguished in the lower temperature case, but they are clearly visible after the highest-temperature heat treatments.

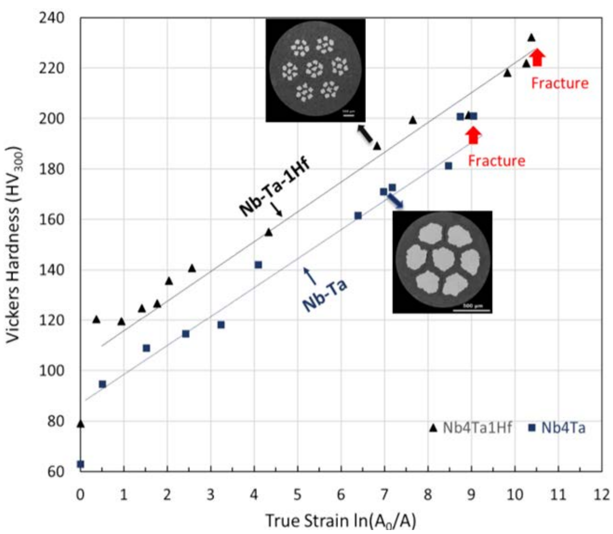

Figure 4.4.20: Work-hardening behavior of Nb-4Ta and Nb-4Ta1Hf during drawing. Nb-4Ta1Hf and Nb-4Ta have similar work hardening rates and draw similarly in a multi-filament configuration.

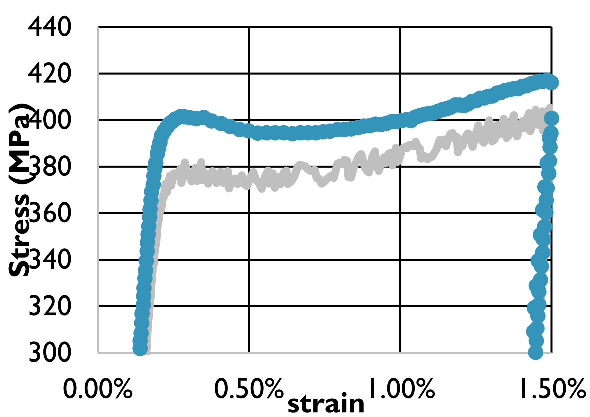

Figure 4.4.21: Upper and lower yielding shown in stress-strain curves measured at room temperature for annealed stainless steel (thin solid line) and for aged stainless steel (thick solid line). Ageing was done at 700C for 100 hours. At a strain of about 0.25%, samples reached their upper yield point, but softening occurred. After the materials reached lower yield point at strain of 0.5%, further hardening occurred. The aged sample had higher yield strength than the as-received sample. The ultimate tensile strength increased from 701MPa before aging to 733MPa after aging.

In 2019 we focused on understanding the root cause of such improvement, performing heat treatment (HT) studies on both the alloys and the Nb_3Sn wires. We concluded that the A15 grain refinement is likely a consequence of a delayed recrystallization in the Hf-doped alloy with respect to the standard Nb-4Ta, whereas the point pins are originated by HfO_2 precipitates. **Figure 4.4.19** presents the fractographs of the A15 layer after three different HTs. Those images reveal that even at the highest HT temperature very fine grain A15 still forms near the rod interface, and significant grain coarsening occurs farther from the interface only at 800°C. Moreover after the 750°C and 800°C HTs precipitates at grain boundaries can be clearly distinguished.

Since the mechanical properties of the alloys are of fundamental importance for the fabrication of a practical conductor, we also compared the work-hardening of the new Nb-4Ta-1Hf with the standard Nb-4Ta. **Figure 4.4.20** shows that despite a slightly larger hardness for the Nb-4Ta-1Hf alloy, the behavior is very similar and the Nb-4Ta-1Hf alloy fractures at a higher strain than the Nb-4Ta (both alloys suffer from a premature fracture because of the cast-structure in the home-made alloys). Since we do not foresee issues with the workability of Nb-4Ta-1Hf, this result is promising for the fabricability of Nb_3Sn conductors made with this new alloy.

References

[LTS.1] S. Balachangdran *et al.*, Beneficial influence of Hf and Zr additions to Nb4at.%Ta on the vortex pinning of Nb_3Sn with and without an O surce, *Supercond. Sci. Technol.* 32, 044006 (2019).

Structural Materials for LTS Magnets

Reinforcement materials have become more important as higher magnetic fields have become possible. The search for those materials has turned up various commercial alloys, previously invented for other purposes, which now need to be properly evaluated for application in high field magnets (HFMs). Reinforcement materials need both yield strength and strain-hardening to balance the requirement for fabricating coils and for sharing the Lorentz forces on the conductors in order to avoid excessive plastic strain. Parameters for assessing these alloys are now being designed based on the degree of yielding and strain-hardening, as well as on the level of strength and toughness in a given alloy. Certain high field magnets, both pulsed and superconducting, must often be operated at cryogenic temperatures, so the cryogenic properties of the reinforcement materials need also to be carefully assessed. After an extensive literature search on properties of various high strength alloys in 2019, we focused on such austenitic stainless steels as Nitronic 40 and a modified form of 316LN, and we confirmed that the database for these materials, which have been widely used in the past, is relatively mature [1-3]. The stable face-centered cubic structure of these steels is what makes them tough even at cryogenic temperatures.

One of the advantages of using austenitic stainless steel for winding magnets is that, at room temperature, it retains acceptable yield strength, and it has a relatively low hardening rate at strain greater than 3%. This low strain-hardening rate with a moderate yield point makes coil fabrication easier and more economical.

We observed both upper and lower yield points for annealed austenitic stainless steel samples. Heat treatment at about 700C, the commonly used temperature for Nb_3Sn superconductor reaction, enhanced both high and low yield points (**Figure 4.4.21**). Since this enhancement phenomenon is similar to that of carbon steels, we assume that heat treatment of stainless steels with high carbon content can enhance the mechanical strength of those steels. The same treatment, however, reduced the toughness at cryogenic temperatures because of a process known as sensitization [3]. To reduce the risk of sensitization, we specified that the vendor fabricated only billets with low carbon content. In collaboration with Scot Forge, we procured four low-carbon Nitronic 40 shells, which have been useful for extensive research on reinforcement materials for many HFMs, including superconducting magnets and the proposed 100 T+ pulsed magnet. Even though the carbon content is low, however, these materials could still become brittle at cryogenic temperatures if their manufacture is kept in the sensitization range for too long. Consequently, we have tightened quality control by requiring careful testing of all austenitic stainless steel shells. In 2019, the vendor had to remanufacture one of the shells in order to meet our new quality control protocol. Since that event, all four shells have consistently met our standards.

References

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[3] K. Han, V.J. Toplosky, J. Lu, Y. Xin, R. Walsh, *IEEE Transactions on Applied Superconductivity* 29 (2019) 7800405.

5. PUBLICATIONS

The Laboratory continued its strong record of publishing, with 410 articles appearing in peer-reviewed scientific and engineering journals in 2019. Among these, 318 acknowledge NSF support for the operation of the NHMFL and 174 (42 percent) appeared in significant journals.

Table 5.1 provides an overview about NSF-acknowledged peer-reviewed and significant peer reviewed publications by user facility, followed by Applied Superconductivity Center, Magnet Science & Technology, Center for Integrating Research & Learning at FSU, the Condensed Matter Theory/Experiment group, Geochemistry, MBI and Physics at UF.

Table 5.1: Submitted peer-reviewed publications from OPMS live database. The point-in-time snapshot was on February 28, 2020. A total number of publications per year should NOT be drawn from this report because a submitter may, as appropriate, link a publication to two or more facilities. We note that the State of Florida contributes significantly to NHMFL and hired faculty at UF and FSU to enhance NHMFL programs. Publications from these professors are included as they significantly enhance the NHMFL research effort and are listed here in the UF physics and CMT/E categories.

Facility	2019 Peer Reviewed	Acknowledges Core Grant	2019 Significant Peer Reviewed	Acknowledges Core Grant
AMRIS Facility at UF	42	31	9	7
DC Field Facility at FSU	89	84	62	58
EMR Facility at FSU	29	28	13	12
High B/T Facility at UF	2	2	1	1
ICR Facility at FSU	31	28	12	11
NMR Facility at FSU	53	41	19	17
Pulsed Field Facility at LANL	47	43	35	33
ASC	20	19	14	14
MS & T	35	30	12	11
Education at FSU	2	2	0	0
CMT/E	43	36	29	23
Geochemistry Facility	37	19	3	0
MBI at UF	28	5	4	1
UF Physics	5	1	3	0

318 of the 410 publications acknowledge NSF support for the operation of the MagLab. **Table 5.2** summarizes the publications generated by external users and in-house research activities. A detailed lists of these publications can be found below **Table 5.2.**

Table 5.2: Overview of publications generated by external users and in-house research activities. A total number of publications per year should NOT be drawn from this report because a submitter may, as appropriate, link a publication to two or more facilities.

	All Internal Authors		Internal Corresponding Author(s) with External Co- Authors		External Corresponding Author(s) with Internal Co- Authors		All External Authors		Totals		Totals
Facility	NSF Core Grant Cited	NSF Core Grant Not Cited	NSF Core Grant Cited	NSF Core Grant Not Cited	NSF Core Grant Cited	NSF Core Grant Not Cited	NSF Core Grant Cited	NSF Core Grant Not Cited	NSF Core Grant Cited	NSF Core Grant Not Cited	Pubs for (selected period)
AMRIS Facility at UF	1	1	10	6	16	4	4	-	31	11	42
DC Field Facility at FSU	4	-	17	-	59	4	4	1	84	5	89
EMR Facility at FSU	1	-	3	-	23	1	1	-	28	1	29
High B/T Facility at UF	-	-	2	-	-	-	-	-	2	-	2
ICR Facility at FSU	2	1	8	-	13	1	5	1	28	3	31
NMR Facility at FSU	3	-	8	5	27	2	3	5	41	12	53
Pulsed Field Facility at LANL	-	-	11	1	32	3	-	-	43	4	47
ASC	5	-	8	-	6	1	-	-	19	1	20
MS&T	8	-	12	1	10	4	-	-	30	5	35
Education at FSU	2	-	-	-	-	-	-	-	2	-	2
CMT/E	2	-	16	2	18	4	-	1	36	7	43
Geochemistry	2	-	10	3	4	15	3	-	19	18	37
MBI at UF	-	-	1	2	2	6	2	15	5	23	28
UF Physics	-	-	-	-	1	4	-	-	1	4	5
Total of Publications	**23**	**2**	**88**	**20**	**185**	**47**	**22**	**23**	**318**	**92**	**410**
% of Publications	**6%**	**0%**	**21%**	**5%**	**45%**	**11%**	**5%**	**6%**	**78%**	**22%**	**100%**

Besides 410 peer reviewed publications, the following other products have also been published at the MagLab in 2019:

- Books: 8
- Patents: 3
- Disseminations: 13
- Awards: 13
- Grants: 11
- M.S. Theses: 17
- Ph.D. Theses
    - Local 34
    - External 17

Publications generated by facilities:

AMRIS Facility at UF (42)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Baniani, A.; Chmelik, C.; Forman, E.M.; Fan, L.; Zhou, E.K.; Zhang, F.Y.; Lyndon, R.; Lively, R.P.; Vasenkov, S.,	*Anomalous Relationship between Molecular Size and Diffusivity of Ethane and Ethylene inside Crystals of Zeolitic Imidazolate Framework-11*	Journal of Physical Chemistry C	123	27	16813-16822	10.1021/acs.jpcc.9b03933	Yes
Bera, T.; Vardanyan, L.; Inglett, K.S.; Reddy, K.R.; O'Connor, G.A.; Erickson, J.E.; Wilkie, A.C.,	*Influence of select bioenergy by-products on soil carbon and microbialactivity: A laboratory study*	Science of the Total Environment	653		1354-1363	10.1016/j.scitotenv.2018.10.237	Yes
Berens, S.; Hillman, F.; Jeong, H.K.; Vasenkov, S.,	*Self-diffusion of pure and mixed gases in mixed-linker zeolitic imidazolate framework-7-8 by high field diffusion NMR*	Microporous and Mesoporous Materials	288		109603	10.1016/j.micromeso.2019.109603	Yes
Bowers, C.R.; Vasenkov, S.,	*Editorial: The Fourteenth International Bologna Conference on Magnetic Resonance in Porous Media (MRPM14) Preface*	Magnetic Resonance Imaging	56		1-2	10.1016/j.mri.2018.10.010	Yes
Butcher, R.,	*Natural products as chemical tools to dissect complex biology in C. elegans*	Current Opinion in Chemical Biology	50		138-144	10.1016/j.cbpa.2019.03.005	No
Chen, H.; Humes, S.T.; Robinson, S.E.; Loeb, J.C.; Sabaraya, I.V.; Saleh, N.B.; Khattri, R.B.; Merritt, M.E.; Martyniuk, C.J.; Lednicky, J.A.; Sabo-Attwood, T.,	*Single-walled carbon nanotubes repress viral-induced defense pathways through oxidative stress*	Nanotoxicology	13	9	1176-1196	10.1080/17435390.2019.1645903	Yes
Colon-Perez, L.M.; Ibanez, K.R.; Suarez, M.; Torroella, K.; Acuna, K.; Ofori, E.; Levites, Y.; Vaillancourt, D.; Golde, T.E.; Chakrabarty, P.; Febo, M.,	*Neurite orientation dispersion and density imaging reveals white matter and hippocampal microstructure changes produced by Interleukin-6 in the TgCRND8 mouse model of amyloidosis*	NeuroImage	202		116138	10.1016/j.neuroimage.2019.116138	Yes
Colon-Perez, L.M.; Turner, S.M.; Lubke, K.N.; Pompilus, M.; Febo, M.; Burke, S.N.,	*Multi-scale Imaging Reveals Aberrant Functional Connectome Organization and Elevated Dorsal Striatal Arc Expression in Advanced Age*	eNeuro	6	6	19	10.1523/ENEURO.0047-19.2019	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Downes, D.P.; Collins, J.H.P.; Lama, B.; Zeng, H.D.; Nguyen, T.; Keller, G.; Febo, M.; Long, J.R.,	*Characterization of Brain Metabolism by Nuclear Magnetic Resonance*	ChemPhysChem	20	2	216-230	10.1002/cphc.201800917	Yes
Ehrenberger, M.A.; Vieyra, A.; Esquiaqui, J.M.; Fanucci, G.E.,	*Ion-dependent mobility effects of the Fusobacterium nucleatum glycine riboswitch aptamer II via site-directed spin-labeling (SDSL) electron paramagnetic resonance (EPR)*	Biochemical and Biophysical Research Communications	516	3	839-844	10.1016/j.bbrc.2019.06.105	No
Forman, E.M.; Baniani, A.; Fan, L.; Ziegler, K.J.; Zhou, E.K.; Zhang, F.Y.; Lively, R.P.; Vasenkov, S.,	*Ethylene diffusion in crystals of zeolitic imidazole Framework-11 embedded in polymers to form mixed-matrix membranes*	Microporous and Mesoporous Materials	274		163-170	10.1016/j.micromeso.2018.07.044	Yes
Gatto, R.G.; Amin, M.; Finkielsztein, A.; Weissmann, C.; Barrett, T.; Lamoutte, C.; Uchitel, O.; Sumagin, R.; Mareci, T.H.; Magin, R.L.,	*Unveiling early cortical and subcortical neuronal degeneration in ALS mice by ultra-high field diffusion MRI*	Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration	0		1-13	10.1080/21678421.2019.1620285	Yes
Gatto, R.G.; Ye, A.Q.; Colon-Perez, L.; Mareci, T.H.; Lysakowski, A.; Price, S.D.; Brady, S.T.; Karaman, M.; Morfini, G.; Magin, R.L.,	*Detection of axonal degeneration in a mouse model of Huntington's disease: comparison between diffusion tensor imaging and anomalous diffusion metrics*	Magnetic Resonance Materials in Physics, Biology and Medicine	32	4	461-471	10.1007/s10334-019-00742-6	Yes
Khattri, R.B.; Sirusi, A.A.; Suh, E.H.; Kovacs, Z.; Merritt, M.E.,	*The influence of Ho^{3+} doping on $C\text{-}^{13}$ DNP in the presence of BDPA*	Physical Chemistry Chemical Physics	21	34	18629-18635	10.1039/c9cp03717a	Yes
Kirpich, A.; Ragavan, M.; Bankson, J.A.; McIntyre, L.M.; Merritt, M.E.,	*Kinetic Analysis of Hepatic Metabolism Using Hyperpolarized Dihydroxyacetone*	Journal of Chemical Information and Modeling	59	1	605-614	10.1021/acs.jcim.8b00745	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Kurhanewicz, J.; Vigneron, D.B.; Ardenkjaer-Larsen, J.H.; Bankson, J.A.; Brindle, K.; Cunningham, C.H.; Gallagher, F.A.; Keshari, K.R.; Kjaer, A.; Laustsen, C.; Mankoff, D.A.; Merritt, M.E.; Nelson, S.J.; Pauly, J.M.; Lee, P.; Ronen, S.; Tyler, D.J.; Rajan, S.S.; Spielman, D.M.; Wald, L.; Zhang, X.L.; Malloy, C.R.; Rizi, R.,	*Hyperpolarized C-13 MRI: Path to Clinical Translation in Oncology*	Neoplasia	21	1	1-16	10.1016/j.neo.2018.09.006	No
LaClair, M.; Febo, M.; Nephew, B.; Gervais, N.J.; Poirier, G.; Workman, K.; Chumachenko, S.; Payne, L.; Moore, M.C.; King, J.A.; Lacreuse, A.,	*Sex differences in cognitive flexibility and resting brain networks in middle-aged marmosets*	eNeuro	6	4	0154-19.2019	10.1523/ENEURO.0154-19.2019	No
Lee-McMullen, B.; Chrzanowski, S.M.; Vohra, R.; Vandenborne, K.H.; Edison, A.S.; Walter, G.A.,	*Age-dependent changes in metabolite profile and lipid saturation in dystrophic mice*	NMR in Biomedicine	32	5	e4075	10.1002/nbm.4075	Yes
Liang, X.; Luo, D.; Luesch, H.,	*Advances in exploring the therapeutic potential of marine natural products*	Pharmacological Research	147		104373	10.1016/j.phrs.2019.104373	No
Liang, X.; Luo, D.; Yan, J.L.; Rezaei, M.A.; Salvador-Reyes, L.A.; Gunasekera, S.P.; Li, C.; Ye, T.; Paul, V.J.; Luesch, H.,	*Discovery of Amantamide, a Selective CXCR7 Agonist from Marine Cyanobacteria*	Organic Letters	21	6	1622-1626	10.1021/acs.orglett.9b00163	No
Liang, X.; Matthew, S.; Chen, Q.Y.; Kwan, J.C.; Paul, V.J.; Luesch, H.,	*Discovery and Total Synthesis of Doscadenamide A: A Quorum Sensing Signaling Molecule from a Marine Cyanobacterium*	Organic Letters	21	18	7274-7278	10.1021/acs.orglett.9b02525	No
Lohr, K.E.; Khattri, R.B.; Guingab-Cagmat, J.; Camp, E.F.; Merritt, M.E.; Garrett, T.J.; Patterson, J.T.,	*Metabolomic profiles differ among unique genotypes of a threatened Caribbean coral*	Nature Scientific Reports	9		6067	10.1038/s41598-019-42434-0	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Luo, D.M.; Putra, M.Y.; Ye, T.; Paul, V.J.; Luesch, H.,	*Isolation, Structure Elucidation and Biological Evaluation of Lagunamide D: A New Cytotoxic Macrocyclic Depsipeptide from Marine Cyanobacteria*	Marine Drugs	17	2	83	10.3390/md17020083	No
Lyu, S.; Xing, H.; DeAndrade, M.P.; Liu, Y.; Perez, P.D.; Yokoi, F.; Febo, M.; Walters, A.S.; Li, Y.,	*The Role of BTBD9 in Striatum and Restless Legs Syndrome*	eNeuro	6	5	15	10.1523/ENEURO.0277-19.2019	Yes
Magdoom, K.N.; Brown, A.; Rey, J.; Mareci, T.H.; King, M.A.; Sarntinoranont, M.,	*MRI of Whole Rat Brain Perivascular Network Reveals Role for Ventricles in Brain Waste Clearance*	Nature Scientific Reports	9		11480	10.1038/s41598-019-44938-1	Yes
Magdoom, K.N.; Delgado, F.; Bohorquez, A.C.; Brown, A.C.; Carney, P.R.; Rinaldi, C.; Mareci, T.H.; Ewing, J.R.; Sarntinoranont, M.,	*Longitudinal evaluation of tumor microenvironment in rat focal brainstem glioma using diffusion and perfusion MRI*	Journal of Magnetic Resonance Imaging	49	5	1322-1332	10.1002/jmri.26315	Yes
Magdoom, K.N.; Zeinomar, A.; Lonser, R.R.; Sarntinoranont, M.; Mareci, T.H.,	*Phase contrast MRI of creeping flows using stimulated echo*	Journal of Magnetic Resonance	299		49-58	10.1016/j.jmr.2018.12.009	Yes
Osis, G.; Webster, K.L.; Harris, A.N.; Lee, H.W.; Chen, C.; Fang, L.J.; Romero, M.F.; Khattri, R.B.; Merritt, M.E.; Verlander, J.W.; Weiner, I.D.,	*Regulation of renal NaDC1 expression and citrate excretion by NBCe1-A*	American Journal of Physiology-Renal Physiology	317	2	F489-F501	10.1152/ajprenal.00015.2019	Yes
Ratra, A.; Vohra, R.S.; Chrzanowski, S.M.; Hammers, D.W.; Lott, D.J.; Vandenborne, K.H.; Walter, G.A.; Forbes, S.C.,	*Effects of PDE5 inhibition on dystrophic muscle following an acute bout of downhill running and endurance training*	Journal of Applied Physiology	126	6	1737-1745	10.1152/japplphysiol.00664.2018	Yes
Riviere, G.; Peng, E.Q.; Brotgandel, A.; Andring, J.T.; Lakshmanan, R.; Agbandje-McKenna, M.; McKenna, R.; Brady, L.J.; Long, J.R.,	*Characterization of an intermolecular quaternary interaction between discrete segments of the Streptococcus mutans adhesin P1 by NMR spectroscopy*	The FEBS Journal	Early View		15158	10.1111/febs.15158	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Sindt, A.J.; DeHaven, B.A.; Goodlett, D.W.; Hartel, J.O.; Ayare, P.J.; Du, Y.; Smith, M.D.; Mehta, A.K.; Brugh, A.M.; Forbes, M.D.E.; Bowers, C.R.; Vannucci, A.K.; Shimizu, L.S.,	*Guest Inclusion Modulates Concentration and Persistence of Photogenerated Radicals in Assembled Triphenylamine Macrocycles*	Journal of the American Chemical Society	142	1	502-511	10.1021/jacs.9b11518	Yes
Sindt, A.J.; Smith, M.D.; Berens, S.; Vasenkov, S.; Bowers, C.R.; Shimizu, L.S.,	*Single-crystal-to-single-crystal guest exchange in columnar assembled brominated triphenylamine bis-urea macrocycles*	Chemical Communications	55	39	5619-5622	10.1039/C9CC01725A	Yes
Tan, Y.; Singhal, S.M.; Harden, S.W.; Cahill, K.M.; Nguyen, D.M.; Colon-Perez, L.M.; Sahagian, T.J.; Thinschmidt, J.S.; de Kloet, A.D.; Febo, M.; Frazier, C.J.; Krause, E.G.,	*Oxytocin Receptors Are Expressed by Glutamatergic Prefrontal Cortical Neurons That Selectively Modulate Social Recognition*	Journal of Neuroscience	39	17	3249-3263	10.1523/JNEUROSCI.2944-18.2019	No
Thapa, B.; Diaz-Diestra, D.; Badillo, D.; Sharma, R.; Dasari, K.; Kumari, S.; Holcomb, M.; Beltran-Huarac, J.; Weiner, B.; Morell, G.,	*Controlling the magnetic resonance properties of magnetic graphene oxide for MRI applications*	Scientific Report	9		5633	10.1038/s41598-019-42093-1	Yes
Turer, A.; Altamirano, F.; Schiattarella, G.G.; May, H.; Gillette, T.G.; Malloy, C.R.; Merritt, M.E.,	*Remodeling of substrate consumption in the murine sTAC model of heart failure*	Journal of Molecular and Cellular Cardiology	134		144-153	10.1016/j.yjmcc.2019.07.007	Yes
von Morze, C.; Merritt, M.E.,	*Cancer in the crosshairs: targeting cancer metabolism with hyperpolarized carbon-13 MRI technology*	NMR in Biomedicine	32	10	3937	10.1002/nbm.3937	Yes
Walejko, J.M.; Antolic, A.; Koelmel, J.P.; Garrett, T.J.; Edison, A.S.; Keller-Wood, M.,	*Chronic maternal cortisol excess during late gestation leads to metabolic alterations in the newborn heart*	American Journal of Physiology-Endocrinology and Metabolism	316	3	E546-E556	10.1152/ajpendo.00386.2018	Yes
Wang, X.; Caulkins, B.G.; Riviere, G.; Mueller, L.; Mentink-Vigier, F.; Long, J.R.,	*Direct dynamic nuclear polarization of 15N and 13C spins at 14.1 T using a trityl radical and magic angle spinning*	Solid State Nuclear Magnetic Resonance	100		85-91	10.1016/j.ssnmr.2019.03.009	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Wilkes, B.J.; Bass, C.; Korah, H.; Febo, M.; Lewis, M.H.,	*Volumetric magnetic resonance and diffusion tensor imaging of C58/J mice: neural correlates of repetitive behavior*	Brain Imaging and Behavior	ePub		13	10.1007/s11682-019-00158-9	Yes
Yang, J.; Archer, D.B.; Burciu, R.G.; Muller, M.L.T.M.; Roy, A.; Ofori, E.; Bohnen, N.I.; Albin, R.L.; Vaillancourt, D.,	*Multimodal dopaminergic and free-water imaging in Parkinson's disease*	Parkinsonism & Related Disorders	62		10-15	10.1016/j.parkreldis.2019.01.007	No
Yang, T.; Aquino, V.; Lobaton, G.O.; Li, H.B.; Colon-Perez, L.; Goel, R.; Qi, Y.F.; Zubcevic, J.; Febo, M.; Richards, E.M.; Pepine, C.J.; Raizada, M.K.,	*Sustained Captopril-Induced Reduction in Blood Pressure Is Associated With Alterations in Gut-Brain Axis in the Spontaneously Hypertensive Rat*	Journal of the American Heart Association	8	4	e010721	10.1161/JAHA.118.010721	No
Yang, T.; Magee, K.L.; Colon-Perez, L.M.; Larkin, R.; Liao, Y.S.; Balazic, E.; Cowart, J.R.; Arocha, R.; Redler, T.; Febo, M.; Vickroy, T.; Martyniuk, C.J.; Reznikov, L.R.; Zubcevic, J.,	*Impaired butyrate absorption in the proximal colon, low serum butyrate and diminished central effects of butyrate on blood pressure in spontaneously hypertensive rats*	Acta Physiologica	226	2	e13256	10.1111/apha.13256	Yes

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Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Balachandran, S.; Tarantini, C.; Lee, P.J.; Kametani, F.; Su, Y.; Walker, B.; Starch, W.L.; Larbalestier, D.C.,	*Beneficial influence of Hf and Zr additions to Nb4atTa on the vortex pinning of Nb3Sn with and without an O source*	Superconductor Science and Technology	32		44006	10.1088/1361-6668/aaff02	Yes
Balk, A.N.; Sung, N.H.; Thomas, S.M.; Rosa, P.F.S.; McDonald, R.; Thompson, J.D.; Bauer, E.; Ronning, E.; Crooker, S.,	*Comparing the anomalous Hall effect and the magneto-optical Kerr effect through antiferromagnetic phase transitions in Mn3Sn*	Applied Physics Letters	114		32401	10.1063/1.5066557	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Balz, C.; Lampen-Kelley, P.; Banerjee, A.; Yan, J.; Lu, Z.; Hu, X.; Yadav, S.M.; Takano, Y.; Liu, Y.; Tennant, D.; Lumsden, M.D.; Mandrus, D.; Nagler, S.E.,	*Finite field regime for a quantum spin liquid in α-RuCl3*	Physical Review B	100		60405	10.1103/PhysRevB.100.060405	Yes
Barry, K.; Zhang, B.; Anand, N.; Xin, Y.; Vailionis, A.; Neu, J.N.; Heikes, C.; Cochran, C.; Zhou, H.; Qiu, Y.; Ratcliff, W.; Siegrist, T.M.; Beekman, C.,	*Modification of spin-ice physics in Ho2Ti2O7 thin films*	Physical Review Materials	3	8	84412	10.1103/PhysRevMaterials.3.084412	Yes
Barzola-Quiquia, J.; Esquinazi, P.D.; Precker, C.E.; Stiller, M.; Zoraghi, M.; Forster, T.; Herrmannsdorfer, T.; Coniglio, W.,	*High-field magnetoresistance of graphite revised*	Physical Review Materials	3		54603	10.1103/PhysRevMaterials.3.054603	Yes
Baumbach, R.; Balicas, L.; McCandless, G.T.; Sotelo, P.; Zhang, Q.R.; Evans, J.; Camdzic, D.; Martin, T.J.; Chan, J.Y.; Macaluso, R.,	*One-dimensional tellurium chains: Crystal structure and thermodynamic properties of PrCuxTe2 (x~ 0.45)*	Journal of Solid State Chemistry	269		553	10.1016/j.jssc.2018.10.008	Yes
Brown, M.D.; Jiang, J.; Tarantini, C.; Abraimov, D.V.; Bradford, G.; Jaroszynski, J.; Hellstrom, E.; Larbalestier, D.C.,	*Prediction of the Jc(B) Behavior of Bi-2212 Wires at High Field*	IEEE Transactions on Applied Superconductivity	29	5	6400504	10.1109/TASC.2019.2899226	Yes
Brumberg, A.; Harvey, S.M.; Philbin, J.P.; Diroll, B.T.; Lee, B.; Crooker, S.; Wasielewski, M. R.; Rabani, E.; Schaller, R.D.,	*Determination of the In-Plane Exciton Radius in 2D CdSe Nanoplatelets via Magneto-optical Spectroscopy*	American Chemical Society Nano	13		8589	10.1021/acsnano.9b02008	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Chemey, A.T.; Celis-Barros, C.; Huang, K.; Sperling, J.M.; Windorff, C.J.; Baumbach, R.; Graf, D.E.; Paez-Hernandez, D.; Ruf, M.; Hobart, D.E.; Albrecht-Schmitt, T.E.,	*Electronic, Magnetic, and Theoretical Characterization of (NH4)(4)UF8, a Simple Molecular Uranium(IV) Fluoride*	Inorganic Chemistry	58	1	637-647	10.1021/acs.inorgchem.8b02800	Yes
Chen, S.Y.; Lu, Z.; Goldstein, T.; Tong, J.; Chaves, A.; Kunstmann, J.; Cavalcante, L.S.R.; Wozniak, T.; Seifert, G.; Reichman, D.R.; Taniguchi, T.; Watanabe, K.; Smirnov, D.; Jun, Y.,	*Luminescent Emission of Excited Rydberg Excitons from Monolayer WSe2*	Nano Letters	19	4	2464	10.1021/acs.nanolett.9b00029	Yes
Chikara, S.; Gu, J.; Zhang, X.G.; Cheng, H.P.; Smythe, N.; Singleton, J.; Scott, B.; Krenkel, E.; Eckert, J.; Zapf, V.S .,	*Magnetoelectric behavior via a spin state transition*	Nature Communications	10		4043	10.1038/s41467-019-11967-3	Yes
Chiu, Y.; Chen, K.W.; Schoenemann, R.; Quito, V.L.; Sur, S.; Zhou, Q.; Graf, D.E.; Kampert, E.; Forster, T.; Yang, K.; McCandless, G.T.; Chan, J.Y.; Baumbach, R.; Johannes, M.D.; Balicas, L.,	*Origin of the butterfly magnetoresistance in a Dirac nodal-line system*	Physical Review B	100		125112	10.1103/PhysRevB.100.125112	Yes
Chu, J.H.; Liu, J.; Zhang, H.; Noordhoek, K.; Riggs, S.C.; Shapiro, M.C.; Serro, C.R.; Yi, D.; Mellisa, M.; Suresha, S.J.; Frontera, C.; Arenholz, E.; Vishwanath, A.; Marti, X.; Fisher, I.R.; Ramesh, R.,	*Possible scale invariant linear magnetoresistance in pyrochlore iridates Bi2Ir2O7*	New Journal of Physics	21		113041	10.1088/1367-2630/ab534c	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Coldea, A.I.; Blake, S.; Kasahara, S.; Haghighirad, A.A.; Watson, M.D.; Knafo, W.; Choi, E.S.; McCollam, A.; Reiss, P.; Yamashita, T.; Bruma, M.; Speller, S.; Matsuda, Y.; Wolf, T.; Shibauchi, T.; Schofield, A.,	*Evolution of the low-temperature Fermi surface of superconducting FeSe1−xSx across a nematic phase transition*	Nature Partner Journals Quantum Materials (npj)	4		2	10.1038/s41535-018-0141-0	Yes
Das, S.D.; Zhu, Z.; Mun, E.; McDonald, R.; Li, G.; Balicas, L.; McCallam, A.; Cao, G.; Rau, J.G.; Kee, H.Y.; Sebastian, S.E.,	*Magnetic anisotropy of the alkali iridate Na2IrO3 at high magnetic fields: Evidence for strong ferromagnetic Kitaev correlations*	Physical Review B Rapid Communications	99		081101(R)	10.1103/PhysRevB.99.081101	Yes
Davenport, J.L.; Ge, Z.; Liu, J.; Nuñez-Lobato, C.; Moon, S.; Lu, Z.; Quezada-Lopez, E.A.; Hellier, K.; LaBarre, P.G.; Taniguchi, T.; Watanabe, K.; Carter, S.; Ramirez, A.P.; Smirnov, D.; Velasco, J.,	*Probing the electronic structure of graphene near and far from the Fermi level via planar tunneling spectroscopy*	Applied Physics Letters	115	16	163504	10.1063/1.5118422	Yes
Drichko, I.L.; Smirnov, I.Y.U.; Suslov, A.; Kamburov, D.; Baldwin, K.W.; Pfeiffer, L.N.; West, K.W.; Galperin, Y.M.,	*Composite fermions in a wide quantum well in the vicinity of the filling factor 1/2*	Solid State Communications	301		113698	10.1016/j.ssc.2019.113698	Yes
Drosdov, A.P.; Kong, P.P.; Minkov, V.S.; Besedin, S.P.; Kuzovnikov, M.A.; Mozaffari, S.; Balicas, L.; Balakirev, F.; Graf, D.E.; Prakapenka, V.B.; Greenberg, E.; Knyazev, D.A.; Tkacz, M.; Eremets, M.I.,	*Superconductivity at 250 K in lanthanum hydride under high pressures*	Nature	569		528–531	10.1038/s41586-019-1201-8	Yes
Ernmanouilidou, E.; Liu, J.; Graf, D.E.; Can, H.; Ni, N.,	*Spin-flop phase transition in the orthorhombic antiferromagnetic topological semimetal Cu0.95MnAs*	Journal of Magnetism and Magnetic Materials	469		570-573	10.1016/j.jmmm.2018.08.084	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Feng, Y.; Wang, Y.; Silevitch, D.M.; Yan, J.Q.; Kobayashi, R.; Hedo, M.; Nakama, T.; Ōnuki, Y.; Suslov, A.; Mihaila, B.; Littlewood, P.B.; Rosenbaum, T.F.,	*Linear magnetoresistance in the low-field limit in density-wave materials*	Proceedings of the National Academy of Sciences of the USA (PNAS)	116	23	11201-11206	10.1073/pnas.1820092116	Yes
Garlea, V.O.; Sanjeewa, L.D.; McGuire, M.A.; Batista, C.D.; Samarakoon, A.M.; Graf, D.E.; Winn, B.; Ye, F.; Hoffmann, C.; Kolis, J.W.,	*Exotic Magnetic Field-Induced Spin-Superstructures in a Mixed Honeycomb-Triangular Lattice System*	Physical Review X	9		11038	10.1103/PhysRevX.9.011038	Yes
Gen, M.; Nomura, T.; Gorbunov, D.I.; Yasin, S.; Cong, P.T.; Dong, C.; Kohama, Y.; Green, E.L.; Law, J.M.; Henriques, M.S.; Wosnitza, J.; Zvyagin, A.A.; Cheranovskii, V.O.; Kremer, R.K.; Zherlitsyn, S.,	*Magnetocaloric effect and spin-strain coupling in the spin-nematic state of LiCuVO4*	Physical Review Research	1		33065	10.1103/PhysRevResearch.1.033065	No
Gui, X.; Finkelstein, G.J.; Graf, D.E.; Wei, K.; Zhang, D.Z.; Baumbach, R.; Dera, P.; Xie, W.W.,	*Enhanced Néel temperature in EuSnP under pressure*	Dalton Transactions in Chemistry	48	16	5327-5334	10.1039/c9dt00449a	Yes
Hahn, S.; Kim, K.; Kim, K.; Hu, X.; Painter, T.A.; Dixon, I.R.; Kim, S.; Bhattarai, K.R.; Noguchi, S.; Jaroszynski, J.; Larbalestier, D.C.,	*45.5-tesla direct-current magnetic field generated with a high-temperature superconducting magnet*	Nature	570	7762	496+	10.1038/s41586-019-1293-1	Yes
Hay, M.A.; Sarkar, A.; Craig, G.A.; Bhaskaran, L.; Nehrkorn, J.; Ozerov, M.; Marriott, K.E.R.; Wilson, C.; Rajamaran, G.; Hill, S.; Murrie, M.,	*In-depth investigation of large axial magnetic anisotropy in monometallic 3d complexes using frequency domain magnetic resonance and ab initio methods: a study of trigonal bipyramidal Co(II)*	Chemical Science	10		6354 - 6361	10.1039/c9sc00987f	Yes
Huang, K.; Chen, K.; Gallagher, A.; Lai, Y.; Nelson, W.L.; Graf, D.E.; Baumbach, R.,	*Instability of the f-electron state in URu2Si2-xPx probed using high magnetic fields*	Physical Review B	99	23	235146	10.1103/PhysRevB.99.235146	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Huang, K.; Nelson, W.L.; Chemey, A.; Albrecht-Schmitt, T.E.; Baumbach, R.,	*A novel cage for actinides: A 6W4Al43 (A= U and Pu)*	Journal of Physics-Condensed Matter	31	16	165601	10.1088/1361-648X/aafe9e	Yes
Jaime, M.; Bauer, E.D.; Gofryk, K.,	*Magnetoelastics of High Field Phenomena in Antiferromagnets UO2 and CeRhIn5*	16th MEGA-GAUSS Conference Proceedings	NA		43835	10.1109/MEGAGAUSS.2018.8722665	Yes
Jaroszynski, J.,	*Constructing high field magnets is a real tour de force*	Superconductor Science and Technology	32	7	70501	10.1088/1361-6668/ab1fc9	Yes
Jayasinghe, A.S.; Lai, Y.; Baumbach, R.; Latturner, S.,	*U1.33T4Al8Si2 (T = Ni, Co): Complex Uranium Silicides Grown from Aluminum/Gallium Flux Mixtures*	Inorganic Chemistry	58	18	12209	10.1021/acs.inorgchem.9b01627	Yes
Jiang, Y.; Lu, Z.; Gigliotti, J.; Rustagi, A.; Chen, L.; Berger, C.; de Heer, W.; Stanton, C.J.; Smirnov, D.; Jiang, Z.,	*Valley and Zeeman Splittings in Multilayer Epitaxial Graphene Revealed by Circular Polarization Resolved Magneto-infrared Spectroscopy*	Nano Letters	19	10	7043-7049	10.1021/acs.nanolett.9b02505	Yes
Jiao, L.; Smidman, M.; Kohama, Y.; Wang, Z.S.; Graf, D.E.; Weng, Z.F.; Zhang, Y.J.; Matsuo, A.; Bauer, E.D.; Lee, H.; Kirchner, S.; Singleton, J.; Kindo, K.; Wosnitza, J.; Steglich, F.; Thompson, J.D.; Yuan, H.Q.,	*Enhancement of the effective mass at high magnetic fields in CeRhIn5*	Physical Review B	99	4	45127	10.1103/PhysRevB.99.045127	Yes
Kar, S.; Sai Sandra, J.; Luo, W.; Kochat, M.; Jaroszynski, J.J.; Abraimov, D.V.; Majkic, G.; Selvamanickam, V.,	*Next-generation highly flexible round REBCO STAR wires with over 580 A mm(-2) at 4.2 K, 20 T for future compact magnets*	Superconductor Science and Technology	32		10LT01	10.1088/1361-6668/ab3904	Yes
Karna, S.K.; Womack, F.N.; Chapai, R.; Young, D.P.; Marshall, M.; Xie, W.; Graf, D.E.; Wu, Y.; Cao, H.; DeBeer-Schmitt, L.; Adams, P.W.; Jin, R.; DiTusa, J.F.,	*Consequences of magnetic ordering in chiral Mn1/3Nb2*	Physical Review B	100		184413	10.1103/PhysRevB.100.184413	Yes

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Kauffmann-Weiss, S.; Iida, K.; Tarantini, C.; Boll, T.; Schneider, R.; Ohmura, T.; Matsumoto, T.; Hatano, T.; Langer, M.; Meyer, S.; Jaroszynski, J.; Gerthsen, D.; Ikuta, H.; Holzapfel, B.; Haenisch, J.,	*Microscopic origin of highly enhanced current carrying capabilities of thin NdFeAs(O,F) films*	Nanoscale Advances	1	8	3036-3048	10.1039/c9na00147f	Yes
Kaur, N.; Christian, J.H.; Kinyon, J.S.; Ramachandran, V.; Nellutla, S.; Dalal, N.S.; Kim, Y.H.; Park, J.H.; Meehan, C.; Takano, Y.,	*Magnetic-field-driven quantum criticality of the Ising-class square lattice Cr(dien)(O2)2 ·H2O and the orientation dependence of its spin-flop transition*	Physical Review B	99		214434	10.1103/PhysRevB.99.214434	Yes
Khan, M.A.; Graf, D.E.; Vekhter, I.; Browne, D.A.; DiTusa, J.F.; Phelan, W.A.; Young, D.P.,	*Quantum oscillations and a nontrivial Berry phase in the noncentrosymmetric topological superconductor candidate BiPd*	Physical Review B Rapid Communications	99		20507	10.1103/PhysRevB.99.020507	Yes
Klyueva, M.; Shulyatev, D.; Andreev, N.; Tabachkova, N.; Sviridova, T.; Suslov, A.,	*New stable icosahedral quasicrystal in the system Al-Cu-Co-Fe*	Journal of Alloys and Compounds	801		478-482	10.1016/j.jallcom.2019.06.056	Yes
Lee, S.; Zhu, Y.; Wang, Y.; Miao, L.; Pillsbury, T.; Yi, H.; Kempinger, S.; Hu, J.; Heikes, C.A.; Quarterman, P.; Ratcliff, W.; Borchers, J.A.; Zhang, H.; Ke, X.; Graf, D.E.; Alem, N.; Chang, C.; Samarth, N.; Mao, Z.,	*Spin scattering and noncollinear spin structure-induced intrinsic anomalous Hall effect in antiferromagnetic topological insulator MnBi2Te4*	Physical Review Research	1		12011	10.1103/PhysRevResearch.1.012011	Yes
Li, Y.; Tabis, W.; Tang, Y.; Yue, G.; Jaroszynski, J.; Barisic, N.; Greven, M.,	*Hole pocket-driven superconductivity and its universal features in the electron-doped cuprates*	Science Advances	5	2	eaap7349	10.1126/sciadv.aap7349	Yes
Li, Y.; Terzic, J.; Baity, P.G.; Popovic, D.; Gu, G.D.; Li, Q.; Tsvelik, A.M.; Tranquada, J.M.,	*Tuning from failed superconductor to failed insulator with magnetic field*	Science Advances	5		eaav7686	10.1126/sciadv.aav7686	Yes
Li, Y.; Wu, J.; Camino, F.; Gu, G.D.; Bozovic, I.; Tranquada, J.M.,	*Large surface conductance and superconductivity in topological insulator microstructures*	Applied Physics Letters	115	17	173507	10.1063/1.5122789	Yes

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Li, Z.; Wang, T.; Jin, C.; Lu, Z.; Lian, Z.; Meng, Y.; Blei, M.; Gao, S.; Taniguchi, T.; Watanabe, K.; Ren, T.; Tongay, S.; Yang, L.; Smirnov, D.; Cao, T.; Shi, S.,	*Emerging photoluminescence from the dark-exciton phonon replica in monolayer WSe2*	Nature Communi-cations	10	1	2469	10.1038/s41467-019-10477-6	Yes
Li, Z.; Wang, T.; Jin, C.; Lu, Z.; Lian, Z.; Meng, Y.; Blei, M.; Gao, M.; Taniguchi, T.; Watanabe, K.; Ren, T.; Cao, T.; Tongay, S.; Smirnov, D.; Zhang, L.; Shi, S.,	*Momentum-Dark Intervalley Exciton in Monolayer Tungsten Diselenide Brightened via Chiral Phonon*	American Chemical Society Nano	13	12	14107	10.1021/acsnano.9b06682	Yes
Li, Z.; Wang, T.; Lu, Z.; Khatoniar, M.; Lian, Z.; Meng, Y.; Blei, M.; Taniguchi, T.; Watanabe, K.; McGill, S.A.; Tongay, S.; Menon, V.M.; Smirnov, D.; Shi, S.,	*Direct Observation of Gate-Tunable Dark Trions in Monolayer WSe2*	Nano Letters	19	10	6886	10.1021/acs.nanolett.9b02132	Yes
Litvak, I.; Griffin, A.; Paulino, J.; Mao, W.; Gor'kov, P.L.; Shetty, K.K.; Brey, W.W.,	*Achieving 1 ppm field homogeneity above 24 T: Application of differential mapping for shimming Keck and the Series Connected Hybrid magnets at the NHMFL*	Journal of Magnetic Resonance	301		109-118	10.1016/j.jmr.2019.03.002	Yes
Liu, E.; van Baren, J.; Lu, Z.; Altaiary, M.M.; Taniguchi, T.; Watanabe, K.; Smirnov, D.; Lui, C.,	*Gate Tunable Dark Trions in Monolayer WSe2*	Physical Review Letters	123		27401	10.1103/PhysRevLett.123.027401	Yes
Liu, E.; van Baren, J.; Taniguchi, T.; Watanabe, K.; Chang, Y.C.; Lui, C.H.,	*Magnetophotoluminescence of exciton Rydberg states in monolayer WSe2*	Physical Review B	99	20	205420	10.1103/PhysRevB.99.205420	No
Liu, E.; van Baren, J.; Taniguchi, T.; Watanabe, K.; Chang, Y.; Lui, C.,	*Valley-selective chiral phonon replicas of dark excitons and trions in monolayer WSe2*	Physical Review Research	1		32007	10.1103/PhysRevResearch.1.032007	Yes

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Liu, J.Y.; Liu, P.F.; Gordon, K.; Emmanouilidou, E.; Xing, J.; Graf, D.E.; Chakoumakos, B.C.; Wu, Y.; Cao, H.B.; Dessau, D.; Liu, Q.H.; Ni, N.,	*Nontrivial topology in the layered Dirac nodal-line semimetal candidate SrZnSb2 with distorted Sb square nets*	Physical Review B	100		195123	10.1103/PhysRevB.100.195123	Yes
Lu, Z.; Rhodes, D.A.; Li, Z.; Van Tuan, D.; Jiang, Y.; Ludwig, J.K.; Jiang, Z.; Lian, Z.; Shi, S.; Hone, J.; Dery, H.; Smirnov, D.,	*Magnetic field mixing and splitting of bright and dark excitons in monolayer MoSe2*	2D Materials	7	1	15017	10.1088/2053-1583/ab5614	Yes
Mograbi, M.; Maniv, E.; Rout, P.K.; Graf, D.E.; Park, J.; Dagan, Y.,	*Vortex excitations in the insulating state of an oxide interface*	Physical Review B	99		94507	10.1103/PhysRevB.99.094507	Yes
Moir, C.; Riggs, S.; Galvis, J.; Lian, X.; Giraldo-Gallo, P.; Chu, J.; Walmsley, P.; Fisher, I.; Shehter, A.; Boebinger, G.S.,	*{Multi-band mass enhancement towards critical doping in a pnictide superconductor}*	Nature Partner Journals Quantum Materials (npj)	4	1	8	10.1038/s41535-018-0144-x	Yes
Mozaffari, S.; Sun, D.; Minkov, V.S.; Drozdov, A.P.; Knyazev, D.; Betts, J.; Einaga, M.; Shimizu, K.; Eremets, M.I.; Balicas, L.; Balakirev, F.,	*Superconducting phase diagram of H3S under high magnetic fields*	Nature Communi-cations	10		2522	10.1038/s41467-019-10552-y	Yes
Mudiyanselage,, R.R.H.H.; Magill, B.A.; Burton, J.; Miller, M.; Spencer, J.; McMillan, K.; Khodaparast, G.A.; Buyl Kang, H.; Gyu Kang, M.; Maurya, D.; Priya, S.; Holleman, J.; McGill, S.A.; Stanton, C.J.,	*Coherent acoustic phonons and ultrafast carrier dynamics in hetero-epitaxial BaTiO3–BiFeO3 films and nanorods*	Journal of Materials Chemistry C	7		14212	10.1039/C9TC01584A	Yes
Ozaki, T.; Jaroszynski, J.; Li, Q.,	*Two-Fold Reduction of Jc Anisotropy in FeSe0.5Te0.5 Films Using Low-Energy Proton Irradiation*	IEEE Transactions on Applied Superconductivity	29	5	43833	10.1109/TASC.2019.2900615	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Rawl, R.; Ge, L.; Lu, Z.; Evenson, Z.; Dela Cruz, C.R.; Huang, Q.; Lee, M.; Choi, E.S.; Mourigal, M.; Zhou, H.D.; Ma, J.,	*Ba8MnNb6O24: A model two-dimensional spin-5/2 triangular lattice antiferromagnet*	Physical Review Materials	3		54412	10.1103/PhysRevMaterials.3.054412	Yes
Rosa, P.F.S.; Thomas, S.M.; Balakirev, F.; Bauer, E.D.; Fernandes, R.M.; Thompson, J.D.; Jaime, M.,	*Enhanced Hybridization Sets the Stage for Electronic Nematicity in CeRhIn5*	Physical Review Letters	122		16402	10.1103/PhysRevLett.122.016402	Yes
Sakhratov, Y.A.; Prinz-Zwick, M.; Wilson, D.; Buttgen, N.; Shapiro, A.Y.; Svistov, L.E.; Reyes, A.P.,	*Magnetic structure of the triangular antiferromagnet RbFe(MoO4)2 weakly doped with nonmagnetic K+ ions studied by NMR*	Physical Review B	99		24419	10.1103/PhysRevB.99.024419	Yes
Schoenemann, R.; Chiu, Y.C.; Zheng, W.; Quito, V.L.; Sur, S.; McCandless, G.T.; Chan, J.Y.; Balicas, L.,	*Bulk Fermi surface of the Weyl type-II semimetallic candidate NbIrTe4*	Physical Review B	99		195128	10.1103/PhysRevB.99.195128	Yes
Shi, Z.; Steinhardt, W.; Graf, D.E.; Corboz, P.; Weickert, D.F.; Harrison, N.; Jaime, M.; Marjerrison, C.; Dabkowska, H.A.; Mila, F.; Haravifard, S.,	*Emergent bound states and impurity pairs in chemically doped Shastry-Sutherland system*	Nature Communi-cations	9		2349	10.1038/s41467-019-10410-x	Yes
Shimura, Y.; Zhang, Q.; Zeng, B.; Rhodes, D.; Schoenemann, R.; Tsujimoto, M.; Matsumoto, Y.; Sakai, A.; Sakakibara, T.; Araki, K.; Zheng, W.; Zhou, Q.; Balicas, L.; Nakatsuji, S.,	*Giant Anisotropic Magnetoresistance due to Purely Orbital Rearrangement in the Quadrupolar Heavy Fermion Superconductor PrV2Al20*	Physical Review Letters	122		256601	10.1103/PhysRevLett.122.256601	Yes
Shivaram, B.S.; Holleuis, L.; Ulrich, V.W.; Singleton, J.; Jaime, M.,	*Field Angle Tuned Metamagnetism and Lifschitz Transitions in UPt3*	Nature Scientific Reports	9		8162	10.1038/s41598-019-44602-8	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Song, T.C.; Fei, Z.Y.; Yankowitz, M.; Lin, Z.; Jiang, Q.N.; Hwangbo, K.; Zhang, Q.; Sun, B.S.; Taniguchi, T.; Watanabe, K.; McGuire, M.A.; Graf, D.E.; Cao, T.; Chu, J.H.; Cobden, D.H.; Dean, C.R.; Xiao, D.; Xu, X.D.,	*Switching 2D magnetic states via pressure tuning of layer stacking*	Nature Materials	18	12	1298	10.1038/s41563-019-0505-2	Yes
Stepanov, P.; Barlas, Y.; Che, S.; Myhro, K.; Voigt, G.; Pi, Z.; Watanabe, K.; Taniguchi, T.; Smirnov, D.; Zhang, F.; Lake, R.K.; MacDonald, A.H.; Lau, C.N.,	*Quantum parity Hall effect in Bernal-stacked trilayer graphene*	Proceedings of the National Academy of Sciences of the USA (PNAS)	116	21	10286	10.1073/pnas.1820835116	Yes
Stephen, G.M.; Buda, G.; Jamer, M.E.; Lane, C.; Kaprzyk, S.; Barbiellini, B.; Graf, D.E.; Lewis, L.H.; Bansil, A.; Heiman, D.,	*Structural and electronic properties of the spin-filter material CrVTiAl with disorder*	Journal of Applied Physics	125		123903	10.1063/1.5079749	Yes
Stephen, G.M.; Lane, C.; Buda, G.; Graf, D.; Kaprzyk, S.; Barbiellini, B.; Bansil, A.; Heiman, D.,	*Electrical and magnetic properties of thin films of the spin-filter material CrVTiAl*	Physical Review B	99	22	224207	10.1103/PhysRevB.99.224207	Yes
Suslov, A.; Davydov, A.B.; Oveshnikov, L.N.; Morgun, L.A.; Kugel, K.I.; Zakhvalinskii, V.S.; Pilyuk, E.A.; Kochura, A.V.; Kuzmenko, A.P.; Pudalov, V.M.; Aronzon, B.A.,	*Observation of subkelvin superconductivity in Cd3As2 thin films*	Physical Review B	99		94512	10.1103/PhysRevB.99.094512	Yes
Tarantini, C.; Balachandran, S.; Heald, S.M.; Lee, P.J.; Paudel, N.; Choi, E.; Starch, W.L.; Larbalestier, D.C.,	*Ta, Ti and Hf effects on Nb3Sn high-field performance: temperature-dependent dopant occupancy and failure of Kramer extrapolation*	Superconductor Science and Technology	32		124003	10.1088/1361-6668/ab4d9e	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Terashima, T.; Kikugawa, N.; Graf, D.E.; Hirose, H.T.; Uji, S.; Matsushita, Y.; Lin, H.; Zhu, X.; Wen, H.H.; Nomoto, T.; Suzuki, K.; Ikeda, H.,	*Accurate determination of the Fermi surface of tetragonal FeS via quantum oscillation measurements and quasiparticle self-consistent GW calculations*	Physical Review B	99		134501	10.1103/PhysRevB.99.134501	Yes
Terashima, T.; Kikugawa, N.; Kiswandhi, A.; Choi., E.S.; Kihou, K.; Ishida, S.; Lee, C.H.; Iyo, A.; Eisaki, H.; Shinya, U.,	*Anomalous peak effect in iron-based superconductors Ba1−xKxFe2As2 (x ≈ 0.69 and 0.76) for magnetic-field directions close to the ab plane and its possible relation to the spin paramagnetic effect*	Physical Review B	99		94508	10.1103/PhysRevB.99.094508	Yes
Vallejo, J.; Viciano-Chumillas, M.; Lloret, F.; Julve, M.; Castro, I.; Krzystek, J.; Ozerov, M.; Armentano, D.; De Munno, G.; Cano, J.,	*Coligand effects on the field-induced double slow magnetic relaxation in six-coordinate cobalt(II) SIMs with positive magnetic anisotropy*	Inorganic Chemistry	58	23	15726-15740	10.1021/acs.inorgchem.9b01719	Yes
Wang, J.; Zhang, C.; Liu, H.; McLaughlin, R.; Zhai, Y.; Vardeny, S.R.; Liu, X.; McGill, S.A.; Semenov, D.; Guo, H.; Tsuchikawa, R.; Deshpande, V.; Sun, D.; Vardeny, Z.,	*Spin-optoelectronic devices based on hybrid organic-inorganic trihalide perovskites*	Nature Communi-cations	10	1	129:1-6	10.1038/s41467-018-07952-x	Yes
Wang, L.; Yin, M.; Zhong, B.; Jaroszynski, J.; Mbamalu, G.; Datta, T.,	*Quantum transport properties of monolayer graphene with antidot lattice*	Journal of Applied Physics	126	8	84305	10.1063/1.5100813	Yes
Wartenbe, M.; Baumbach, R.; Shekhter, A.; Boebinger, G.S.; Bauer, E.D.; Corvalan Moya, C.; Harrison, N.; McDonald, R.; Salamon, M.B.; Jaime, M.,	*Magnetoelastic coupling in URu2Si2: Probing multipolar correlations in the hidden order state*	Physical Review B	99		235101	10.1103/PhysRevB.99.235101	Yes
Wei, K.; Chen, K.; Neu, J.N.; Lai, Y.; Chappell, G.L.; Nolas, G.S.; Graf, D.E.; Xin, Y.; Balicas, L.; Baumbach, R.; Siegrist, T.M.,	*Fermi surface of the flat-band intermetallics APd3 (A=Pb,Sn)*	Physical Review Materials	3		041201(R)	10.1103/PhysRevMaterials.3.041201	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Wei, K.; Neu, J.N.; Lai, Y.; Chen, K.; Hobbis, D.; Nolas, G.S.; Graf, D.E.; Siegrist, T.M.; Baumbach, R.,	*Enhanced thermoelectric performance of heavy-fermion compounds YbTM2Zn20 (TM = Co, Rh, Ir) at low temperatures*	Science Advances	5	5	eaaw6183	10.1126/sciadv.aaw6183	Yes
Xin, Y.; Han, K.; Svanidze, E.; Besara, T.; Siegrist, T.M.; Morosan, E.,	*Microstructure of hard biocompatible Ti1−xAux alloys*	Materials Characterization	149		133-142	10.1016/j.matchar.2019.01.013	Yes
Yanagisawa, T.; Hidaka, H.; Amitsuka, H.; Nakamura, S.; Awaji, S.; Green, E.L.; Zherlitsyn, S.; Wosnitza, J.; Yazici, D.; White, B. D.; Maple, M. B.,	*Quadrupolar Susceptibility and Magnetic Phase Diagram of PrNi2Cd20 with Non-Kramers Doublet Ground State*	arXiv	1911		11914	https://arxiv.org/ftp/arxiv/papers/1911/1911.11914.pdf	No
Yankowitz, M.; Chen, S.W.; Polshyn, H.; Zhang, Y.X.; Watanbe, K.; Taniguchi, T.; Graf, D.E.; Young, A.F.; Dean, C.R.,	*Tuning superconductivity in twisted bilayer graphene*	Science	363	6431	1059	10.1126/science.aav1910	Yes
Ye, L.D.; Chan, M.; McDonald, R.; Graf, D.E.; Kang, M.G.; Liu, J.W.; Suzuki, T.; Comin, R.; Fu, L.; Checkelsky, J.G.,	*de Haas-van Alphen effect of correlated Dirac states in kagome metal Fe3Sn2*	Nature Communi-cations	10		4870	10.1038/s41467-019-12822-1	Yes
You, J.S.; Lee, I.; Choi, E.S.; Jo, Y.J.; Shim, J.H.; Kim, J.S.,	*Shubnikov-de Haas oscillations of massive Dirac fermions in a Dirac antiferromagnet SrMnSb2*	Current Applied Physics	19	3	230 - 235	10.1016/j.cap.2018.10.022	Yes
Yue, G.; Xia, D.D.; Pelc, D.; He, R.H.; Kaneko, N.H.; Sasagawa, T.; Li, Y.; Zhao, X.; Barisic, N.; Shehter, A.; Greven, M.,	*Universal precursor of superconductivity in the cuprates*	Physical Review B	99		214502	10.1103/PhysRevB.99.214502	No
Zhang, C.; Ni, Z.; Zhang, J.; Yuan, X.; Liu, Y.; Zou, Y.; Liao, Z.; Du, Y.; Narayan, A.; Zhang, H.; Gu, T.; Zhu, X.; Pi, L.; Sanvito, S.; Han, X.; Zou, J.; Shi, Y.; Wan, X.; Y.Savrasov, S.; Xiu, F.,	*Ultrahigh conductivity in Weyl semimetal NbAs nanobelts*	Nature Materials	18		482-488	10.1038/s41563-019-0320-9	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Zhang, C.; Zhang, Y.; Yuan, X.; Lu, S.; Zhang, J.; Narayan, A.; Liu, Y.; Zhang, H.; Ni, Z.; Liu, R.; Choi, E.; Suslov, A.; Sanvito, S.; Pi, L.; Lu, H.Z.; Potter, A.C.; Xiu, F.,	*Quantum Hall effect based on Weyl orbits in Cd3As2*	Nature	565		331-336	10.1038/s41586-018-0798-3	Yes
Zhang, Q.; Zeng, B.; Chiu, Y.; Schoenemann, R.; Memaran, S.; Zheng, W.; Rhodes, D.A.; Chen, K.; Besara, T.; Sankar, R.; Chou, F.C.; McCandless, G.; Chan, J.Y.; Alidoust, N.; Xu, S.Y.; Belopolski, I.; Hasan, M.Z.; Balakirev, F.; Balicas, L.,	*Possible manifestations of the chiral anomaly and evidence for a magnetic field inducedtopological phase transition in the type-I Weyl semimetal TaAs*	Physical Review B	100		115138	10.1103/PhysRevB.100.115138	Yes
Zhang, X.; Lai, Y.; Dohner, E.; Moon, S.; Taniguchi, T.; Watanabe, K.; Smirnov, D.; Heinz, T.F.,	*Zeeman-Induced Valley-Sensitive Photocurrent in Monolayer MoS2*	Physical Review Letters	122		127401	10.1103/PhysRevLett.122.127401	Yes
Zhu, Y.L.; Hu, J.; Womack, F.N.; Graf, D.E.; Wang, Y.; Adams, P.W.; Mao, Z.Q.,	*Emergence of intrinsic superconductivity below 1.178 K in the topologically non-trivial semimetal state of CaSn3*	Journal of Physics-Condensed Matter	31	24	245703	10.1088/1361-648X/ab0f0d	Yes
Zvyagin, S.A.; Graf, D.E.; Sakuri, T.; Kimura, S.; Nojiri, H.; Wosnitza, J.; Ohta, H.; Ono, T.; Tanaka, H.,	*Pressure-tuning the quantum spin Hamiltonian of the triangular lattice antiferromagnet Cs2CuCl4*	Nature Communi-cations	10		1064	10.1038/s41467-019-09071-7	Yes

EMR Facility at FSU (29)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Banerjee, A.; Tolla, S.A.; Stjepanovic, S.; Sevilla, M.D.; Goodsell, J.L.; Angerhofer, A.; Brennessel, W.W.; Loloee, R.; Chavez, F.A.,	*Structural, spectroscopic, electrochemical, and magnetic properties for manganese(II) triazamacrocyclic complexes*	Inorganica Chimica Acta	486		546-555	10.1016/j.ica.2018.11.013	Yes
Barker, A.; Kelly, C.T.; Kühne, I.A.; Hill, S.; Krzystek, J.; Wix, P.; Esien, K.; Felton, S.; Müller-Bunz, H.; Morgan, G.C.,	*Spin state solvomorphism in a series of rare S = 1 manganese(III) complexes*	Dalton Transactions in Chemistry	48		15560-15566	10.1039/c9dt02476j	Yes
Bucinsky, L.; Breza, M.; Malcek, M.; Powers, D.C.; Hwang, S.J.; Krzystek, J.; Nocera, D.G.; Telser, J.,	*High-Frequency and -Field EPR (HFEPR) Investigation of a Pseudotetrahedral Cr(IV) Siloxide Complex and Computational Studies of Related Cr(IV)L4 Systems*	Inorganic Chemistry	58	8	4907-4920	10.1021/acs.inorgchem.8b03512	Yes
Dragulescu-Andrasi, A.; Filatov, A.; Oakley, R.; Li, X.; Lekin, K.; Huq, A.; pak, C.; Greer, S.; McKay, J.E.; Jo, M.; Lengyel, J.; Hung, I.; Maradzike, E.; DePrince, A.E.; Stoian, S.A.; Hill, S.; Hu, Y.Y.; Shatruk, M.,	*Radical Dimerization in Plastic Organic Crystal Leads to Structural and Magnetic Bistability with Wide Thermal Hysteresis*	Journal of American Chemical Society	141	45	17989-17994	10.1021/jacs.9b09533	Yes
Dubroca, T.; Wi, S.; van Tol, J.; Frydman, L.; Hill, S.,	*Large Volume Liquid State Scalar Overhauser Dynamic NuclearPolarization at High Magnetic Field*	Physical Chemistry Chemical Physics	21	NA	21200-21204	10.1039/C9CP02997D	Yes
Escobar, L.B.L.; Guedes, G. P.; Soriano, S.; Marbey, J.; Hill, S.; Novak, M. A.; Vaz, M. G. F.,	*Synthesis, Magnetic and High-Field EPR investigation of two novel tetranuclear NiII-based complexes*	Inorganic Chemistry	58		14420-14428	10.1021/acs.inorgchem.9b01816	Yes
Gagnon, D.M.; Hadley, R.C.; Ozarowski, A.; Nolan, E.M.; Britt, R.D.,	*High-Field EPR Spectroscopic Characterization of Mn(II) Bound to the Bacterial Solute-Binding Proteins MntC and PsaA*	Journal of Physical Chemistry B	123	23	4929-4934	10.1021/acs.jpcb.9b03633	Yes
Gaita-Arino, A.; Luis, F.; Hill, S.; Coronado, E.,	*Molecular spins for quantum computation*	Nature Chemistry	11		301-309	10.1038/s41557-019-0232-y	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Gawraczyński, J.; Kurzydłowski, D.; Ewings, R.A.; Bandaru, S.; Gadomski, W.; Mazej, Z.; Ruani, G.; Bergenti, I.; Jaroń, T.; Ozarowski, A.; Hill, S.; Leszczyński, P.J.; Tokár, K.; Derzsi, M.; Barone, P.; Wohlfeld, K.; Lorenzana, J.; Grochala, W.,	*Silver route to cuprate analogs*	Proceedings of the National Academy of Sciences of the USA (PNAS)	116	5	1495-1500	10.1073/pnas.1812857116	Yes
Grant, L.N.; Krzystek, J.; Pinter, B.; Telser, J.; Grutzmacher, H.; Mindiola, D.J.,	*Finding a soft spot for vanadium: a P-bound OCP ligand*	Chemical Communications	55		5966-5969	10.1039/C9CC01500K	Yes
Hadley, R.C.; Gagnon, D.M.; Ozarowski, A.; Britt, R.D.; Nolan, E.M.,	*Murine Calprotectin Coordinates Mn(II) at a Hexahistidine Site with Ca(II)-Dependent Affinity*	Inorganic Chemistry	58	20	13578-13590	10.1021/acs.inorgchem.9b00763	Yes
Hamilton, J.A.G.; Ozarowski, A.; Archibong, E.; Thomas, C.; Serrano-Garcia, W.; Stoian, S.A.; Weider, C.; Mateeva, N.,	*Synthesis and characterization of novel polyethylene oxide–dinuclear Cu(II) complex electrospun nanofibers*	Materials Letters	238		58-61	10.1016/j.matlet.2018.11.149	Yes
Hay, M.A.; Sarkar, A.; Craig, G.A.; Bhaskaran, L.; Nehrkorn, J.; Ozerov, M.; Marriott, K.E.R.; Wilson, C.; Rajamaran, G.; Hill, S.; Murrie, M.,	*In-depth investigation of large axial magnetic anisotropy in monometallic 3d complexes using frequency domain magnetic resonance and ab initio methods: a study of trigonal bipyramidal Co(II)*	Chemical Science	10		6354 - 6361	10.1039/c9sc00987f	Yes
Hickey, A.K.; Greer, S.M.; Valdez-Moreira, J.A.; Lutz, S.A.; Pink, M.; DeGayner, J.A.; Harris, T.D.; Hill, S.; Telser, J.; Smith, J.M.,	*A Dimeric Hydride-Bridged Complex with Geometrically Distinct Iron Centers Giving Rise to an S = 3 Ground State*	Journal of American Chemical Society	141		11970-11975	10.1021/jacs.9b04389	Yes
Jackson, C.E.; Lin, C.; Johnson, S.H.; van Tol, J.; Zadrozny, J.M.,	*Nuclear-spin-pattern control of electron-spin dynamics in a series of V(IV) complexes*	Chemical Science	10	36	8447-8454	10.1039/C9SC02899D	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Krzystek, J.; Kohl, G.; Hansen, H.B.; Enders, M.; Telser, J.,	*Combining HFEPR and NMR Spectroscopies to Characterize Organochromium(III) Complexes with Large Zero-Field Splitting*	Organo-metallics	38	9	2179-2188	10.1021/acs.organomet.9b00158	Yes
Liu, B.; Yu, F.; Zhu, Z.H.; Zhang, Y.; Ouyang, Z.W.; Wang, Z.; Zeng, M.H.,	*Tracking the Process of a Solvothermal Domino Reaction Leading to a Stable Triheteroarylmethyl Radical: A Combined Crystallographic and Mass-Spectrometric Study*	Angewandte Chemie (International ed. in English)	58		3748 –3753	10.1002/anie.201813829	Yes
Liu, J.; Kittaka, S.; Johnson, R.D.; Lancaster, T.; Singleton, J.; Sakakibara, T.; Kohama, Y.; van Tol, J.; Ardavan, A.; Wiliams, B.H.; Blundell, S.J.; Manson, Z.E.; Manson, J.L.; Goddard, P.A.,	*Unconventional Field-Induced Spin Gap in an S = 1=2 Chiral Staggered Chain*	Physical Review Letters	122		57207	10.1103/PhysRevLett.122.057207	Yes
Mandal, T.; Hustedt, E.J.; Song, L.; Oh., K.J.,	*CW EPR and DEER Methods to Determine BCL-2 Family Protein Structure and Interactions: Application of site-directed spin labeling to BAK apoptotic pores*	Methods in Molecular Biology	1877		257-303	10.1007/978-1-4939-8861-7_18	Yes
Masegosa, A.; Palacio, M.A.; Ruiz, E.; Gomez-Coca, S.; Krzystek, J.; Moreno, J.M.; Colacio, E.,	*Dinuclear Co(II)Y(III) vs. tetranuclear Co(II)2Y(III)2 complexes: the effect of increasing molecular size on magnetic anisotropy and relaxation dynamics*	Dalton Transactions in Chemistry	48	39	14873-14884	10.1039/C9DT02969A	Yes
Mentink-Vigier, F.; Barra, A.L.; van Tol, J.; Hediger, S.; Lee, D.; De Paepe, G.,	*De novo prediction of cross-effect efficiency for magic angle spinning dynamic nuclear polarization*	Physical Chemistry Chemical Physics	21	-	2166-2176	10.1039/C8CP06819D	Yes
Pan, J.; Dalzini, A.; Song, L.,	*Cholesterol and phosphatidylethanolamine lipids exert opposite effects on membrane modulations caused by the M2 amphipathic helix*	Biochimica et Biophysica Acta Biomembranes	1861	1	201-209	10.1016/j.bbamem.2018.07.013	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Parish, C.; Niedbalski, P.; Wang, Q.; Khashami, F.; Hayati, Z.; Liu, M.; Song, L.; Lumata, L.,	*Effects of glassing matrix deuteration on the relaxation properties of hyperpolarized 13C spins and free radical electrons at cryogenic temperatures*	Journal of Chemical Physics	150		234307	10.1063/1.5096036	Yes
Saiz, C.L.; McGuire, M.A.; Hennadige, S.R.J.; van Tol, J.; Singamaneni, S.R.,	*Electron Spin Resonance Properties of CrI3 and CrCl3 Single Crystals*	MRS Advances	4	40	2169–2175	10.1557/adv.2019.241	No
Shova, S.; Vlad, A.; Cazacu, M.; Krzystek, J.; Ozarowski, A.; Malcek, M.; Bucinsky, L.; Rapta, P.; Cano, J.; Telser, J.; Arion, V. B.,	*Dinuclear manganese(III) complexes with bioinspired coordination and variable linkers showing weak exchange effects: a synthetic, structural, spectroscopic and computation study*	Dalton Transactions in Chemistry	48	18	5909-5922	10.1039/c8dt04596h	Yes
Song, B.; Tang, M.; Enyuan, H.E.; Borkiewicz, O.J.; Wiaderek, K.M.; Zhang, Y.; Phillip, N.D.; Liu, X.; Shadike, Z.; Li, C.; Song, L.; Hu, Y.; Chi, M.; Veith, G.M.; Yan, X.Q.; Liu, J.; Nanda, J.; Page, K.; Hu, A.,	*Understanding the Low-Voltage Hysteresis of Anionic Redox in Na2Mn3O7*	Chemistry of Materials	3110		3756-3765	10.1021/acs.chemmater.9b00772	Yes
Sunay, U.R.; Zvanut, M.E.; Marbey, J.; Hill, S.; Leach, J.H.; Udwary, K.,	Small non-uniform basal crystal fields in HVPE free-standing GaN:Mg as evidenced by angular dependent and frequency-dependent EPR	Journal of Physics-Condensed Matter	31		345702	10.1088/1361-648X/ab21ec	Yes
Vallejo, J.; Viciano-Chumillas, M.; Lloret, F.; Julve, M.; Castro, I.; Krzystek, J.; Ozerov, M.; Armentano, D.; De Munno, G.; Cano, J.,	Coligand effects on the field-induced double slow magnetic relaxation in six-coordinate cobalt(II) SIMs with positive magnetic anisotropy	Inorganic Chemistry	58	23	15726-15740	10.1021/acs.inorgchem.9b01719	Yes
Wang, Y.; Kaur, P.; Elbahnasawy, M.A.; Hayati, Z.; Qiao, Z.S.; Bui, N.N.; Chile, C.; Nasr, M.L.; Wagner, G.; Wang, J.H.; Song, L.; Reinherz, E.L.; Kim, M.,	Topological analysis of the gp41 MPER on lipid bilayers relevant to the metastable HIV-1 envelope prefusion state	Proceedings of the National Academy of Sciences of the USA (PNAS)	116	45	22556-22566	10.1073/pnas.1912427116	Yes

High B/T Facility at UF (2)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Huan, C.; Adam, J.; Lewkowitz, M.; Masuhara, N.; Candela, D.; Sullivan, N.S.,	*Nuclear Spin Relaxometry of 3He Atoms Confined in Mesoporous MCM-41*	Journal of Low Temperature Physics	196	1-2	308-313	10.1007/s10909-018-02123-0	Yes
VanGennep, D.; Paul, T.A.; Yerger, C.W.; Weir, S.T.; Vohra, Y.K.; Hamlin, J.J.,	*Possible pressure-induced topological quantum phase transition in the nodal line semimetal ZrSiS*	Physical Review B	99		85204	10.1103/PhysRevB.99.085204	Yes

ICR Facility at FSU (31)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Ajaero, C.; Peru, K.M.; Hughes, S.A.; Chen, H.; McKenna, A.M.; Corilo, Y.E.; McMartin, D.W.; Headley, J.V.,	*Atmospheric Pressure Photoionization Fourier Transform Ion Cyclotron Resonance Mass Spectrometry Characterization of Oil Sand Process-Affected Water in Constructed Wetland Treatment*	Energy & Fuels	33		4420-4431	10.1021/acs.energyfuels.9b00469	Yes
Campbell, E.K.; Dunk, P.W.,	*LV-DIB-s4PT: A new tool for astrochemistry*	Review of Scientific Instruments	90		103101	10.1063/1.5116925	Yes
D"Andrilli, J.; Junker, J.R.; Smith, H.J.; Scholl, E.A.; Foreman, C.M.,	*DOM composition alters ecosystem function during microbial processing of isolated sources*	Biogeo-chemistry	142		281-298	10.1007/s10533-018-00534-5	Yes
Di Lorenzo, R.A.; Lobodin, V.V.; Cochran, J.; Kolic, T.; Besevic, S.; Sled, J.G.; Reiner, E.J.; Jobst, K.J.,	*Fast Gas Chromatography-atmospheric Pressure (photo)ionization Mass Spectrometry of Polybrominated Diphenylether Flame Retardants*	Analytica Chimica Acta	1056		70-78	10.1016/j.aca.2019.01.007	Yes
Drake, T.W.; Oost, K.V.; Barthel, M.; Bauters, M.; Hoyt, A.M.; Podgorski, D.C.; Six, J.; Boeckx, P.; Trumbore, S.E.; Ntaboba, L.C.; Spencer, R.G.M.,	*Mobilization of Aged and Biolabile Soil Carbon by Tropical Deforestation*	Nature Geoscience	12		541-546	10.1038/s41561-019-0384-9	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Fathabad, S.G.; Arumanayagam, A.S.; Tabatabai, B.; Chen, H.; Lu, J.; Sitther, V.,	*Augmenting Fremyella diplosiphon Cellular Lipid Content and Unsaturated Fatty Acid Methyl Esters Via Sterol Desaturase Gene Overexpression*	Applied Biochemistry and Biotechnology	1		1-14	10.1007/s12010-019-03055-5	Yes
Gómez-Torres, A.; Esper, R.; Dunk, P.W.; Morales-Martínez, R.; Rodríguez-Fortea, A.; Echegoyen, L.; Poblet, J.M.,	*Small Cage Uranofullerenes: 27 Years after Their First Observation*	Helvetica Chimica Acta	102	5	e1900046	10.1002/hlca.201900046	Yes
Graca, D.C.; Lescuyer, P.,	*Ultrahigh Performance Mass Spectrometry in Clinical Chemistry: A Taste of the Future?*	Clinical Chemistry	65	8	943-945	10.1373/clinchem.2019.305631	No
He, L.; Anderson, L.C.; Barnidge, D.R.; Murray, D.L.; Dasari, S.; Dispenzieri, A.; Hendrickson, C.L.; Marshall, A.G.,	*Classification of Plasma Cell Disorders by 21 Tesla Fourier Transform Ion Cyclotron Resonance Top-Down and Middle-Down MS/MS Analysis of Monoclonal Immunoglobulin Light Chains in Human Serum*	Analytical Chemistry	91	5	3263–3269	10.1021/acs.analchem.8b03294	Yes
He, L.; Marshall, A.G.,	*Top-Down Mass Spectrometry in Clinical Diagnosis? A Potentially Less Invasive Approach for Plasma Cell Disorders Classification*	AACC Academy Scientific Shorts	1		1-2	na	No
He, L.; Rockwood, A.L.; Agarwal, A.M.; Anderson, L.C.; Weisbrod, C.; Hendrickson, C.L.; Marshall, A.G.,	*Diagnosis of Hemoglobinopathy and β-Thalassemia by 21-Tesla Fourier Transform Ion Cyclotron Resonance Mass Spectrometry and Tandem Mass Spectrometry of Hemoglobin from Blood*	Clinical Chemistry	65	8	986-994	10.1373/clinchem.2018.295766	Yes
Hemingway, J.D.; Spencer, R.G.M.; Podgorski, D.C.; Zito, P.; Sen, I.S.; Galy, V.V.,	*Glacier Meltwater and Monsoon Precipitation Drive Upper Ganges Basin Dissolved Organic Matter Composition*	Geochimica et Cosmochimica Acta	244		216-228	10.1016/j.gca.2018.10.012	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Heslop, J.K.; Winkel, M.; Anthony, K.M.W.; Spencer, R.G.M.; Podgorski, D.C.; Zito, P.; Kholodov, A.; Liebner, S.,	*Increasing Organic Carbon Biolability With Depth in Yedoma Permafrost: Ramifications for Future Climate Change*	Journal of Geophysical Research Biogeosciences	124	7	2021-2038	10.1029/2018JG004712	Yes
Johnston, S.E.; Bogard, M.J.; Rogers, J.A.; Butman, D.; Striegl, R.G.; Dornblaser, M.; Spencer, R.G.M.,	*Constraining Dissolved Organic Matter Sources and Temporal Variability in a Model sub-Arctic Lake*	Biochemistry	146		271-292	10.1007/s10533-019-00619-9	Yes
Kellerman, A.M.; Arellano, A.; Podgorski, D.C.; Martin, E.E.; Martin, J.B.; Deuerling, K.; Bianchi, T.S.; Spencer, R.G.M.,	*Fundamental Drivers of Dissolved Organic Matter Composition Across an Arctic Effective Precipitation Gradient*	Limnology and Oceanography	9999		1-18	10.1002/lno.11385	Yes
Krajewski, L.; Robbins, W.K.; Corilo, Y.E.; Bota, G.; Marshall, A.G.; Rodgers, R.P.,	*Characterization of Ketones Formed in the Open System Corrosion Test of Naphthenic Acids by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry*	Energy & Fuels	33	6	4946-4950	10.1021/acs.energyfuels.9b00626	Yes
Letourneau, M.L.; Medeiros, P.M.,	*Dissolved organic matter composition in a marsh-dominated estuary: Response to seasonal forcing and to the passage of a hurricane.*	Journal of Geophysical Research Biogeosciences	124		1545-1559	10.1029/2018JG004982	Yes
Lin, Y.J.; Cao, T.; Chacon Patino, M.L.; Rowland, S.M.; Rodgers, R.P.; Yen, A.; Biswal, L.,	*Microfluidic Study of the Deposition Dynamics of Asphaltene Subfractions Enriched with Island and Archipelago Motifs*	Energy & Fuels	33	3	1882-1891	10.1021/acs.energyfuels.8b03835	No
Martin, J.W.; Nyadong, L.; Ducati, C.; Manley-Harris, M.; Marshall, A.G.; Kraft, M.,	*Nanostructure of Gasification Charcoal (Biochar)*	Environmental Science & Technology	53	7	3538-3546	10.1021/acs.est.8b06861	Yes
McKenna, A.M.; Chacon Patino, M.L.; Weisbrod, C.; Blakney, G.T.; Rodgers, R.P.,	*Molecular-Level Characterization of Asphaltenes Isolated from Distillation Cuts*	Energy & Fuels	33	3	2018-2029	10.1021/acs.energyfuels.8b04219	Yes

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Niles, S.; Chacon Patino, M.L.; Chen, H.; McKenna, A.M.; Blakney, G.T.; Rodgers, R.P.; Marshall, A.G.,	*Molecular-Level Characterization of Oil-Soluble Ketone/Aldehyde Photo-Oxidation Products by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry Reveals Similarity Between Microcosm and Field Samples*	Environmental Science & Technology	53	12	6887-6894	10.1021/acs.est.9b00908	Yes
Rodgers, R.P.; Mapolelo, M.M.; Robbins, W.K.; Chacon Patino, M.L.; Putman, J.; Rowland, S.M.; Niles, S.; Marshall, A.G.,	*Combating selective ionization in the high resolution mass spectral characterization of complex mixtures*	Faraday Discussions	2019		1-23	10.1039/C9FD00005D	Yes
Schaffer, L.V.; Millikin, R.J.; Miller, R.M.; Anderson, L.C.; Fellers, R.T.; Ge, Y.; Kelleher, N.L.; LeDuc, R.D.; Liu, X.; Payne, S.H.; Sun, L.; Tucholski, T.; Wu, S.; Yu, D.; Shortreed, M.R.; Smith, L.M.,	*Identification and quantification of proteoforms by mass spectrometry*	Proteomics	19		1800361	10.1002/pmic.201800361	Yes
Smith, L.M.; Thomas, P.M.; Shortreed, M.R.; Schaffer, L.V.; Fellers, R.T.; LeDuc, R.D.; Tucholski, T.; Ge, Y.; Agar, J.N.; Anderson, L.C.; Chamot-Rook, J.; Gault, J.; Loo, J.A.; Pasa-Tolic, L.; Robinson, C.V.; Schluter, H.; Tsybin, Y.O.; Vilaseca, M.; Vizcaino, J.A.; Danis, P.O.; Kelleher, N.L.,	*A five-level classification system for proteoform identifications*	Nature Methods	16		939-940	10.1038/s41592-019-0573-x	Yes
Spencer, R.G.M.; Kellerman, A.M.; Podgorski, D.C.; Macedo, M.N.; Jankowski, K.; Nunes, D.; Neill, C.,	*Identifying the Molecular Signatures of Agricultural Expansion in Amazonian Headwater Streams*	Journal of Geophysical Research Biogeosciences	124	6	1637-1650	10.1029/2018JG004910	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Textor, S.R.; Wickland, K.; Podgorski, D.C.; Johnston, S.E.; Spencer, R.G.M.,	*Dissolved Organic Carbon Turnover in Permafrost-Influenced Watersheds of Interior Alaska: Molecular Insights and the Priming Effect*	Frontiers in Earth Science	7		1-17	10.3389/feart.2019.00275	Yes
Ugrin, S.A.; English, A.M.; Syka, J.E.P.; Bai, D.L.; Anderson, L.C.; Shabanowitz, J.; Hunt, D.F.,	*Ion-Ion Proton Transfer and Parallel Ion Parking for the Analysis of Mixtures of Intact Proteins on a Modified Orbitrap Mass Analyzer*	Journal of the American Society for Mass Spectro-metry	30	10	2163--2173	10.1007/s13361-019-02290-8	Yes
Zherebker, A.; Podgorski, D.C.; Kholodov, V.A.; Orlov, A.A.; Yaroslavtseva, N.V.; Kharybin, O.; Kholodov, A.; Spector, V.; Spencer, R.G.M.; Nikolaev, E.; Perminova, I.V.,	*The Molecular Composition of Humic Substances Isolated From Yedoma Permafrost and Alas Cores in the Eastern Siberian Arctic as Measured by Ultrahigh Resolution Mass Spectrometry*	Journal of Geophysical Research Biogeosciences	124	8	2432-2445	10.1029/2018JG004743	Yes
Zhou, Y.; Li, Y.; Yao, X.; Ding, W.; Zhang, Y.; Jeppesen, E.; Zhang, Y.; Podgorski, D.C.; Chen, C.; Ding, Y.; Wu, H.; Spencer, R.G.M.,	*Response of Chromophoric Dissolved Organic Matter Dynamics to Tidal Oscillations and Anthropogenic Disturbances in a Large Subtropical Estuary*	Science of the Total Environment	662		769-778	10.1016/j.scitotenv.2019.01.220	Yes
Zhou, Y.; Zhou, L.; Zhang, Y.; Garcia de Souza, J.; Podgorski, D.C.; Spencer, R.G.M.; Jeppensen, E.; Davidson, T.A.,	*Autochthonous Dissolved Organic Matter Potentially Fuels Methane Ebullition from Experimental Lakes*	Water Research	166		115048	10.1016/j.watres.2019.115048	Yes
Zito, P.; Podgorski, D.C.; Johnson, J.; Chen, H.; Rodgers, R.P.; Guillemette, F.,	*Molecular-Level Composition and Acute Toxicity of Photosolubilized Petrogenic Carbon*	Environmental Science & Technology	53	14	8235-8243	10.1021/acs.est.9b01894	Yes

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Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Ahlschwede, K.M.; Curran, G.L.; Rosenberg, J.T.; Grant, S.C.; Sarkar, G.; Jenkins, R.B.; Ramakrishnan, S.; Poduslo, J.F.; Kandimalla, K.K.,	*Cationic carrier peptide enhances cerebrovascular targeting of nanoparticles in Alzheimer's disease brain*	Nanomedicine	16		258-266	10.1016/j.nano.2018.09.010	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Alamo, R.G.; Marxsen, S.,	*Melt-memory of Polyethylenes with Halogen Substitution: Random vs. Precise Placement*	Polymer	168		168-177	10.1016/j.polymer.2019.02.030	No
Alamo, R.G.; Zhang, X.; Zuo, X.; Ortmann, P.; Mecking, S.,	*Crystallization of Long-Spaced Precision Polyacetals I: Melting and Recrystallization of Rapidly Formed Crystallites*	Macro-molecules	52		4934-4948	10.1021/acs.macromol.9b00922	No
Altenhof, A.R.; Lindquist, A.W.; Foster, L.D.; Holmes, S.T.; Schurko, R.W.,	*On the use of frequency-swept pulses and pulses designed with optimal control theory for the acquisition of ultra-wideline NMR spectra*	Journal of Magnetic Resonance, Series A	309		106612	10.1016/j.jmr.2019.106612	No
Amouzandeh, G.; Mentink-Vigier, F.; Helsper, S.; Bagdasarian, F.A.; Rosenberg, J.T.; Grant, S.C.,	*Magnetic resonance electrical property mapping at 21.1 T: a study of conductivity and permittivity in phantoms, ex vivo tissue and in vivo ischemia*	Physics in Medicine & Biology	n.c.		-	10.1088/1361-6560/ab3259	Yes
Amouzandeh, G.; Ramaswamy, V.; Freytag, N.; Edison, A.S.; Hornak, L.A.; Brey, W.W.,	*Time and Frequency Domain Response of HTS Resonators for Use as NMR Transmit Coils*	IEEE Transactions on Applied Superconductivity	29	5	5-Jan	10.1109/TASC.2019.2902522	Yes
Au, D.F.; Ostrovsky, D.; Fu, R.; Vugmeyster, L.,	*Solid-state NMR reveals a comprehensive view of the dynamics of the flexible, disordered N-terminal domain of amyloid-β fibrils*	Journal of Biological Chemistry	294		5840	10.1074/jbc.RA118.006559	Yes
Chen, X.; Qu, C.; Alamo, R.G.,	*Effect of Annealing Time and Molecular Weight on Melt Memory of Random Ethylene 1-Butene Copolymers*	Polymer International	68		248-256	10.1002/pi.5586	No
Comert, F.; Greenwood, A.; Maramba, J.; Acevedo, R.; Lucas, L.; Kulasinghe, T.; Cairns, L.S.; Wen, Y.; Fu, R.; Hammer, J.; Blazyk, J.; Sukharev, S.; Cotten, M.L.; Mihailescu, M.,	*The host-defense peptide piscidin P1 reorganizes lipid domains in membranes and decreases activation energies in mechanosensitive ion channels*	Journal of Biological Chemistry	294		1855718570	10.1074/jbc.RA119.010232	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Costello, W.N.; Xiao, Y.; Frederick, K.K.,	*DNP-assisted NMR investigation of proteins at endogenous levels in cellular milieu*	Methods in Enzymology	615		373-406	10.1016/bs.mie.2018.08.023	Yes
Cui, J.; Olmsted, D.L.; Mehta, A.K.; Asta, M.; Hayes, S.E.,	*NMRCrystallography:Evaluationof Hydrogen Positions inHydromagnesiteby[13]C{[1]H} REDORSolid-State NMRand DensityFunctionalTheoryCalculationofChemicalShieldingTensors*	Angewandte Chemie (International ed. in English)	58	13	4210-4216	10.1002/anie.201813306	Yes
Dasari, A.K.R.; Hughes, R.M.; Wi, S.; Hung, I.; Gan, Z.; Kelly, J.W.; Lim, K.H.,	*Transthyretin Aggregation Pathway toward the Formation of Distinct Cytotoxic Oligomers*	Scientific Report	9	33	1	10.1038/s41598-018-37230-1	Yes
De Angelis, A.; Rai, R.; Greenwood, A.I.; Opella, S.J.; Cotten, M.L.,	*Metal-ion Binding to Host Defense Peptide Piscidin 3 Observed in Phospholipid Bilayers by Magic Angle Spinning Solid-state NMR*	ChemPhysChem	20		295-301	10.1002/cphc.201800855	No
Dregni, A.J.; Mandala, V.S.; Wu, H.; Elkins, M.R.; Wang, H.K.; Hung, I.; DeGrado, W.F.; Hong, M.,	*In vitro 0N4R tau fibrils contain a monomorphicβ-sheet core enclosed by dynamically heterogeneousfuzzy coat segments*	Proceedings of the National Academy of Sciences of the USA (PNAS)	33		16357	10.1073/pnas.1906839116	Yes
Dubroca, T.; Wi, S.; van Tol, J.; Frydman, L.; Hill, S.,	*Large Volume Liquid State Scalar Overhauser Dynamic NuclearPolarization at High Magnetic Field*	Physical Chemistry Chemical Physics	21		21200-21204	10.1039/C9CP02997D	Yes
Feng, X.; Chien, P.; Patel, S.; Zheng, J.; Immediato-Scuottoa, M.; Xin, Y.; Hung, I.; Gan, Z.; Hu, Y.,	*Synthesis and characterizations of highly conductive and stable electrolyte Li10P3S12I*	Energy Storage Materials	22		397-401	10.1016/j.ensm.2019.07.047	Yes
Feng, X.; Chien, P.; Zhu, Z.; Chu, I.H.; Wang, P.; Immediato-Scuotto, M.; Arabzadeh, H.; Ong, S.P.; Hu, Y.,	*Studies of Functional Defects for Fast Na-Ion Conduction in Na3−yPS4−xClx with a Combined Experimental and Computational Approach*	Advanced Functional Materials	29	9	1807951	10.1002/adfm.201807951	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Gross, N.B.; Abad, N.; Lichtstein, D.; Taron, S.; Aparicio, L.; Fonteh, A.N.; Arakaki, X.; Cowan, R.P.; Grant, S.C.; Harrington, M.G.,	*Endogenous Na+, K+-ATPase inhibitors and CSF [Na+] contribute to migraine formation*	PLoS ONE	14	6	e0218041	10.1371/journal.pone.0218041	No
Harrison, A.; Vuong, T. T.; Zeevi, M. P.; Hittel, B. J.; Wi, S.; Tang, C.,	*Rapid Self-Assembly of Metal/Polymer Nanocomposite Particles as Nanoreactors and Their Kinetic Characterization*	Nanomaterials	9	3	318	10.3390/nano9030318	Yes
Hirsh, D.A.; Holmes, S.T.; Chakravarty, P.; Peach, A.A.; DiPasquale, A.; Nagapudi, K.; Schurko, R.,	*In Situ Characterization of Waters of Hydration in a Variable-Hydrate Active Pharmaceutical Ingredient using 35Cl Solid-State NMR and X-ray Diffraction*	Crystal Growth & Design	12		7349-7362	10.1021/acs.cgd.9b01218	No
Hirsh, D.A.; Wijesekara, A.V.; Carnahan, S.L.; Hung, I.; Lubach, J.W.; Nagapudi, K.; Rossini, A.J.,	*Rapid Characterization of Formulated Pharmaceuticals Using Fast MAS 1H Solid-State NMR Spectroscopy*	Molecular Pharmaceutics	16	7	3121-3132	10.1021/acs.molpharmaceut.9b00343	Yes
Hu, Z.; Vugmeyster, L.; Ostrovsky, D.; Sun, Y.; Qiang, W.,	*Molecular structure of an N-terminal phosphorylated β-amyloid fibril*	Proceedings of the National Academy of Sciences of the USA (PNAS)	116		11253-11258	10.1073/pnas.1818530116	Yes
Kang, X.; Kirui, A.; Dickwella Widanage, M.C.; Mentink-Vigier, F.; Cosgrove, D.J.; Wang, T.,	*Lignin-polysaccharide interactions in plant secondary cell walls revealed by solid-state NMR*	Nature Communications	10		347	10.1038/s41467-018-08252-0	Yes
Kirui, A.; Widanage, M.D.; Mentink-Vigier, F.; Wang, P.; Kang, X.; Wang, T.,	*Preparation of Fungal and Plant Materials for Structural Elucidation Using Dynamic Nuclear Polarization Solid-State NMR*	Journal of Visualized Experiments	144		e59152	10.3791/59152	Yes
Levenson, C.W.; Morgan, T.J.; Twigg, P.D.; Logan, T.M.; Schepkin, V.D.,	*Use of MRI, metabolomic, and genomic biomarkers to identify mechanisms of chemoresistance in glioma*	Cancer Drug Resistance	2		862-876	10.20517/cdr.2019.18	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Litvak, I.; Griffin, A.; Paulino, J.; Mao, W.; Gor'kov, P.L.; Shetty, K.K.; Brey, W.W.,	*Achieving 1 ppm field homogeneity above 24 T: Application of differential mapping for shimming Keck and the Series Connected Hybrid magnets at the NHMFL*	Journal of Magnetic Resonance	301		109-118	10.1016/j.jmr.2019.03.002	Yes
Liu, X.; Zuo, W.; Zheng, B.; Xiang, Y.; Zhou, K.; Xiao, Z.; Shan, P.; Shi, J.; Li, Q.; Zhong, G.; Fu, R.; Yang, Y.,	*P2-Na0.67AlxMn1−xO2: Cost-Effective, Stable and High-Rate Sodium Electrodes by Suppressing Phase Transitions and Enhancing Sodium Cation Mobility*	Angewandte Chemie (International ed. in English)	131	50	18254-18263	10.1002/ange.201911698	Yes
Liu, X.; Zuo, W.; Zheng, B.; Xiang, Y.; Zhou, K.; Xiao, Z.; Shan, P.; Shi, J.; Li, Q.; Zhong, G.; Fu, R.; Yong, Y.,	*P2-Na0.67AlxMn1@xO2: Cost-Effective, Stable and High-Rate Sodium Electrodes by Suppressing Phase Transitions and Enhancing Sodium Cation Mobility*	Angewandte Chemie (International ed. in English)	58		18086-18095	10.1002/anie.201911698	Yes
Lyden, J.; Grant, S.C.; Ma, T.,	*Altered metabolism for neuroprotection provided by mesenchymal stem cells*	Brain Circulation	5	3	140-144	10.4103/bc.bc_36_19	No
Marple, M.; Jesuit, M.; Hung, I.; Gan, Z.; Feller, S.; Sen, S.,	*Structure of TeO2 glass: Results from 2D 125Te NMR spectroscopy*	Journal of Non-Crystalline Solids	513		183	10.1016/j.jnoncrysol.2019.03.019	Yes
Mckay, M.J.; Fu, R.; Greathouse, D.V.; Koeppe, R.E.,	*Breaking the Backbone: Central Arginine Residues Induce Membrane Exit and Helix Distortions within a Dynamic Membrane Peptide*	Journal of Physical Chemistry B	123		8034-8047	10.1021/acs.jpcb.9b06034	Yes
Mentink-Vigier, F.; Barra, A.L.; van Tol, J.; Hediger, S.; Lee, D.; De Paepe, G.,	*De novo prediction of cross-effect efficiency for magic angle spinning dynamic nuclear polarization*	Physical Chemistry Chemical Physics	21	-	2166-2176	10.1039/C8CP06819D	Yes

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Mihailescu, M.; Sorci, M.; Seckute, J.; Silin, V.I.; Hammer, J.; Perrin,Jr., B.S.; Hernandez, J.I.; Smajic, N.; Shrestha, A.; Bogardus, K.A.; Greenwood, A.I.; Fu, R.; Blazyk, J.; Pastor, R.W.; Nicholson, L.K.; Belfort, G.; Cotten, M.L.,	*Structure and Function in Antimicrobial Piscidins: Histidine Position, Directionality of Membrane Insertion, and pH-dependent Permeabilization*	Journal of the American Chemical Society	141		9837	10.1021/jacs.9b00440	Yes
Morales-Leal, F.J.; de la Rosa, J.R.; Lucio-Ortiz, C.J.; De Haro-Del Rio, D.A.; Maldonado, C.S.; Wi, S.; Casabianca, L.B.; Garcia, C.D.,	*Dehydration of fructose over thiol and sulfonic modified alumina in acontinuous reactor for 5HMF production: Study of catalyst stability by NMR*	Applied Catalysis B: Environmental	244		250-261	10.1016/j.apcatb.2018.11.053	Yes
Schepkin, V.D.,	*Statistical tensor analysis of the MQ MR signals generated by weak quadrupole interactions.*	Zeitschrift fur Medizinische Physik	29	4	326-336	10.1016/j.zemedi.2019.03.002	Yes
Song, B.; Tang, M.; Enyuan, H.E.; Borkiewicz, O.J.; Wiaderek, K.M.; Zhang, Y.; Phillip, N.D.; Liu, X.; Shadike, Z.; Li, C.; Song, L.; Hu, Y.; Chi, M.; Veith, G.M.; Yan, X.Q.; Liu, J.; Nanda, J.; Page, K.; Hu, A.,	*Understanding the Low-Voltage Hysteresis of Anionic Redox in Na2Mn3O7*	Chemistry of Materials	3110		3756-3765	10.1021/acs.chemmater.9b00772	Yes
Tan, C.H.; Huang, Y.Q.; Cai, S.H.; Chen, Z.,	*High-resolution two-dimensional 1H J-resolved MRS measurements on in vivo samples*	Journal of Magnetic Resonance	300		51-60	10.1016/j.jmr.2019.01.012	No
Urban, J.M.; Ho, J.; Piester, G.; Fu, R.; Nilsson, B.L.,	*Rippled β-Sheet Formation by an Amyloid- β Fragment Indicate Expanded Scope of Sequence Space for Enantiomeric β -Sheet Peptide Coassembly*	Molecules	24		1983	10.3390/molecules24101983	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Vugmeyster, L.; Au, D.F.; Ostrovsky, D.; Fu, R.,	*Deuteron Solid-State NMR Relaxation MeasurementsReveal Two Distinct Conformational Exchange Processes in the Disordered N-Terminal Domain of Amyloid-β Fibrils*	ChemPhysChem	20		1680-1689	10.1002/cphc.201900363	Yes
Vugmeyster, L.; Au, D.F.; Ostrovsky, D.; Kierl, B.; Fu, R.; Hu, Z.W.; Qiang, W.,	*Effect of Post-Translational Modifications and Mutations on Amyloid-b Fibrils Dynamics at N Terminus*	Biophysical Journal	117		1524-1535	10.1016/j.bpj.2019.09.004	Yes
Vugmeyster, L.; Ostrovsky, D.,	*Deuterium Rotating Frame NMR Relaxation Measurements in the Solid State under Static Conditions for Quantification of Dynamics*	ChemPhysChem	20	2	333-342	10.1002/cphc.201800454	Yes
Wang, J.L.; You, X.Q.; Xiao, C.; Zhang, X.P.; Cai, S.H.; Jiang, W.L.; Guo, S.H.; Cao, S.H.; Chen, Z.,	*Small-sized Pt nanoparticles supported on hybrid structures of MoS2 nanoflowers/graphene nanosheets: Highly active composite catalyst toward efficient ethanol oxidation reaction studied by in situ electrochemical NMR spectroscopy*	Applied Catalysis B: Environmental	259		118060	1016/j.apcatb.2019.118060	No
Wang, X.; Caulkins, B.G.; Riviere, G.; Mueller, L.; Mentink-Vigier, F.; Long, J.R.,	*Direct dynamic nuclear polarization of 15N and 13C spins at 14.1 T using a trityl radical and magic angle spinning*	Solid State Nuclear Magnetic Resonance	100		85-91	10.1016/j.ssnmr.2019.03.009	Yes
Wu, G.; Hung, I.; Gan, Z.; Terskikh, V.; Kong, X.,	*Solid-state 17O NMR study of carboxylic acid dimers: Simultaneously accessing spectral properties of low- and high-energy tautomers*	Journal of Physical Chemistry A	123		8243-8253	10.1021/acs.jpca.9b07224	Yes
Xu, H.; Chien, P.; Shi, J.; Li, Y.; Wu, N.; Liu, Y.; Hu, Y.; Goodenough, J.B.,	*High-performance all-solid-state batteries enabled by salt bonding to perovskite in poly(ethylene oxide)*	Proceedings of the National Academy of Sciences of the USA (PNAS)	116		18815-18821	10.1073/pnas.1907507116	Yes

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Yang, L.; Li, X.; Liu, J.; Xiong, S.; Ma, X.; Liu, P.; Bai, J.; Xu, W.; Tang, Y.; Hu, Y.Y.; Liu, M.; Chen, H.,	*Lithium-Doping Stabilized High-Performance P2–Na0.66Li0.18Fe0.12Mn0.7O2 Cathode for Sodium Ion Batteries*	Journal of American Chemical Society	141	16	6680-6689	10.1021/jacs.9b01855	Yes
Yuan, X.; Rosenberg, J.T.; Liu, Y.; Grant, S.C.; Ma, T.,	*Aggregation of human mesenchymal stem cells enhances survival and efficacy in stroke treatment*	Cytotherapy	21	10	1033 - 1048	10.1016/j.jcyt.2019.04.055	Yes
Zhan, H.L.; Huang, Y.Q.; Chen, Z.,	*High-resolution probing of heterogeneous samples by spatially selective pure shift NMR spectroscopy*	Journal of Physical Chemistry Letters	10	23	7356-7361	10.1021/acs.jpclett.9b03092	No
Zhan, H.L.; Lin, X.Q.; Wei, Z.L.; Ye, Q.M.; Cai, S.H.; You, X.Q.; Huang, Y.Q.; Chen, Z.,	*A single-scan inhomogeneity-tolerant nmr method for high-resolution 2D J-resolved spectroscopy*	IEEE Transactions on Biomedical Engineering	66	6	1559-1566	10.1109/TBME.2018.2875797	No
Zhang, L.; Gao, C.; Mentink-Vigier, F.; Tang, L.; Zhang, D.; Wang, S.; Coa, S.; Xu, Z.; Liu, X.; Wang, T.; Zhou, Y.; Zhang, B.,	*Arabinosyl Deacetylase Modulates the Arabinoxylan Acetylation Profile and Secondary Wall Formation*	Plant Cell	31	2	1-43	10.1105/tpc.18.00894	Yes
Zhao, E.W.; Maligal Ganesh, R.; Mentink-Vigier, F.; Zhao, T.Y.; Du, Y.; Pei, Y.; Huang, W.; Bowers, C.R.,	*Atomic-Scale Structure of Mesoporous Silica-Encapsulated Pt and PtSn Nanoparticles Revealed by Dynamic Nuclear Polarization-Enhanced Si-29 MAS NMR Spectroscopy*	Journal of Physical Chemistry C	123	12	7299-7307	10.1021/acs.jpcc.9b01782	Yes
Zheng, J.; Wang, P.; Liu, H.; Hu, Y.Y.,	*Interface-Enabled Ion Conduction in Li10GeP2S12–Poly(ethylene Oxide) Hybrid Electrolytes*	ACS Applied Energy Materials	2	2	1452-1459	10.1021/acsaem.8b02008	Yes
Zhu, W.; Hung, I.; Gan, Z.; Aitken, B.; Sen, S.,	*Dynamical processes related to viscous flow in a supercooled arsenic selenide glass-forming liquid: Results from high-temperature 77Se NMR spectroscopy*	Journal of Non-Crystalline Solids	526		119698	10.1016/j.jnoncrysol.2019.119698	Yes

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Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Anand, A.; Zaffalon, M.L.; Gariano, G.; Camellini, A.; Gandini, M.; Capitani, C.; Bruni, F.; Pinchetti, V.; Zavelani-Rossi, M.; Meinardi, F.; Crooker, S.; Brovelli, S.,	*Evidence for the Band-Edge Exciton of CuInS2 Nanocrystals Enables Record Efficient Large-Area Luminescent Solar Concentrators*	Advanced Functional Materials	1906629		1906629	10.1002/adfm.201906629	Yes
Bachmann, M.D.; Ferguson, G.M.; Theuss, F.; Meng, T.; Putzke, C.; Helm, T.; Shirer, K.R.; Li, Y.S.; Modic, K.A.; Nicklas, M.; Konig, M.; Low, D.; Ghosh, S.; Mackenzie, A.P.; Arnold, F.; Hassinger, E.; McDonald, R.D.; Winter, L.E.; Bauer, E.D.; Ronning, F.; Ramshaw, B.J.; Nowack, K.C.; Moll, P.J.W.,	*Spatial control of heavy-fermion superconductivity in $CeIrIn_5$*	Science	366		221	10.1126/science.aao6640	Yes
Balakirev, F.F.; Ennaceur, S.M.; Migliori, R.J.; Maiorov, B.A.; Migliori, A.,	*Resonant ultrasound spectroscopy: The essential toolbox*	Review of Scientific Instruments	90	12	121401	10.1063/1.5123165	Yes
Barisic, N.; Chan, M.; Veit, M.J.; Dorow, C.J.; Ge, Y.; Li, Y.; Tabis, W.; Tang, Y.; Yue, G.; Zhao, X.; Greven, M.,	*Evidence for a universal Fermi-liquid scattering rate throughout the phase diagram of the copper-oxide superconductors*	New Journal of Physics	21	11	113007	10.1088/1367-2630/ab4d0f	No
Bartolome, E.; Valles, F.; Palau, A.; Rouco, V.; Pompeo, N.; Balakirev, F.F.; Maiorov, B.A.; Civale, L.; Puig, T.; Obradors, X.; Silva, E.,	*Intrinsic anisotropy versus effective pinning anisotropy in $YBa_2Cu_3O_7$ thin filmsand nanocomposites*	Physical Review B	100		54502	10.1103/PhysRevB.100.054502	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Blackmore, W.J.; Brambleby, J.; Lancaster, T.; Clark, S.J.; Johnson, R.D.; Singleton, J.; Ozarowski, A.; Schlueter, J.A.; Chen, Y.S.; Arif, A.M.; Lapidus, S.; Xiao, F.; Williams, R.C.; Blundell, S.J.; Pearce, M.J.; Lees, M.R.; Manuel, P.; Villa, D.Y.V.; Villa, J.A.; Manson, J.L.; Goddard, P.,	*Determining the anisotropy and exchange parameters ofpoly-crystalline spin-1 magnets*	New Journal of Physics	21		93025	10.1088/1367-2630/ab3dba	Yes
Capitani, C.; Pinchetti, V.; Gariano, G.; Gonzalez, B.; Santanbrogio, C.; Campione, M.; Prato, M.; Brescia, R.; Camellini, A.; Bellato, F.; Carulli, F.; Anand, A.; Zavelani, M.; Meinardi, F.; Crooker, S.; Brovelli, S.,	*Quantized Electronic Doping towards Atomically Controlled Charge-Engineered Semiconductor Nanocrystals*	Nano Letters	19		1307	10.1021/acs.nanolett.8b04904	Yes
Chikara, S.; Gu, J.; Zhang, X.G.; Cheng, H.P.; Smythe, N.; Singleton, J.; Scott, B.; Krenkel, E.; Eckert, J.; Zapf, V.S .,	*Magnetoelectric behavior via a spin state transition*	Nature Communi-cations	10		4043	10.1038/s41467-019-11967-3	Yes
Choi, S.M.; Manni, S.; Singleton, J.; Topping, C.V.; Lancaster, T.; Blundell, S.J.; Adroja, D.T.; Zapf, V.S.; Gegenwart, P.; Coldea, R.,	*Spin dynamics and field-induced magnetic phase transition in the honeycomb Kitaev magnet α−Li2IrO3*	Physical Review B	99		54426	10.1103/PhysRevB.99.054426	Yes
Clune, A.J.; Nam, J.; Lee, M.; Hughey, K.D.; Tian, W.; Fernandez-Baca, J.A.; Fishman, R.S.; Singleton, J.; Lee, J.H.; Musfeldt, J.L.,	*Magnetic field-temperature phase diagram of multiferroic(NH4)2FeCl5 ·H2O*	Nature Partner Journals Quantum Materials (npj)	4		44	10.1038/s41535-019-0180-1	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Correa, V.F.; Villagran Asiares, A.G.; Betancourth, D.; Encina, S.; Pedrazzini, P.; Cornaglia, P.S.; Garcia, D.J.; Sereni, J.G.; Maiorov, B.A.; Caroca Canales, N.; Geibel, C.,	*Strong magnetoelastic effect in CeCo $_{1-x}$ Fe $_x$ Si as Néel order is suppressed*	Physical Review B	100		184409	10.1103/PhysRevB.100.184409	Yes
Das, S.D.; Zhu, Z.; Mun, E.; McDonald, R.; Li, G.; Balicas, L.; McCallam, A.; Cao, G.; Rau, J.G.; Kee, H.Y.; Sebastian, S.E.,	*Magnetic anisotropy of the alkali iridate Na_2IrO_3 at high magnetic fields: Evidence for strong ferromagnetic Kitaev correlations*	Physical Review B Rapid Communi-cations	99		081101(R)	10.1103/PhysRevB.99.081101	Yes
Ding, L.; Manuel, P.; Bachus, S.; Grussler, F.; Gegenwart, P.; Singleton, J.; Johnson, R.; Walker, H.; Adroja, D.; Hiller, A.; Tsirlin, A.,	*Gapless spin-liquid state in the structurally disorder-free triangular antiferromagnet NaYbO2*	Physical Review B	100		144432	10.1103/PhysRevB.100.144432	Yes
Ding, X.N.; Gao, B.; Krenkel, E.; Dawson, C.; Eckert, J.C.; Cheong, S.W.; Zapf, V.,	*Magnetic properties of double perovskite Ln2CoIrO6 (Ln = Eu, Tb, Ho): Hetero-tri-spin 3d-5d-4 f systems*	Physical Review B	99		14438	10.1103/PhysRevB.99.014438	Yes
Goryca, M.M.; Li, J.; Stier, A.; Taniguchi, T.; Watanabe, K.; Courtade, E.; Shree, S.; Robert, C.; Urbaszek, B.; Marie, X.; Crooker, S.,	*Revealing exciton masses and dielectric properties of monolayer semiconductors with high magnetic fields*	Nature Communi-cations	10		4172	10.1038/s41467-019-12180-y	Yes
Goryca, M.M.; Wilson, N.P.; Dey, P.; Xu, X.; Crooker, S.,	*Detection of thermodynamic valley noise in monolayer semiconductors: Access to intrinsic valley relaxation time scales*	Science Advances	5		eaau4899	10.1126/sciadv.aau4899	Yes
Harrison, N.; Betts, J.; Wartenbe, M.; Balakirev, F.; Richmond, S.; Jaime, M.; Tobash, P.H.,	*Phase stabilization by electronic entropy in plutonium*	Nature Communi-cations	10		3159	10.1038/s41467-019-11166-0	No

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Jaime, M.; Bauer, E.D.; Gofryk, K.,	*Magnetoelastics of High Field Phenomena in Antiferromagnets UO2 and CeRhIn5*	16th MEGA-GAUSS Conference Proceedings	NA		1-5	10.1109/MEGA-GAUSS.2018.8722665	Yes
Jiao, L.; Smidman, M.; Kohama, Y.; Wang, Z.S.; Graf, D.E.; Weng, Z.F.; Zhang, Y.J.; Matsuo, A.; Bauer, E.D.; Lee, H.; Kirchner, S.; Singleton, J.; Kindo, K.; Wosnitza, J.; Steglich, F.; Thompson, J.D.; Yuan, H.Q.,	*Enhancement of the effective mass at high magnetic fields in CeRhIn5*	Physical Review B	99	4	45127	10.1103/PhysRevB.99.045127	Yes
Khan, M.A.; Zhang, Q.; Bao, J.K.; Fishman, R.S.; Botana, A.S.; Choi, Y.; Fabbris, G.; Haskel, D.; Singleton, J.; Mitchell, J.F.,	*Steplike metamagnetic transitions in a honeycomb lattice antiferromagnet Tb2Ir3Ga9*	Physical Review Materials	3		114411	10.1103/PhysRevMaterials.3.114411	Yes
Kim, J.; Wang, Y.; Huang, F.T.; Wang, Y.; Fang, X.; Luo, X.; Li, Y.; Wu, M.; Mori, S.; Kwok, D.; Mun, E.; Zapf, V.; Cheong, S.W.,	*Spin liquid phase and topological structural defects in hexagonal TbInO3*	Physical Review X	9		31005	10.1103/PhysRevX.9.031005	Yes
Kushwaha, S.K.; Chan, M.; Park, J.; Thomas, S.M.; Bauer, E.D.; Thompson, J.D.; Ronning, F.; Rosa, P.; Harrison, N.,	*Magnetic field-tuned Fermi liquid in a Kondo insulator*	Nature Communi-cations	10	1	5487	10.1038/s41467-019-13421-w	Yes
Lei, S.; Chikara, S.; Puggioni, D.; Peng, J.; Zhu, M.; Gu, M.; Zhao, W.; Wang, Y.; Yuan, Y.; Akamatsu, H.; Chan, M. H. W.; Ke, X.; Mao, Z.; Rondinelli, J. M.; Jaime, M.; Singleton, J.; Weickert, F.; Zapf, V.; Gopalan, V.,	*Comprehensive magnetic phase diagrams of the polar metal Ca3(Ru0.95Fe0.05)2O7*	Physical Review B	99		224411	10.1103/PhysRevB.99.224411	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Leroux, M.; Balakirev, F.F.; Miura, M.; Agatsuma, K.; Civale, L.; Maiorov, B.A.,	*Dynamics and Critical Currents in Fast Superconducting Vortices at High pulsed Magnetic Fields*	Physical Review Applied	11		54005	10.1103/PhysRevApplied.11.054005	Yes
Liu, J.; Kittaka, S.; Johnson, R.D.; Lancaster, T.; Singleton, J.; Sakakibara, T.; Kohama, Y.; van Tol, J.; Ardavan, A.; Wiliams, B.H.; Blundell, S.J.; Manson, Z.E.; Manson, J.L.; Goddard, P.A.,	*Unconventional Field-Induced Spin Gap in an S = 1=2 Chiral Staggered Chain*	Physical Review Letters	122		57207	10.1103/PhysRevLett.122.057207	Yes
Mozaffari, S.; Sun, D.; Minkov, V.S.; Drozdov, A.P.; Knyazev, D.; Betts, J.; Einaga, M.; Shimizu, K.; Eremets, M.I.; Balicas, L.; Balakirev, F.,	*Superconducting phase diagram of H3S under high magnetic fields*	Nature Communi-cations	10		2522	10.1038/s41467-019-10552-y	Yes
O"Neal, K.R.; Paul, A.; al-Wahish, A.; Hughey, K.D.; Blockmon, A.; Luo, X.; Cheong, S.W.; Zapf, V.S.; Topping, C.V.; Singleton, J.; Ozerov, M.; Birol, T.; Musfeldt, J.L.,	*Spin-lattice and electron-phonon coupling in 3d/5dhybrid Sr3NiIrO6*	Nature Partner Journals Quantum Materials (npj)	4		48	10.1038/s41535-019-0184-x	Yes
Pinchetti, V.; Shornikova, E.V.; Qiang, G.; Bae, W.K.; Meinardi, F.; Crooker, S.; Yakovlev, D.R.; Bayer, M.; Klimov, V.I.; Brovelli, S.,	*Dual-Emitting Dot-in-Bulk CdSe/CdS Nanocrystals with Highly Emissive Core- and Shell-Based Trions Sharing the Same Resident Electron*	Nano Letters				10.1021/acs.nanolett.9b03676	Yes
Precker, C.E.; Barzola-Quiquia, J.; Esquinazi, P.D.; Stiller, M.; Chan, M.; Jaime, M.; Zhang, Z.; Grundmann, M.,	*Record-Breaking Magnetoresistance at the Edge of a Microflake of Natural Graphite*	Advanced Engineering Materials	21		1900991	10.1002/adem.201900991	Yes

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Rebar, D.; Birnbaum, S.M.; Singleton, J.; Khan, M.; Ball, J.C.; Adams, P.W.; Chan, J.Y.; Young, D.P.; Browne, D.A.; DiTusa, J.F.,	*Fermi surface, possible unconventional fermions, and unusually robust resistive criticalfields in the chiral-structured superconductor AuBe*	Physical Review B	99		94517	10.1103/PhysRevB.99.094517	Yes
Rosa, P.F.S.; Thomas, S.M.; Balakirev, F.; Bauer, E.D.; Fernandes, R.M.; Thompson, J.D.; Jaime, M.,	*Enhanced Hybridization Sets the Stage for Electronic Nematicity in CeRhIn5*	Physical Review Letters	122		16402	10.1103/PhysRevLett.122.016402	Yes
Sarkar, T.; Mandal, P.R.; Poniatowski, N.R.; Chan, M.; Greene, R.L.,	*Correlation between scale-invariant normal-state resistivity and superconductivity in an electron-doped cuprate*	Science Advances	5	5	eaav6753	10.1126/sciadv.aav6753	Yes
Sato, Y.; Xiang, Z.; Kasahara, Y.; Taniguchi, T.; Kasahara, S.; Chen, L.; Asaba, T.; Tinsman, C.; Murayama, H.; Tanaka, O.; Mizukami, Y.; Shibauchi, T.; Iga, F.; Singleton, J.; Li, L.; Matsuda, Y.,	*Unconventional thermal metallic state of charge-neutral fermions in an insulator*	Nature Physics	19		552	10.1038/s41567-019-0552-2	Yes
Sheng, R.; Liu, I.; Eo, Y.S.; Campbell, D.J.; Neves, P.M.; Fuhrman, W.T.; Saha, S.R.; Eckberg, C.; Kim, H.; Graf, D.E.; Balakirev, F.; Singleton, J.; Paglione, J.; Butch, N.,	*Extreme magnetic field-boosted superconductivity*	Nature Physics	19		41567	10.1038/s41567-019-0670-x	Yes
Shi, Z.; Steinhardt, W.; Graf, D.E.; Corboz, P.; Weickert, D.F.; Harrison, N.; Jaime, M.; Marjerrison, C.; Dabkowska, H.A.; Mila, F.; Haravifard, S.,	*Emergent bound states and impurity pairs in chemically doped Shastry-Sutherland system*	Nature Communications	9		2349	10.1038/s41467-019-10410-x	Yes
Shivaram, B.S.; Holleuis, L.; Ulrich, V.W.; Singleton, J.; Jaime, M.,	*Field Angle Tuned Metamagnetism and Lifschitz Transitions in UPt3*	Nature Scientific Reports	9		8162	10.1038/s41598-019-44602-8	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Silva, S.R.; Rahman, A.; Kort-Kamp, W.M.; Rushton, J.J.; Singleton, J.; Taylor, A.J.; Dalvit, D.A.; Chen, H.; Azad, A.,	*Metasurface-based ultra-lightweight high-gain off-axis flat parabolic reflectarray for microwave beam collimation/focusing*	Scientific Report	9		18984	10.1038/s41598-019-55221-8	No
Smylie, M.P.; Koshelev, A.E.; Willa, K.; Kwok, W.K.; Bao, J.K.; Chung, D.Y.; Kanatzidis, M.G.; Singleton, J.; Balakirev, F.; Hebbeker, H.; Niraula, P.; Bokari, E.; Kayani, A.; Welp, U.,	*Anisotropic upper critical field of pristine and proton-irradiated single crystals of the magnetically ordered superconductor RbEuFe4As4*	Physical Review B	100		54507	10.1103/PhysRevB.100.054507	Yes
Straquadine, J.A.W.; Palmstrom, J.C.; Walmsley, P.; Hristrov, A.T.; Weickert, D.F.; Balakirev, F.; Jaime, M.; McDonald, R.; Fisher, I.R.,	*Growth of nematic susceptibility in the field-induced normal state of an iron-based superconductor revealed by elastoresistivity measurmenet in a 65T pulsed magnet*	Physical Review B	100		125147	10.1103/PhysRevB.100.125147	Yes
Thomas, S.M.; Ding, X.N.; Ronning, F.; Zapf, V.; Thompson, J.D.; Fisk, Z.; Xia, J.; Rosa, P.F.S.,	*Quantum Oscillations in Flux-Grown SmB6 with Embedded Aluminum*	Physical Review Letters	122		166401	10.1103/PhysRevLett.122.166401	Yes
Veit, M.J.; Chan, M.; Ramshaw, B.J.; Arras, R.; Pentcheva, R.; Suzuki, Y.,	*Three-dimensional character of the Fermi surface in ultrathin $LaTiO_3/SrTiO_3$ heterostructures*	Physical Review B	99		115126	10.1103/PhysRevB.99.115126	Yes
Walmsley, P.; Abrams, D.M.; Straquadine, J.; Chan, M.; McDonald, R.D.; Giraldo-Gallo, P.; Fisher, I.R.,	*Sharp increase in the density of states in PbTe upon approaching a saddle point in the band structure*	Physical Review B	99		35105	10.1103/PhysRevB.99.035105	Yes
Wartenbe, M.; Baumbach, R.; Shekhter, A.; Boebinger, G.S.; Bauer, E.D.; Corvalan Moya, C.; Harrison, N.; McDonald, R.; Salamon, M.B.; Jaime, M.,	*Magnetoelastic coupling in URu2Si2: Probing multipolar correlations in the hidden order state*	Physical Review B	99		235101	10.1103/PhysRevB.99.235101	Yes

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Weickert, D.F.; Aczel, A.A.; Stone, M.B.; Garlea, V.O.; Dong, C.; Kohama, Y.; Movshovich, R.; Demuer, A.; Harrison, N.; Gamza, M.B.; Steppke, A.; Brando, M.; Rosner, H.; Tsirlin, A.A.,	*Field-induced double dome and Bose-Einstein condensation in the crossingquantum spin chain system AgVOAsO4*	Physical Review B	100		104422	10.1103/PhysRevB.100.104422	Yes
Wu, F.; Guo, C.; Smidman, M.; Zhang, J.; Chen, Y.; Singleton, J.; Yuan, H.,	*Anomalous quantum oscillations and evidence for a non-trivial Berry phase in SmSb*	Nature Partner Journals Quantum Materials (npj)	4	20	161	10.1038/s41535-019-0161-4	Yes
Ye, L.D.; Chan, M.; McDonald, R.; Graf, D.E.; Kang, M.G.; Liu, J.W.; Suzuki, T.; Comin, R.; Fu, L.; Checkelsky, J.G.,	*de Haas-van Alphen effect of correlated Dirac states in kagome metal* Fe_3Sn_2	Nature Communications	10		4870	10.1038/s41467-019-12822-1	Yes
Yuan, J.; Balk, A.N.; Guo, H.; Fang, Q.; Patel, S.; Zhao, X.; Terlier, T.; Natelson, D.; Crooker, S.; Lou, J.,	*Room-Temperature Magnetic Order in Air-Stable Ultrathin Iron Oxide*	Nano Letters	19		3777	10.1021/acs.nanolett.9b00905	Yes

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Balachandran, S.; Smathers, D.B.; Walsh, R.P.; Starch, W.L.; Lee, P.J.,	*High Strength Cu-Ta-W Composite*	IEEE Transactions on Applied Superconductivity	29	5	6900604	10.1109/TASC.2019.2906781	Yes
Balachandran, S.; Tarantini, C.; Lee, P.J.; Kametani, F.; Su, Y.; Walker, B.; Starch, W.L.; Larbalestier, D.C.,	*Beneficial influence of Hf and Zr additions to Nb4atTa on the vortex pinning of* Nb_3Sn *with and without an O source*	Superconductor Science and Technology	32		44006	10.1088/1361-6668/aaff02	Yes
Brown, M.D.; Jiang, J.; Tarantini, C.; Abraimov, D.V.; Bradford, G.; Jaroszynski, J.; Hellstrom, E.; Larbalestier, D.C.,	*Prediction of the Jc(B) Behavior of Bi-2212 Wires at High Field*	IEEE Transactions on Applied Superconductivity	29	5	6400504	10.1109/TASC.2019.2899226	Yes

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Cheggour, N.; Stauffer, T.C.; Starch, W.L.; Goodrich, L.F.; Splett, J.D.,	*Implications of the strain irreversibility cliff on the fabrication of particle-accelerator magnets made of restacked-rod-process Nb_3Sn wires*	Nature Scientific Reports	9		5466	10.1038/s41598-019-41817-7	Yes
Dhakal, P.; Ciovati, G.; Pudasaini, U.; Chetri, S.; Balachandran, S.; Lee, P.J.,	*Surface characterization of nitrogen-doped high purity niobium coupons compared with superconducting rf cavity performance*	Physical Review Accelerators and Beams	22	12	122002	10.1103/PhysRevAccelBeams.22.122002	Yes
Hahn, S.; Kim, K.; Kim, K.; Hu, X.; Painter, T.A.; Dixon, I.R.; Kim, S.; Bhattarai, K.R.; Noguchi, S.; Jaroszynski, J.; Larbalestier, D.C.,	*45.5-tesla direct-current magnetic field generated with a high-temperature superconducting magnet*	Nature	570	7762	496+	10.1038/s41586-019-1293-1	Yes
Hänisch, J.; Iida, K.; Hühne, R.; Tarantini, C.,	*Fe-based superconducting thin films Preparation and tuning of superconducting properties*	Superconductor Science and Technology	32		93001	10.1088/1361-6668/ab1c00	Yes
Jaroszynski, J.,	*Constructing high field magnets is a real tour de force*	Superconductor Science and Technology	32	7	70501	10.1088/1361-6668/ab1fc9	Yes
Jiang, J.; Bradford, G.; Hossain, S. I.; Brown, M. D.; Cooper, J.; Miller, E.; Huang, Y.; Miao, H.; Parrell, J. A.; White, M.; Hunt, A.; Sengupta, S.; Revur, R.; Shen, T.; Kametani, F.; Trociewitz, U. P.; Hellstrom, E. E.; Larbalestier, D. C.,	*High-Performance Bi-2212 Round Wires Made With Recent Powders*	IEEE Transactions on Applied Superconductivity	29	5	6400405	10.1109/TASC.2019.2895197	Yes
Kametani, F.; Oloye, A.; Jiang, J.; Osabe, G.; Kobayashi, S.,	*Visualization of the grain structure in the filament cross sections of uniaxially textured high Jc Bi-2223 tapes*	Applied Physics Express	12	9	93002	10.7567/1882-0786/ab347e	Yes

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Kar, S.; Sai Sandra, J.; Luo, W.; Kochat, M.; Jaroszynski, J.J.; Abraimov, D.V.; Majkic, G.; Selvamanickam, V.,	*Next-generation highly flexible round REBCO STAR wires with over 580 A mm(-2) at 4.2 K, 20 T for future compact magnets*	Superconductor Science and Technology	32		10LT01	10.1088/1361-6668/ab3904	Yes
Kauffmann-Weiss, S.; Iida, K.; Tarantini, C.; Boll, T.; Schneider, R.; Ohmura, T.; Matsumoto, T.; Hatano, T.; Langer, M.; Meyer, S.; Jaroszynski, J.; Gerthsen, D.; Ikuta, H.; Holzapfel, B.; Haenisch, J.,	*Microscopic origin of highly enhanced current carrying capabilities of thin NdFeAs(O,F) films*	Nanoscale Advances	1	8	3036-3048	10.1039/c9na00147f	Yes
Levitan, J.W.; Lu, J.; Lombardo, V.; Cooley, L.,	*Verification testing of MQXFA Nb3Sn wires procured under LARP*	IEEE Transactions on Applied Superconductivity	29	5	6000904	10.1109/TASC.2019.2898556	Yes
Marshall, W.; Dixon, I.R.; Larbalestier, D.C.,	*Design of Strain-Limited Bi-2223 Insert Coils For High-Field Magnets*	IEEE Transactions on Applied Superconductivity	29	5	1-4	10.1109/TASC.2019.2897069	Yes
Ozaki, T.; Jaroszynski, J.; Li, Q.,	*Two-Fold Reduction of Jc Anisotropy in FeSe0.5Te0.5 Films Using Low-Energy Proton Irradiation*	IEEE Transactions on Applied Superconductivity	29	5	1-3	10.1109/TASC.2019.2900615	Yes
Painter, T.A.; Abraimov, D.V.; Bole, S.T.; Coombs, T.G.; Coombs, T.A.; Francis, A.; Geng, J.; Larbalestier, D.C.; Sossong, D.; Viouchkov, Y.L.; Voran, A.; White, J.M.,	*An Integrated Coil Form Test Coil Design for High Current REBCO DC Solenoids*	IEEE Transactions on Applied Superconductivity	29	5	626-630	10.1109/TASC.2019.2899146	Yes
Ravaioli, E.; Davis, D.S.; Marchevsky, M.; Sabbi, G.; Shen, T.; Verweij, A.; Zhang, K.,	*A new quench detection method for {HTS} magnets: stray-capacitance change monitoring*	Physica Scripta	Accepted Manuscript		1-23	10.1088/1402-4896/ab4570	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Shen, T.; Bosque, E.; Davis, D.; Jiang, J.; White, M.; Zhang, K.; Higley, H.; Turqueti, M.; Huang, Y.; Miao, H.; Trociewitz, U.; Hellstrom, E.; Parrell, J.; Hunt, A.; Gourlay, S.; Prestemon, S.; Larbalestier, D.,	*Stable, predictable and training free operation of superconducting Bi-2212 Rutherford cable racetrack coils at the wire current density of 1000 A/mm^2*	Scientific Report	9		10170	10.1038/s41598-019-46629-3	Yes
Tarantini, C.; Balachandran, S.; Heald, S.M.; Lee, P.J.; Paudel, N.; Choi, E.; Starch, W.L.; Larbalestier, D.C.,	*Ta, Ti and Hf effects on Nb3Sn high-field performance: temperature-dependent dopant occupancy and failure of Kramer extrapolation*	Superconductor Science and Technology	32		124003	10.1088/1361-6668/ab4d9e	Yes
Zhang, Z.; Jiang, J.; Tian, H.; Wang, Q.; Larbalestier, D.C.; Hellstrom, E.E.,	*Investigation of the melt-growth process of YbBa2Cu3O7−δ powder in Ag-sheathed tapes*	CrystEngComm	21	9	1369-1377	10.1039/C8CE02079E	Yes

MS&T (35)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
An, B.L.; Xin, Y.; Niu, R.M.; Lu, J.; Wang, E.G.; Han, K.,	*Hardening Cu-Ag composite by doping with Sc*	Materials Letters	252		207-210	10.1016/j.matlet.2019.05.101	Yes
Balachandran, S.; Smathers, D.B.; Walsh, R.P.; Starch, W.L.; Lee, P.J.,	*High Strength Cu-Ta-W Composite*	IEEE Transactions on Applied Superconductivity	29	5	6900604	10.1109/TASC.2019.2906781	Yes
Balachandran, S.; Tarantini, C.; Lee, P.J.; Kametani, F.; Su, Y.; Walker, B.; Starch, W.L.; Larbalestier, D.C.,	*Beneficial influence of Hf and Zr additions to Nb4atTa on the vortex pinning of Nb_3Sn with and without an O source*	Superconductor Science and Technology	32		44006	10.1088/1361-6668/aaff02	Yes
Bao, S.; Guo, W.,	*Quench spot detection for superconducting accelerator cavities via flow visualization in superfluid helium-4*	Physical Review Applied	11		44003	10.1103/PhysRevApplied.11.044003	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Barry, K.; Zhang, B.; Anand, N.; Xin, Y.; Vailionis, A.; Neu, J.N.; Heikes, C.; Cochran, C.; Zhou, H.; Qiu, Y.; Ratcliff, W.; Siegrist, T.M.; Beekman, C.,	*Modification of spin-ice physics in Ho2Ti2O7 thin films*	Physical Review Materials	3	8	84412	10.1103/PhysRevMaterials.3.084412	Yes
Bawatna, M.; Green, B.W.; Kovalev, S.; Deinert, J.; Knodel, O.; Spallek, R.G.,	*Research and Implementation of Efficient Parallel Processing of Big Data at TELBE User Facility*	2019 International Symposium on Performance Evaluation of Computer and Telecommunication Systems	2019		1-6	10.23919/SPECTS.2019.8823486	No
Bird, M.D.; Bai, H.; Dixon, I.R.; Gavrilin, A.V.,	*Test Results of the 36 T, 1 ppm Series-Connected Hybrid Magnet System at the NHMFL*	IEEE Transactions on Applied Superconductivity	29	5	4300105	10.1109/TASC.2019.2895569	Yes
Cavallucci, L.; Breschi, M.; Ribani, P.L.; Gavrilin, A.V.; Weijers, H.W.; Noyes, P.D.,	*A Numerical Study of Quench in the NHMFL 32T Magnet*	IEEE Transactions on Applied Superconductivity	29	5	4701605	10.1109/TASC.2019.2900175	No
Chen, M.; Deinert, J.C.; Green, B.W.; Wang, Z.; Ilyakov, I.; Awari, N.; Bawatna, M.; Germanskiy, S.; de Oliveira, T.; Geloni, G.; Tanikawa, T.; Gensch, M.; Kovalev, S.,	*Pulse- and field-resolved THz-diagnostics at 4 t h generation lightsources*	Optics Express	27	22	32360--32369	10.1364/OE.27.032360	No
Deng, L.; Liu, Z.; Wang, B.; Han, K.; Xiang, H.,	*Effects of interface area density and solid solution on the microhardness of Cu-Nb microcomposite wires*	Materials Characteri-zation	150		62-66	10.1016/j.matchar.2019.02.002	Yes
Deng, L.; Wang, B.; Han, K.; Niu, R.; Xiang, H.; Hartwig, K.T.; Yang, X.,	*Response of microstructure to annealing in in situ Cu–Nb microcomposite*	Journal of Materials Science	54	1	840-850	10.1007/s10853-018-2865-4	Yes
Dixon, I.R.; Adkins, T.; Bird, M.D.; Hoffman, M.; Perenboom, J.A.A.J.; Wulffers, C.A.; den Ouden, A.; Hussey, N.E.,	*Fabrication of the Nb_3Sn/Cu CICC Coil and Cold Mass for the Radboud University HFML 45 T Hybrid Magnet*	IEEE Transactions on Applied Superconductivity	29	5	4300204	10.1109/TASC.2019.2897059	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Feng, X.; Chien, P.; Patel, S.; Zheng, J.; Immediato-Scuottoa, M.; Xin, Y.; Hung, I.; Gan, Z.; Hu, Y.,	*Synthesis and characterizations of highly conductive and stable electrolyte Li10P3S12I*	Energy Storage Materials	22		397-401	10.1016/j.ensm.2019.07.047	Yes
Garceau, N.; Bao, S.; Guo, W.,	*The design and testing of a liquid helium cooled tube system for simulating sudden vacuum loss in particle accelerators*	Cryogenics	100		92	10.1016/j.cryogenics.2019.04.012	Yes
Garceaua, N.; Bao, S.; Guo, W.,	*Heat and mass transfer during a sudden loss of vacuum in a liquid helium cooled tube - Part I: Interpretation of experimental observations*	International Journal Heat and Mass Transfer	129		1144	10.1016/j.ijheatmasstransfer.2018.10.053	Yes
Goddard, R.E.; Toplosky, V.J.,	*Microscopy Investigation of Surface Contamination Effect on Fatigue Fracture of Al60 (GlidCop) Wire*	Microscopy & Microanalysis	25	S2	778-779	10.1017/S1431927619004628	Yes
Han, K.; Toplosky, V.; Lu, J.; Xin, Y.; Walsh, R.,	*Yielding and Strain-hardening of Reinforcement Materials*	IEEE Transactions on Applied Superconductivity	29	5	7800405	10.1109/TASC.2019.2907869	Yes
Hu, P.; Dorogov, M.; Xin, Y.; Aifantis, K.E.,	*Transforming Single-Crystal CuO/Cu2O Nanorods intoNano-Polycrystalline Cu/Cu2O through Lithiation*	CHEMElectroCHEM	6		3139-3144	10.1002/celc.201900564	Yes
Ilyakov, I.; Awari, N.; Kovalev, S.; Fowley, C.; Rode, K.; Stamenov, P.; Lau, Y.C.; Betto, D.; Thiyagarajah, N.; Green, B.W.; Yildirim, O.; Lindner, J.; Fassbender, J.; Coey, M.; Deac, A.; Gensch, M.,	*Thickness-Dependent THz Emission From Ultrathin Ferrimagnetic Mn3-xGa Films*	CLEO, OSA Technical Digest	2019		STu4F.6	10.1364/CLEO_SI.2019.STu4F.6	No
Jin, P.; Li, Y.; Dai, Y.; Xu, Z.; Song, C.; Luo, Z.; Zhai, Q.; Han, K.; Zheng, H.,	*Zn and P Alloying Effect in Sub-Rapidly Solidified LaFe11. 6Si1. 4 Magnetocaloric Plates*	Metals	9	4	432	10.3390/met9040432	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Levitan, J.W.; Lu, J.; Lombardo, V.; Cooley, L.,	*Verification testing of MQXFA Nb3Sn wires procured under LARP*	IEEE Transactions on Applied Superconductivity	29	5	6000904	10.1109/TASC.2019.2898556	Yes
Li, H.; Wang, L.; Xiao, H.; Xu, J.; Zheng, S.; Zhai,, Q .J.; Han, K.,	*Hardening Low-Carbon Steels by Engineering the Size and Distribution of Inclusions*	Metallurgical and Materials Transactions A - Physical Metallurgy and Materials Science	50		336-347	10.1007/s11661-018-5003-7	Yes
Mao, L.; Xin, Y.; Liu, J.Y.; Zhu, H.W.; Xu, H.; Talbayev, D.; Stanislavchuk, T.; Sirenko, A.; Puli, V.; Mao, Z.Q.,	*Thin-film growth and structural characterization of a novel layered iridate Ba7Ir3O13+δ*	Semi-conductor Science and Technology	34	2	25002	10.1088/1361-6641/aaf74e	Yes
Marshall, W.; Dixon, I.R.; Larbalestier, D.C.,	*Design of Strain-Limited Bi-2223 Insert Coils For High-Field Magnets*	IEEE Transactions on Applied Superconductivity	29	5	1-4	10.1109/TASC.2019.2897069	Yes
Mastracci, B.; Bao, S.; Guo, W.; Vinen, W. F.,	*Particle tracking velocimetry applied to thermal counterflow in superfluid 4He: motion of the normal fluid at small heat fluxes*	Physical Review Fluids	4		83305	10.1103/PhysRevFluids.4.083305	Yes
Mastracci, B.; Guo, W.,	*Characterizing vortex tangle properties in steady-state He II counterflow using particle tracking velocimetry*	Physical Review Fluids	4		23301	10.1103/PhysRevFluids.4.023301	Yes
Mishra, D.; Wang, S.; Jin, Z.C.; Xin, Y.; Lochner, E.; Mattoussi, H.,	*Highly fluorescent hybrid Au/Ag nanoclusters stabilized with poly(ethylene glycol)- and zwitterion-modified thiolate ligands*	Physical Chemistry Chemical Physics	21		21317	10.1039/C9CP03723C	Yes
Overdeep, K. R.; Ridge, C. J.; Xin, Y.; Jensen, T. N.; Anderson, S. L.; Lindsay, C. M.,	*Oxidation of Aluminum Particles from 1 to 10 nm in Diameter: The Transition from Clusters to Nanoparticles*	Journal of Physical Chemistry C	123	38	23721-23731	10.1021/acs.jpcc.9b05564	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Painter, T.A.; Abraimov, D.V.; Bole, S.T.; Coombs, T.G.; Coombs, T.A.; Francis, A.; Geng, J.; Larbalestier, D.C.; Sossong, D.; Viouchkov, Y.L.; Voran, A.; White, J.M.,	*An Integrated Coil Form Test Coil Design for High Current REBCO DC Solenoids*	IEEE Transactions on Applied Superconductivity	29	5	626-630	10.1109/TASC.2019.2899146	Yes
Tan, X.; Deng, Q.; Xu, H.; Li, H.; Stachurski, Z.H.; Han, K.,	*Composition variation of amorphous phase controlled coercivity of Nd60Fe30Al10 alloy*	Journal of Magnetism and Magnetic Materials	482	15	376-381	10.1016/j.jmmm.2019.03.059	Yes
Wang, X.; Ling, Y.; Lian, X.; Xin, Y.; Dhungana, K.B.; Perez-Orive, F.; Knox, J.; Chen, Z.; Zhou, Y.; Beery, D.; Hanson, K.; Shi, J.; Lin, S.; Gao, H.,	*Suppressed phase separation of mixed-halide perovskites confined in endotaxial matrices*	Nature Communi-cations	10	1	695	10.1038/s41467-019-08610-6	Yes
Xia, J.; Bai, H.; Yong, H.; Weijers, H.W.; Painter, T.A.; Bird, M.D.,	*Stress and strain analysis of a REBCO high field coil based on the distribution of shielding current*	Super-conductor Science and Technology	33		45	10.1088/1361-6668/ab279c	Yes
Xin, Y.; Han, K.; Svanidze, E.; Besara, T.; Siegrist, T.M.; Morosan, E.,	*Microstructure of hard biocompatible Ti1−xAux alloys*	Materials Characteri-zation	149		133-142	10.1016/j.matchar.2019.01.013	Yes
Zhang, C.; Li, J.; Park, J.; Su, Y.; Goddard, R.E.; Gelfand, R.M.,	*Optimization of metallic nanoapertures at short-wave infrared wavelengths for self-induced back-action trapping*	Applied Optics	58	35	9498-9504	10.1364/AO.58.009498	No
Zhang, L.; Han, K.; Zhang, X.; Wang, E.; Lu, J.; Goddard, R.E.,	*Effect of a high magnetic field on hard magnetic multilayered Fe-Pt alloys*	Journal of Magnetism and Magnetic Materials	490	15	165533	10.1016/j.jmmm.2019.165533	Yes

Education at FSU (2)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Hughes, R.; Roberts, K.L.,	*STEM Identity Growth in Co-Educational and Single-Sex STEM Summer Camps*	International Journal of Gender, Science, and Technology	11	2	232-311	10.15695/jstem/v2i1.07	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Roberts, K.L.; Hughes, R.,	*Girls STEM Identity Growth in Co-Educational and Single-Sex STEM Summer Camps*	Journal of STEM Outreach	2	1	1-9	na	Yes

CMT/E (43)

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Barry, K.; Zhang, B.; Anand, N.; Xin, Y.; Vailionis, A.; Neu, J.N.; Heikes, C.; Cochran, C.; Zhou, H.; Qiu, Y.; Ratcliff, W.; Siegrist, T.M.; Beekman, C.,	*Modification of spin-ice physics in Ho2Ti2O7 thin films*	Physical Review Materials	3	8	84412	10.1103/PhysRevMaterials.3.084412	Yes
Changlani, H.J.; Pujari, S.; Chung, C.M.; Clark, B.,	*Resonating quantum three-coloring wave functions for the kagome quantum antiferromagnet*	Physical Review B	99		104433	10.1103/PhysRevB.99.104433	No
Chen, L.; Bandyopadhyay, S.; Yang, K.; Seidel, A.,	*Composite fermions in Fock space: Operator algebra, recursion relations, and order parameters*	Physical Review B	100		45136	10.1103/PhysRevB.100.045136	Yes
Chen, S.Y.; Lu, Z.; Goldstein, T.; Tong, J.; Chaves, A.; Kunstmann, J.; Cavalcante, L.S.R.; Wozniak, T.; Seifert, G.; Reichman, D.R.; Taniguchi, T.; Watanabe, K.; Smirnov, D.; Jun, Y.,	*Luminescent Emission of Excited Rydberg Excitons from Monolayer WSe2*	Nano Letters	19	4	2464	10.1021/acs.nanolett.9b00029	Yes
Chiu, Y.; Chen, K.W.; Schoenemann, R.; Quito, V.L.; Sur, S.; Zhou, Q.; Graf, D.E.; Kampert, E.; Forster, T.; Yang, K.; McCandless, G.T.; Chan, J.Y.; Baumbach, R.; Johannes, M.D.; Balicas, L.,	*Origin of the butterfly magnetoresistance in a Dirac nodal-line system*	Physical Review B	100		125112	10.1103/PhysRevB.100.125112	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Das, S.D.; Zhu, Z.; Mun, E.; McDonald, R.; Li, G.; Balicas, L.; McCallam, A.; Cao, G.; Rau, J.G.; Kee, H.Y.; Sebastian, S.E.,	*Magnetic anisotropy of the alkali iridate Na_2IrO_3 at high magnetic fields: Evidence for strong ferromagnetic Kitaev correlations*	Physical Review B Rapid Communications	99		081101 (R)	10.1103/PhysRevB.99.081101	Yes
Datta, A.; Yang, K.; Ghosal, A.,	*Fulde-Ferrell-Larkin-Ovchinnikov state in strongly correlated d-wave superconductors*	Physical Review B	100		35114	10.1103/PhysRevB.100.035114	No
Davenport, J.L.; Ge, Z.; Liu, J.; Nuñez-Lobato, C.; Moon, S.; Lu, Z.; Quezada-Lopez, E.A.; Hellier, K.; LaBarre, P.G.; Taniguchi, T.; Watanabe, K.; Carter, S.; Ramirez, A.P.; Smirnov, D.; Velasco, J.,	*Probing the electronic structure of graphene near and far from the Fermi level via planar tunneling spectroscopy*	Applied Physics Letters	115	16	163504	10.1063/1.5118422	Yes
Edelberg, D.; Rhodes, D.; Kerelsky, A.; Kim, B.; Wang, J.; Zangiabadi, A.; Kim, C.; Antony, A.; Ardelean, J.; Scully, M.; Scullion, D.; Embon, L.; Zu, R.; Santos, E.J.G.; Balicas, L.; Marianetti, C.A.; Barmak, K.; Zhu, X.; Hone, J.C.; Pasupathy, A.N.,	*Approaching the Intrinsic Limit in Transition Metal Diselenides via Point Defect Control*	Nano Letters	19	7	4371-4379	10.1021/acs.nanolett.9b00985	Yes
Falb, N.W.; Neu, J.N.; Besara, T.; Whalen, J.B.; Singh, D.J.; Siegrist, T.M.,	*Ba3CrN3H: A New Nitride-Hydride with Trigonal Planar Cr4+*	Inorganic Chemistry	58	5	3302-3307	10.1021/acs.inorgchem.8b03367	Yes
Henderson, A.M.; Dong, L.Y.; Biswas, S.; Revell, H.I.; Xin, Y.; Valenti, R.; Schlueter, J.A.; Siegrist, T.M.,	*Order-disorder transition in the S=1/2 kagome antiferromagnets claringbullite and barlowite*	Chemical Communications Cambridge	55	77	11587-11590	10.1039/c9cc04930d	Yes
Kang, J.; Vafek, O.,	*Strong Coupling Phases of Partially Filled Twisted Bilayer Graphene Narrow Bands*	Physical Review Letters	122		246401	10.1103/PhysRevLett.122.246401	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Lanata, N.; Lee, T.S.; Yao, Y.X.; Stevanovic, V.; Dobrosavljevic, V.,	*Connection between Mott physics and crystal structure in a series of transition metal binary compounds*	Nature Partner Journals (npj) Computational Materials	5		30	10.1038/s41524-019-0169-0	No
Lengyel, J.; Wang, X.; Choi, E.; Besara, T.; Schoenemann, R.; Ramakrishna, S.K.; Holleman, J.; Blockmon, A.L.; Hughey, K.D.; Liu, T.; Hudis, J.B.; Beery, D.; Balicas, L.; McGill, S.A.; Hanson, K.; Musfeldt, J.L.; Siegrist, T.M.; Dalal, N.S.; Shatruk, M.,	*Antiferroelectric Phase Transition in a Proton-Transfer Salt of Squaric Acid and 2,3-Dimethylpyrazine*	Journal of the American Chemical Society	141	41	16279	10.1021/jacs.9b04473	Yes
Li, Y.; Tabis, W.; Tang, Y.; Yue, G.; Jaroszynski, J.; Barisic, N.; Greven, M.,	*Hole pocket-driven superconductivity and its universal features in the electron-doped cuprates*	Science Advances	5	2	eaap7349	10.1126/sciadv.aap7349	Yes
Li, Z.; Wang, T.; Jin, C.; Lu, Z.; Lian, Z.; Meng, Y.; Blei, M.; Gao, S.; Taniguchi, T.; Watanabe, K.; Ren, T.; Tongay, S.; Yang, L.; Smirnov, D.; Cao, T.; Shi, S.,	*Emerging photoluminescence from the dark-exciton phonon replica in monolayer WSe2*	Nature Communi-cations	10	1	2469	10.1038/s41467-019-10477-6	Yes
Li, Z.; Wang, T.; Jin, C.; Lu, Z.; Lian, Z.; Meng, Y.; Blei, M.; Gao, M.; Taniguchi, T.; Watanabe, K.; Ren, T.; Cao, T.; Tongay, S.; Smirnov, D.; Zhang, L.; Shi, S.,	*Momentum-Dark Intervalley Exciton in Monolayer Tungsten Diselenide Brightened via Chiral Phonon*	American Chemical Society Nano	13	12	14107	10.1021/acsnano.9b06682	Yes
Li, Z.; Wang, T.; Lu, Z.; Khatoniar, M.; Lian, Z.; Meng, Y.; Blei, M.; Taniguchi, T.; Watanabe, K.; McGill, S.A.; Tongay, S.; Menon, V.M.; Smirnov, D.; Shi, S.,	*Direct Observation of Gate-Tunable Dark Trions in Monolayer WSe2*	Nano Letters	19	10	6886	10.1021/acs.nanolett.9b02132	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Lin, H.; Zhou, C.; Neu, J.N.; Zhou, Y.; Han, D.; Chen, S.; Worku, M.; Chaaban, M.; Lee, S.; Berkwits, E.; Siegrist, T.M.; Du, M.; Ma, B.,	*Bulk Assembly of Corrugated 1D Metal Halides with Broadband Yellow Emission*	Advanced Optical Materials	7	6	1801474	10.1002/adom.201801474	Yes
Lin, H.; Zhou, C.; Tian, Y.U.; Besara, T.; Neu, J.N.; Siegrist, T.M.; Zhou, Y.; Bullock, J.; Schanze, K.S.; Ming, W.; Du, M.; Ma, B.,	*Bulk assembly of organic metal halide nanotubes*	Chemical Science	8	12	8400-8404	10.1039/c7sc03675b	Yes
Liou, S.; Haldane, F.D.M.; Yang, K.; Rezayi, E.H.,	*Chiral Gravitons in Fractional Quantum Hall Liquids*	Physical Review Letters	123		146801	10.1103/PhysRevLett.123.146801	No
Lu, Z.; Rhodes, D.A.; Li, Z.; Van Tuan, D.; Jiang, Y.; Ludwig, J.K.; Jiang, Z.; Lian, Z.; Shi, S.; Hone, J.; Dery, H.; Smirnov, D.,	*Magnetic field mixing and splitting of bright and dark excitons in monolayer MoSe2*	2D Materials	7	1	15017	10.1088/2053-1583/ab5614	Yes
Min, C.; Bentmann, H.; Neu, J.N.; Eck, P.; Moser, S.; Figgemeier, T.; Uenzelmann, M.; Kissner, K.; Lutz, P.; Koch, R.J.; Jozwiak, C.; Bostwick, A.; Rotenberg, E.; Thomale, R.; Sangiovanni, G.; Siegrist, T.M.; Di Sante, D.; Reinert, F.,	*Orbital Fingerprint of Topological Fermi Arcs in the Weyl Semimetal TaP*	Physical Review Letters	122	11	116402	10.1103/PhysRevLett.122.116402	Yes
Mozaffari, S.; Sun, D.; Minkov, V.S.; Drozdov, A.P.; Knyazev, D.; Betts, J.; Einaga, M.; Shimizu, K.; Eremets, M.I.; Balicas, L.; Balakirev, F.,	*Superconducting phase diagram of H3S under high magnetic fields*	Nature Communi-cations	10		2522	10.1038/s41467-019-10552-y	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Neu, J.N.; Wei, K.; He, X.; Delaire, O.; Baumbach, R.; Feng, Z.; Fu, Y.; Zhang, Y.; Singh, D.J.; Siegrist, T.M.,	*Orthorhombic to monoclinic phase transition in $NbNiTe_2$*	Physical Review B	100		144102	10.1103/PhysRevB.100.144102	Yes
Pradhan, N.R.; Garcia, C.; Lucking, M.C.; Pakhira, S.; Martinez, J.; Rosenmann, D.; Divan, R.; Sumant, A.V.; Terrones, H.; Mendoza-Cortes, J.L.; McGill, S.A.; Zhigadlo, N.D.; Balicas, L.,	*Raman and Electrical Transport Properties of Few-LayeredArsenic-Doped Black Phosphorus*	Nanoscale	11		18449	10.1039/C9NR04598H	Yes
Sahoo, P.K.; Memaran, S.; Nugera, F.A.; Xin, Y.; Márquez, T.D.; Lu, Z.; Zheng, W.; Zhigadlo, N.D.; Smirnov, D.; Balicas, L.; Gutierrez, H.R.,	*Bilayer Lateral Heterostructures of Transition Metal Dichalcogenides and their Optoelectronic Response*	American Chemical Society Nano	13		12372	10.1021/acsnano.9b04957	Yes
Schaller, D.; LaBarre, P.G.; Besara, T.; Henderson, A.M.; Wei, K.; Bucher, E.; Siegrist, T.M.; Ramirez, A.P.,	*Mini volume collapse as evidence for a three-body magnetic polaron in Sm1-xEuxS*	Physical Review Materials	3	10	104602	10.1103/PhysRevMaterials.3.104602	Yes
Schoenemann, R.; Chiu, Y.C.; Zheng, W.; Quito, V.L.; Sur, S.; McCandless, G.T.; Chan, J.Y.; Balicas, L.,	*Bulk Fermi surface of the Weyl type-II semimetallic candidate NbIrTe4*	Physical Review B	99		195128	10.1103/PhysRevB.99.195128	Yes
Shimura, Y.; Zhang, Q.; Zeng, B.; Rhodes, D.; Schoenemann, R.; Tsujimoto, M.; Matsumoto, Y.; Sakai, A.; Sakakibara, T.; Araki, K.; Zheng, W.; Zhou, Q.; Balicas, L.; Nakatsuji, S.,	*Giant Anisotropic Magnetoresistance due to Purely Orbital Rearrangement in the Quadrupolar Heavy Fermion Superconductor PrV_2Al_{20}*	Physical Review Letters	122		256601	10.1103/PhysRevLett.122.256601	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Sie, E.J.; Nyby, C.M.; Pemmaraju, C.D.; Park, S.J.; Shen, X.; Yang, J.; Hoffmann, M.C.; Ofori-Okai, B. K.; Li, R.; Reid, A.H.; Weathersby, S.; Mannebach, E.; Finney, N.; Rhodes, D.A.; Chenet, D.; Antony, A.; Balicas, L.; Hone, J.; Devereaux, T.P.; Heinz, T. F.; Wang, X.; Lindenberg, A.M.,	*An ultrafast symmetry switch in a Weyl semimetal*	Nature	565		61–66	10.1038/s41586-018-0809-4	Yes
Stepanov, P.; Barlas, Y.; Che, S.; Myhro, K.; Voigt, G.; Pi, Z.; Watanabe, K.; Taniguchi, T.; Smirnov, D.; Zhang, F.; Lake, R.K.; MacDonald, A.H.; Lau, C.N.,	*Quantum parity Hall effect in Bernal-stacked trilayer graphene*	Proceedings of the National Academy of Sciences of the USA (PNAS)	116	21	10286	10.1073/pnas.1820835116	Yes
Sur, S.; Yang, K.,	*Metallic state in bosonic systems with continuously degenerate minima*	Physical Review B	100		24519	10.1103/PhysRevB.100.024519	Yes
Tan, L.; Ali, J.N.; Cheang, U.K.; Shi, X.; Kim, D.; Kim, M.J.,	*µ-PIV Measurements of Flows Generated by Photolithography-Fabricated Achiral Microswimmers*	Micromachines	10	12	865	10.3390/mi10120865	Yes
Tang, F.; Ren, Y.; Wang, P.; Zhong, R.; Schneeloch, J.; Yang, S. A.; Yang, K.; Lee, P. A.; Gu, G.; Qiao, Z.; Zhang, L.,	*Three-dimensional quantum Hall effect and metal-insulator transition in ZrTe5*	Nature	569		537	10.1038/s41586-019-1180-9	Yes
Wang, H.; Seidel, A.; Yang, K.; Zhang, F. C.,	*Interlayer correlated fractional quantum Hall state in the nu = 4/5 bilayer system*	Physical Review B	100		245122	10.1103/PhysRevB.100.245122	Yes
Wang, L.; Yin, M.; Zhong, B.; Jaroszynski, J.; Mbamalu, G.; Datta, T.,	*Quantum transport properties of monolayer graphene with antidot lattice*	Journal of Applied Physics	126	8	84305	10.1063/1.5100813	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Zhang, Q.; Zeng, B.; Chiu, Y.; Schoenemann, R.; Memaran, S.; Zheng, W.; Rhodes, D.A.; Chen, K.; Besara, T.; Sankar, R.; Chou, F.C.; McCandless, G.; Chan, J.Y.; Alidoust, N.; Xu, S.Y.; Belopolski, I.; Hasan, M.Z.; Balakirev, F.; Balicas, L.,	*Possible manifestations of the chiral anomaly and evidence for a magnetic field inducedtopological phase transition in the type-I Weyl semimetal TaAs*	Physical Review B	100		115138	10.1103/PhysRevB.100.115138	Yes
Zhang, S.; Changlani, H.J.; Plumb, K.; Tchernyshyov, O.; Moessner, R.,	*Dynamical Structure Factor of the Three-Dimensional Quantum Spin Liquid Candidate NaCaNi2F7*	Physical Review Letters	122		167203	10.1103/PhysRevLett.122.167203	No
Zhang, X.; Lai, Y.; Dohner, E.; Moon, S.; Taniguchi, T.; Watanabe, K.; Smirnov, D.; Heinz, T.F.,	*Zeeman-Induced Valley-Sensitive Photocurrent in Monolayer MoS2*	Physical Review Letters	122		127401	10.1103/PhysRevLett.122.127401	Yes
Zhou, C.; Lin, H.; Neu, J.N.; Zhou, Y.; Chaaban, M.; Lee, S.; Worku, M.; Chen, B.; Clark, R.; Cheng, W.; Guan, J.; Djurovich, P.; Zhang, D.; Lu, X.; Bullock, J.; pak, C.; Shatruk, M.; Du, M.; Siegrist, T.M.; Ma, B.,	*Green Emitting Single-Crystalline Bulk Assembly of Metal Halide Clusters with Near-Unity Photoluminescence Quantum Efficiency*	ACS Energy Letters	4	7	1579-1583	10.1021/acsenergylett.9b00991	Yes
Zhou, C.; Tian, Y.U.; Yuan, Z.; Lin, H.; Chen, B.; Clark, R.; Dilbeck, T.; Zhou, Y.; Hurley, J.; Neu, J.N.; Besara, T.; Siegrist, T.M.; Djurovich, P.; Ma, B.,	*Highly Efficient Broadband Yellow Phosphor Based on Zero-Dimensional Tin Mixed-Halide Perovskite*	ACS Applied Materials & Interfaces	9	51	44579-44583	10.1021/acsami.7b12862	No
Zhou, H.; Wiebe, C.R.,	*High-Pressure Routes to New Pyrochlores and Novel Magnetism*	Inorganics	7	4	49	10.3390/inorganics7040049	No

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Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Adiatma, Y.D.; Saltzman, M.R.; Young, S.A.; Griffith, E.M.; Kozik, N.; Edwards, C.T.; Leslie, S.A.; Bancroft, A.M.,	*Did early land plants produce a stepwise-change in atmospheric oxygen during the Late Ordovician (Sandbian ~458 Ma)?*	Palaeogeography, Palaeo-climatology, Palaeoecology	534		1-14	10.1016/j.palaeo.2019.109341	Yes
Bowman, C.N.; Young, S.A.; Kaljo, D.; Eriksson, M.; Them, T.; Hints, O.; Martma, T.; Owens, J.D.,	*Linking the progressive expansion of reducing conditions to a stepwise mass extinction event in the late Silurian oceans*	Geology	47	10	968-972	10.1130/G46571.1	Yes
Castorina, E.; Ingall, E.D.; Morton, P.; Tavakoli, D.A.; Lai, B.,	*Zinc K-edge XANES spectroscopy of mineral and organic standards*	Journal of Synchrotron Radiation	26		1302-1309	10.1107/S160057751900540X	No
Deng, T.; Wang, X.; Wu, F.; Wang, Y.; Li, Q.; Wang, S.; Hou, S.,	*Review: Implications of vertebrate fossils for paleo-elevations of the Tibetan Plateau*	Global and Planetary Change	174		5869	10.1016/j.gloplacha.2019.01.005	No
Fender, C.; Kelly, T.; Guidi, L.; Ohman, M.; Smith, M.; Stukel, M.,	*Investigating particle size-flux relationships and the biological pump across a range of plankton ecosystem states from coastal to oligotrophic*	Frontiers in Marine Science	6		603	10.3389/fmars.2019.00603	Yes
Kozik, N.P.; Young, S.A.; Bowman, C.N.; Saltzman, M.R.; Them, T.R.,	*MiddleUpper Ordovician (DarriwilianSandbian) paired carbon and sulfurisotope stratigraphy from the Appalachian Basin, USA: Implications fordynamic redox conditions spanning the peak of the Great Ordovician Biodiversification Event*	Palaeogeography, Palaeo-climatology, Palaeoecology	520		188-202	10.1016/j.palaeo.2019.01.032	Yes
Lindskog, A.; Eriksson, M.E.; Bergström, S.M.; Young, S.A.,	*Lower Middle Ordovician carbon and oxygen isotope chemostratigraphy at Hallekis, Sweden: implications for regional to global correlation and palaeoenvironmental development*	Lethaia	52		204-219	10.1111/let.12307	Yes

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Lindskog, A.; Young, S.A.,	*Dating of sedimentary rock intervals using visual comparison of carbon isotope records: a comment on the recent paper by Bergström et al. concerning the age of the Winneshiek Shale*	Lethaia	52		299-303	10.1111/let.12316	Yes
Mallick, S.; Salters, V.J.; Langmuir, C.H.,	*Geochemical variability along the northern East Pacific Rise: Coincident source composition and ridge segmentation*	Geo-chemistry, Geophysics, Geosystems	20	4	1889-1911	10.1029/2019GC008287	Yes
Martinez-Ruiz, F.; Paytan, A.; Gonzalez-Munoz, M.T.; Jroundi, F.; Abad, M.M.; Lam, P.J.; Bishop, J.; Horner, T.J.; Morton, P.; Kastner, M.,	*Barite formation in the ocean: Origin of amorphous and crystalline precipitates*	Chemical Geology	511		441-451	10.1016/j.chemgeo.2018.09.011	No
McDaniel, M.M.; Ingall, E.; Morton, P.; Castorina, E.; Weber, R.; Shelley, R.; Landing, W.M.; Longo, A.; Feng, Y.; Lai, B.,	*Relationship between Atmospheric Aerosol Mineral Surface Area and Iron Solubility*	ACS Earth and Space Chemistry	3	11	2443-2451	10.1021/acsearthspacechem.9b00152	Yes
Morton, P.; Landing, W.M.; Shiller, A.; Moody, A.; Kelly, T.; Bizimis, M.; Donat, J.; De Carlo, E.H.; Shacat, J.,	*Shelf Inputs and Lateral Transport of Mn, Co, and Ce in the Western North Pacific Ocean*	Frontiers in Marine Science	6			10.3389/fmars.2019.00591	Yes
Nguyen, K.; Love, G.D.; Zumberge, J.A.; Kelly, A.E.; Owens, J.D.; Rohrssen, M.K.; Bates, S.M.; Cai, C.; Lyons, T.W.,	*Absence of biomarker evidence for early eukaryotic life from the Mesoproterozoic Roper Group: Searching across a marine redox gradient in mid-Proterozoic habitability*	Geobiology	17	3		10.1111/gbi.12329	No
Nielsen, S.G.; Auro, M.; Righter, K.; Davis, D.; Prytulak, J.; Wu, F.; Owens, J.D.,	*Nucleosynthetic vanadium isotope heterogeneity of the early solar system recorded in chondritic meteorites*	Earth and Planetary Science Letters	505	1	131-140	10.1016/j.epsl.2018.10.029	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Ostrander, C.M.; Nielsen, S.G.; Owens, J.D.; Kendall, B.; Gordon, G.W.; Romaniello, S.J.; Anbar, A.D.,	*Fully oxygenated water columns over continental shelves before the Great Oxidation Event*	Nature Geoscience	12		186-191	10.1038/s41561-019-0309-7	No
Ostrander, C.M.; Sahoo, S.K.; Jiang, G.; Kendall, B.; Planavsky, N.J.; Lyons, T.W.; Nielsen, S.G.; Owens, J.D.; Gordon, G.W.; Romaniello, S.J.; Anbar, A.D.,	*Multiple negative molybdenum isotope excursions in the Doushantuo Formation (South China) fingerprint complex redox-related processes in the Ediacaran Nanhua Basin*	Geochimica et Cosmo-chimica Acta	261		191-209	10.1016/j.gca.2019.07.016	No
Perrot, V.; Landing, W.M.; Grubbs, R.D.; Salters, V.J.,	*Mercury bioaccumulation in tilefish from the northeastern Gulf of Mexico 2 years after the Deepwater Horizon oil spill: Insights from Hg, C, N and S stable isotopes*	Science of the Total Environment	666		828-838	10.1016/j.scitotenv.2019.02.295	Yes
Peslier, A.H.; Hervig, R.; Yang, S.; Humayun, M.; Barnes, J.J.; Irving, A.J.; Brandon, A.D.,	*Determination of the water content and D/H ratio of the Martian mantle by unraveling degassing and crystallization effects in nakhlites.*	Geochimica et Cosmo-chimica Acta	266		382-415	10.1016/j.gca.2019.04.023	No
Raven, M.R.; Fike, D.A.; Bradley, A.S.; Gomes, M.L.; Owens, J.D.; Webb, S.A.,	*Paired organic matter and pyrite δ34S profiles reveal mechanisms of carbon, sulfur, and iron cycle disruption during Ocean Anoxic Event 2*	Earth and Planetary Science Letters	512		27-38	10.1016/j.epsl.2019.01.048	No
Rizo, H.; Andrault, D.; Bennett, N.; Humayun, M.; Brandon, A.D.; Vlastelic, I.; Moine, B.; Poirier, A.; Bouhifd, M.A.; Murphy, D.T.,	*^{182}W evidence for core-mantle interaction in the source of mantle plumes.*	Geo-chemical Perspectives Letters	11		6-11	10.7185/geochemlet.1917	No
Ross, A.J.; Downes, H.; Herrin, J.S.; Mittlefehldt, D.W.; Humayun, M.; Smith, C.,	*The origin of iron silicides in ureilite meteorites.*	Geo-chemistry	n/a			10.1016/j.chemer.2019.125539	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Roy, R.; Wang, Y.; Jiang, S.,	*Growth pattern and oxygen isotopic systematics of modern freshwater mollusks along an elevation transect: Implications for paleoclimate reconstruction.*	Palaeo-geography, Palaeo-climatology, Palaeo-ecology	532		10924	10.1016/j.palaeo.2019.109243	Yes
Sanfilippo, A.; Salters, V.J.; Tribuzio, R.; Zanetti, A.,	*Role of ancient, ultra-depleted mantle in Mid-Ocean-Ridge magmatism*	Earth and Planetary Science Letters	511		89-98	10.1016/j.epsl.2019.01.018	Yes
Song, H.; Du, Y.; Algeo, T.J.; Tong, J.; Owens, J.D.; Hong, H.; Tian, L.; Qiu, H.; Zhu, Y.; Lyons, T.W.,	*Cooling-driven oceanic anoxia during the Smithian-Spathian transition (mid-Early Triassic)*	Earth Science Reviews	190			10.1016/j.earscirev.2019.01.009	No
Stukel, M.; Kelly, T.,	*The Carbon: 234Thorium ratios of sinking particles in the California Current Ecosystem 2: examination of a thorium sorption, desorption, and particle transport model*	Marine Chemistry	211		37--51	10.1016/j.marchem.2019.03.005	Yes
Stukel, M.; Kelly, T.; Aluwihare, L.; Barbeau, K.; Goericke, R.; Krause, J.; Landry, M.; Ohman, M.,	*The Carbon: 234Thorium ratios of sinking particles in the California current ecosystem 1: relationships with plankton ecosystem dynamics*	Marine Chemistry	212		1-15	10.1016/j.marchem.2019.01.003	Yes
Sun, F.; Wang, Y.; Wang, YU.; Jin, C.; Deng, T.; Wolff, B.H.,	*Paleoecology of Pleistocene mammals and paleoclimatic change in South China: Evidence from stable carbon and oxygen isotopes.*	Palaeo-geography, Palaeo-climatology, Palaeo-ecology	524		1-12	10.1016/j.palaeo.2019.03.021	Yes
Tagliabue, A.; Bowie, A.R.; DeVries, T.; Landing, W.M.; Milne, A.; Ohnemus, D.; Twining, B.S.; Boyd, P.W.,	*The interplay between regeneration and-scavenging fluxes drives ocean iron cycling*	Nature Communi-cations	10		4960	10.1038/s41467-019-12775-5	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Them, T.; Jagoe, C.H.; Carothers, A.H.; Gill, B.C.; Grasby, S.E.; Gröcke, D.R.; Yin, R.; Owens, J.D.,	*Terrestrial sources as the primary delivery mechanism of mercury to the oceans across the Toarcian Oceanic Anoxic Event (Early Jurassic)*	Earth and Planetary Science Letters	507	1	62-72	10.1016/j.epsl.2018.11.029	Yes
Trumbore, S.; Barros, A.; Davidson, E.; Ehlman, B.; Famiglietti, J.; Gruber, N.; Hudson, M.; Illangasekare, T.; Kang, S.; Parsons, T.; Rizzolli, P.; Salters, V.J.; Stevens, B.; Wuebbels, D.; Zeitler, P.; Zhu, T.,	*AGU Advances Goes Online*	AGU Advances	1	1	1	10.1029/2019AV000105	No
Wang, J.; Zhou, H.; Salters, V.J.; Liu, Y.; Sachi-Kocher, A.; Dick, H.,	*Mantle melting variation and refertilization beneath the Dragon Bone amagmatic segment (53° E SWIR): Major and trace element compositions of peridotites at ridge flanks*	Lithos	324		325+339	10.1016/j.lithos.2018.11.014	Yes
Wang, Y.; Das, R.; Xu, Y.; Liu, J.; Jahan, S.; Means, G.H.; Donoghue, J.; Jiang, S.,	*Implications of radiocarbon ages of organic and inorganic carbon in coastal lakes in Florida for establishing a reliable chronology for sediment-based paleoclimate reconstruction.*	Quaternary Research	91	2	638-649	10.1017/qua.2018.96	Yes
Whitmore, L.M.; Morton, P.; Twining, B.S.; Shiller, A.M.,	*Vanadium cycling in the Western Arctic Ocean is influenced by shelf-basin connectivity*	Marine Chemistry	216		103701	10.1016/j.marchem.2019.103701	No
Wu, F.; Owens, J.D.; Huang, T.; Surafian, A.; Huang, K.F.; Sen, I.S.; Horner, T.J.; Blusztajn, J.; Morton, P.; Nielsen, S.G.,	*Vanadium Isotope Composition of Seawater*	Geochimica et Cosmochimica Acta	244	NA	403-415	10.1016/j.gca.2018.10.010	No
Wu, F.; Owens, J.D.; Tang, L.; Dong, Y.; Huang, F.,	*Vanadium isotopic fractionation during the formation of marine ferromanganese crusts and nodules*	Geochimica et Cosmochimica Acta	265		371-385	10.1016/j.gca.2019.09.007	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Young, S.A.; Kleinberg, A.; Owens, J.D.,	*Geochemical evidence for expansion of marine euxinia during an early Silurian (Llandovery Wenlock boundary) mass extinction*	Earth and Planetary Science Letters	513		187–196	10.1016/j.epsl.2019.02.023	Yes
Zhang, L.; Wang, Y.; Li, M.; Yin, Q.; Zhang, W.,	*Relative sorption coefficient: Key to tracing oil migration and other subsurface fluids.*	Nature Scientific Reports	9		16845	10.1038/s41598-019-52259-6	No

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Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Archer, D.B.; Coombes, S.A.; McFarland, N.R.; DeKosky, S.T.; Vaillancourt, D.,	*Development of a transcallosal tractography template and its application to dementia*	NeuroImage	200		302-312	10.1016/j.neuroimage.2019.06.065	No
Barnard, A.M.; Lott, D.J.; Batra, A.; Triplett, W.T.; Forbes, S.C.; Riehl, S.L.; Willcocks, R.J.; Smith, B.K.; Vandenborne, K.H.; Walter, G.A.,	*Imaging respiratory muscle quality and function in Duchenne muscular dystrophy*	Journal of Neurology	266	11	2752-2763	10.1007/s00415-019-09481-z	Yes
Boissoneault, J.; Letzen, J.; Robinson, M.; Staud, R.,	*Cerebral blood flow and heart rate variability predict fatigue severity in patients with chronic fatigue syndrome*	Brain Imaging and Behavior	13		789-797	10.1007/s11682-018-9897-x	No
Boissoneault, J.; Penza, C.W.; George, S.Z.; Robinson, M.E.; Bishop, M.D.,	*Comparison of brain structure between pain-susceptible and asymptomatic individuals following experimental induction of low back pain*	Spine Journal			1-8	10.1016/j.spinee.2019.08.015	Yes
Bril, F.; Leeming, D.J.; Karsdal, M.A.; Kalavalapalli, S.; Barb, D.; Lai, J.P.; Rabe, M.; Cusi, K.,	*Use of Plasma Fragments of Propeptides of Type III, V, and VI Procollagen for the Detection of Liver Fibrosis in Type 2 Diabetes*	Diabetes Care	13	3	789-797	10.2337/dc18-2578	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Brown, S.B.; Hornyak, J.A.; Jungels, R.R.; Shah, Y.Y.; Yarmola, E.G.; Allen, K.D.; Sharma, B.,	*Characterization of Post-Traumatic Osteoarthritis in Rats Following Anterior Cruciate Ligament Rupture by Non-Invasive Knee Injury (NIKI)*	Journal of Orthopaedic Research	38	2	356-367	10.1002/jor.24470	No
Cai, J.Z.; Xing, F.Y.; Batra, A.; Liu, F.J.; Walter, G.A.; Vandenborne, K.H.; Yang, L.,	*Texture analysis for muscular dystrophy classification in MRI with improved class activation mapping*	Pattern Recognition	86		668-375	10.1016/j.patcog.2018.08.012	No
Colon-Perez, L.M.; Ibanez, K.R.; Suarez, M.; Torroella, K.; Acuna, K.; Ofori, E.; Levites, Y.; Vaillancourt, D.; Golde, T.E.; Chakrabarty, P.; Febo, M.,	*Neurite orientation dispersion and density imaging reveals white matter and hippocampal microstructure changes produced by Interleukin-6 in the TgCRND8 mouse model of amyloidosis*	NeuroImage	202		116138	10.1016/j.neuroimage.2019.116138	Yes
Cruz-Almeida, Y.; Cole, J.,	*Pain, aging, and the brain: new pieces to a complex puzzle*	Pain			3	10.1097/j.pain.0000000000001757	No
Cruz-Almeida, Y.; Fillingim, R.B.; Riley, J.L.; Woods, A.J.; Porges, E.; Cohen, R.; Cole, J.,	*Chronic pain is associated with a brain aging biomarker in community-dwelling older adults*	Pain	160	5	1119-1130	10.1097/j.pain.0000000000001491	No
Cusi, K.; Bril, F.; Barb, D.; Polidori, D.; Sha, S.; Ghosh, A.; Farrell, K.; Sunny, N.E.; Kalavalapalli, S.; Pettus, J.; Ciaraldi, T.P.; Mudaliar, S.; Henry, R.R.,	*Effect of canagliflozin treatment on hepatic triglyceride content and glucose metabolism in patients with type 2 diabetes*	Diabetes, Obesity and Metabolism	21	4	812-821	10.1111/dom.13584	No
Deelchand, D.K.; Berrington, A.; Noeske, R.; Joers, J.M.; Arani, A.; Gillen, J.; Schar, M.; Nielsen, J.F.; Peltier, S.; Seraji-Bozorgzad, N.; Landheer, K.; Juchem, C.; Soher, B.J.; Noll, D.C.; Kantarci, K.; Ratai, E.M.; Mareci, T.H.; Barker, P.B.; Oz, G.,	*Across-vendor standardization of semi-LASER for single-voxel MRS at 3T*	NMR in Biomedicine	Early Access		e4218	10.1002/nbm.4218	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
DeSimone, J.C.; Archer, D.B.; Vaillancourt, D.; Shukla, A.W.,	*Network-level connectivity is a critical feature distinguishing dystonic tremor and essential tremor*	Brain	142	6	1644-1659	10.1093/brain/awz085	Yes
Hagler, D.J.; Hatton, S.; Cornejo, M.D., et al.	*Image processing and analysis methods for the Adolescent Brain Cognitive Development Study*	NeuroImage	202		116091	10.1016/j.neuroimage.2019.116091	No
Horta, M.; Ziaei, M.; Lin, T.; Porges, E.C.; Fischer, H.; Feifel, D.; Spreng, R.N.; Ebner, N.C.,	*Oxytocin alters patterns of brain activity and amygdalar connectivity by age during dynamic facial emotion identification*	Neuro-biology of Aging	78		42-51	10.1016/j.neurobiolaging.2019.01.016	Yes
Indahlastari, A.; Chauhan, M.; Sadleir, R.J.,	*Benchmarking transcranial electrical stimulation finite element models: a comparison study*	Journal of Neural Engineering	16	2	26019	10.1088/1741-2552/aafbbd	No
Lysne, P.; Cohen, R.; Hoyos, L.; Fillingim, R.B.; Riley, J.L.; Cruz-Almeida, Y.,	*Age and pain differences in non-verbal fluency performance: Associations with cortical thickness and subcortical volumes*	Experimen-tal Gerontology	126		110708	10.1016/j.exger.2019.110708	No
Mikkelsen, M.; Rimbault, D.L.; et.al	*Big GABA II: Water-referenced edited MR spectroscopy at 25 research sites*	NeuroImage	191		537-548	10.1016/j.neuroimage.2019.02.059	No
Mitchell, T.; Archer, D.B.; Chu, W.T.; Coombes, S.A.; Lai, S.; Wilkes, B.J.; McFarland, N.R.; Okun, M.S.; Black, M.L.; Herschel, E.; Simuni, T.; Comella, C.; Xie, T.; Li, H.; Parrish, T.B.; Kurani, A.S.; Corcos, D.M.; Vaillancourt, D.,	*Neurite orientation dispersion and density imaging (NODDI) and free-water imaging in Parkinsonism*	Human Brain Mapping	2019		1-14	10.1002/hbm.24760	No
Monnig, M.A.; Woods, A.J.; Walsh, E.; Martone, C.M.; Blumenthal, J.; Monti, P.M.; Cohen, R.A.,	*Cerebral Metabolites on the Descending Limb of Acute Alcohol: A Preliminary ^{1}H MRS Study*	Alcohol and Alcoholism	54	5	487-496	10.1093/alcalc/agz062	No

Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Ofori, E.; DeKosky, S.T.; Febo, M.; Colon-Perez, L.; Chakrabarty, P.; Duara, R.; Adjouadi, M.; Golde, T.E.; Vaillancourt, D.,	*Free-water imaging of the hippocampus is a sensitive marker of Alzheimer'sdisease*	NeuroImage: Clinical	24		101985	10.1016/j.nicl.2019.101985	No
Rajan, A.; Meyyappan, S.; Walker, H.; Babu, I.; Samuel, H.; Hu, Z.H.; Ding, M.,	*Neural mechanisms of internal distraction suppression in visual attention*	Cortex	117		77-88	10.1016/j.cortex.2019.02.026	No
Sambuco, N.; Bradley, M.M.; Herring, D.; Hillbrandt, K.; Lang, P.J.,	*Transdiagnostic trauma severity in anxiety and mood disorders: Functional brain activity during emotional scene processing*	Psychophysiology	57		1-12	10.1111/psyp.13349	No
Sevel, L.; Boissoneault, J.; Alappattu, M.J.; Bishop, M.D.; Robinson, M.E.,	*Training Endogenous Pain Modulation: A Preliminary Investigation of Neural Adaptation Following Repeated Exposure to Clinically-Relevant Pain*	Brain Imaging and Behavior	-		1-16	10.1007/s11682-018-0033-8	No
Wan, L.; Huang, H.Q.; Schwab, N.; Tanner, J.; Rajan, A.; Lam, N.B.; Zaborszky, L.; Li, C.S.R.; Price, C.C.; Ding, M.Z.,	*From eyes-closed to eyes-open: Role of cholinergic projections in EC-to-EO alpha reactivity revealed by combining EEG and MRI.*	Human Brain Mapping	40	2	566-577	10.1002/hbm.24395	No
Willcocks, R.J.; Forbes, S.C.; Walter, G.A.; Vandenborne, K.,	*Magnetic resonance imaging characteristics of injection site reactionsafter long-term subcutaneous delivery of drisapersen*	European Journal of Pediatrics	178	5	777-778	10.1007/s00431-019-03349-0	No
Yang, J.; Archer, D.B.; Burciu, R.G.; Muller, M.L.T.M.; Roy, A.; Ofori, E.; Bohnen, N.I.; Albin, R.L.; Vaillancourt, D.,	*Multimodal dopaminergic and free-water imaging in Parkinson's disease*	Parkinsonism & Related Disorders	62		1-15	10.1016/j.parkreldis.2019.01.007	No
Ziaei, M.; Persson, J.; Bonyadi, M.R.; Reutens, D.C.; Ebner, N.C.,	*Amygdala functional network during recognition of own-age vs. other-age faces in younger and older adults*	Neuropsychologia	129		10-20	10.1016/j.neuropsychologia.2019.03.003	No

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Authors	Title	Journal Name	Vol	Issue	Pages	DOI	Cites NSF Core Grant
Boeker, J.; Volkov, P.A.; Hirschfeld, P.J.; Eremin, I.,	*Quasiparticle interference and symmetry of superconducting order parameter in strongly electron-doped iron-based superconductors*	New Journal of Physics	21	8	83021	10.1088/1367-2630/ab2a82	No
Chen, T.; Chen, Y.; Kreisel, A.; Lu, X.; Schneidewind, A.; Qiu, Y.; Park, J.T.; Perring, T.G.; Stewart, J.R.; Cao, H.; Zhang, R.; Lin, Y.; Rong, Y.; Wei, Y.; Andersen, B.M.; Hirschfeld, P.J.; Broholm, C.; Dai, P.,	*Anisotropic spin fluctuations in detwinned FeSe*	Nature Materials	18	7	709-716	10.1038/s41563-019-0369-5	No
Rajan, D.; Cain, J.M.; Brinzari, T.; Ferreira, C.F.; Rudawski, N.G.; Felts, A.C.; Meisel, M.W.; Talham, D.R.,	*Light-Switchable Exchange-Coupled Magnet*	ACS Applied Electronic Materials	1	12	2471-2475	10.1021/acsaelm.9b00520	Yes
Roemer, A.T.; Scherer, D.D.; Eremin, I.M.; Hirschfeld, P.J.; Andersen, B.M.,	*Knight Shift and Leading Superconducting Instability from Spin Fluctuations in Sr2RuO4*	Physical Review Letters	123		247001	10.1103/PhysRevLett.123.247001	No
Xie, S.R.; Stewart, G.R.; Hamlin, J.J.; Hirschfeld, P.J.; Hennig, R.G.,	*Functional form of the superconducting critical temperature from machine learning*	Physical Review B	100		174513	10.1103/PhysRevB.100.174513	No

Books, Chapters, Reviews and Other One-Time Publications (8)

Authors	Title	Facilities
Esmaeilpour, Z.; Shereen, A.D.; Ghobadi-Azbari, P.; Datta, A.; Woods, A.J.; Ironside, M.; O"Shea, J.; Kirk, U.; Bikson, M. and Ekhtiari, H.,	*Methodology for tDCS integration with fMRI*	MBI-UF
Girvin, S.M. and Yang, K.,	*Modern Condensed Matter Physics*	CMT/E
Lozano, D.; Chacon Patino, M.; Gomez-Escudero, A. and Barrow, M.,	*Fuels and Lubricants Handbook: Technology, Properties, Performance, and Testing*	ICR Facility
Mandal, T.; Hustedt, E.J.; Song, L.; Oh., K.J.,	*CW EPR and DEER Methods to Determine BCL-2 Family Protein Structure and Interactions: Application of site-directed spin labeling to BAK apoptotic pores*	EMR Facility
Owens, J.D.,	*Application of thallium isotopes: tracking marine oxygenation through manganese oxide burial*	Geochemistry Facility
Ragavan, M. and Merritt, M.E.,	*Nuclear Magnetic Resonance Measurement of Metabolic Flux Using 13C and 1H Signals*	AMRIS Facility at UF

Authors	Title	Facilities
Tobash, P.H.; Bauer, E.D.; Mitchel, J.N.; McCall, S.; Jaime, M.; McDonald, R.; Harrison, N. and Mielke, C.,	*44.1 Thermophysical Property Measurements*	Pulsed Field Facility at LANL
Xu, J.; Wang, Q.; Li, S.H. and Deng, F.,	*Solid-state NMR in Zeolite Catalysis*	NMR Facility

Patents & Other Products (3)

Authors	Title	Facilities
Manning, T.J.; Plummer, S.E.B. and Baker, T.A.,	*Tablet Composition for Anti Tuberculosis Antibiotics*	ICR Facility
Matras, M.; Hellstrom, E.; Trociewitz, U.; Jiang, J. and Larbalestier, D.;,	*Densified superconductor materials and methods*	Applied Superconductivity Center
Pradhan, Nihar and McGill, Stephen A.,	*Phase Modulators Based On Ambipolar Field-Effect Transistors (filed) Provisional Application No. 62/741,020*	DC Field Facility

Internet Disseminations (13)

Authors	Title	Facilities
Blackmore, W.J.A.; Brambleby, J.; Lancaster, T.; Clark, S.J.; Johnson, R.D.; Singleton, J.; Ozarowski, A..; Schlueter, J.A.; Chen, Y.S.; Arif, A.M.; Lapidus, S.; Xiao, F.; Williams, R.C.; Blundell, S.J.; Pearce, M.J.; Lees, M.R.; Manuel, P.; Villa, D.Y.; Villa, J.A.; Manson, J.L.; Goddard, P.A.,	*Determining the anisotropy and exchange parameters of polycrystalline spin-1 magnets*	Pulsed Field Facility at LANL
Bretz-Sullivan, T.M.; Edelman, A.; Jiang, J.S.; Suslov, A.; Graf, D.; Zhang, J.; Wang, G.; Chang, C.; Pearson, J.E.; Martinson, A.B.; Littlewood, P.B. and Bhattacharya, A.,	*Superconductivity in the dilute single band limit in reduced Strontium Titanate*	DC Field Facility
Ding, L.; Manuel, P.; Bachus, S.; Grußler, F.; Gegenwart, P.; Singleton, J.; Johnson, R.D.; Walker, H.C.; Adroja, D.T.; Hillier, A.D.; Tsirlin, A.A.,	*Gapless spin-liquid state in the structurally disorder-free triangular antiferromagnet NaYbO2*	Pulsed Field Facility at LANL
Drichko, I.L.; Smirnov, I.Y.U.; Suslov, A.; Kamburov, D.; Baldwin, K.W.; Pfeiffer, L.N.; West, K.W.; Galperin, Y.M.,	*Composite fermions in a wide quantum well in the vicinity of the filling factor 1/2*	DC Field Facility
Gotze, K., Pearce, M.J.; Goddard, P.A.; Jaime, M.; Maple, M.B.; Sasmal, K.; Yanagisawa, T.; McCollam, A.; Khouri, T.; Ho, P.C.; Singleton, J.,	*Unusual phase boundary of the magnetic-field-tuned valence transition in CeOs4Sb12*	Pulsed Field Facility at LANL
Helm, T.; Grockowiak, A.; Balakirev, F.F.; Singleton, J.; Shirer, K.R.; König, M.; Bauer, E.D.; Ronning, F.; Tozer, S.W.; Moll, P.J.W.,	*Pressure-induced critical suppression of high-field nematicity in CeRhIn5*	Pulsed Field Facility at LANL
Khan, M.A.; Zhang, Q.; Bao, J.K.; Fishman, R.S.; Botana, A.S.; Choi, Y.; Fabbris, G.; Haskel, D.; Singleton, J.; Mitchell, J.F.,	*Steplike metamagnetic transitions in a honeycomb lattice antiferromagnet Tb2Ir3Ga9*	Pulsed Field Facility at LANL
Liu, J.; Kittaka, S.; Johnson, R.D.; Lancaster, T.; Singleton, J.;Sakakibara, T.; Kohama, Y.; van Tol, J.; Ardavan, A.; Williams, B.H.; Blundell, S.J.; Manson, Z.E.; Manson, J.L.; Goddard, P.A.,	*Unconventional field-induced spin gap in an S=1/2 chiral staggered chain*	Pulsed Field Facility at LANL

Authors	Title	Facilities
O'Neal, K.R.; Paul, A.; al-Wahish, A.; Hughey, K.D.; Blockmon, A.L.; Luo, X.; Cheong, S.W.; Zapf, V.S.; Topping, C.V.; Singleton, J.; Ozerov, M.; Birol, T.; Musfeldt, J.L.,	*Spin-lattice and electron-phonon coupling in 3d/5d hybrid Sr3NiIrO6*	Pulsed Field Facility at LANL
Ran, S.; Liu, I.; Eo, Y.S.; Campbell, D.J.; Neves, P.; Fuhrman, W.T.; Saha, S.R.; Eckberg, C.; Kim, H.; Paglione, J.; Graf, D.; Singleton, J.; Butch, N.P.,	*Extreme magnetic field-boosted superconductivity*	Pulsed Field Facility at LANL
Sato, Y.; Xiang, X.; Kasahara, Y.; Taniguchi, T.; Kasahara, S.; Chen, L.; Asaba, T.; Tinsman, C.; Murayama, H.; Tanaka, O.;Mizukami, Y.; Shibauchi, T.; Iga, F.; Singleton, J.; Li, L.; Matsuda, Y.;,	*Unconventional thermal metallic state of charge-neutral fermions in an insulator*	Pulsed Field Facility at LANL
Smylie, M.P.; Koshelev, A.E.; Willa, K.; Willa, R.; Kwok, W.K.; Bao, J.K.; Chung, D.Y.; Kanatzidis, M.G.; Singleton, J.; Balakirev, F.F.; Hebbeker, H.; Niraula, P.; Bokari, E.; Kayani, A.; Welp, U.,	*Anisotropic upper critical field of pristine and proton-irradiated single crystals of the magnetically ordered superconductor RbEuFe4As4*	Pulsed Field Facility at LANL
Xiang, Z.; Kasahara, Y.; Asaba, T.; Lawson, Tinsman, C.; Chen, L.; Sugimoto, K.; Kawaguchi, S.; Sato, Y.; Li, G.; Yao, S.; Chen,Y.L.; Iga, F.; Singleton, J;. Matsuda, Y.; Li, L.;,	*Quantum Oscillations of Electrical Resistivity in an Insulator*	Pulsed Field Facility at LANL

Awards (13)

Authors	Title	Facilities
Balachandran, S.	*Jan Evetts SUST Award 2019*	DC Field Facility, ASC
Bojan, O.	*10th Annual Geosyntec Student Paper Competition, 2nd place winner*	ICR Facility
Jaime, M.	*"J.M. Maldacena" Visiting Professor, Instituto Balseiro, Bariloche, Argentina*	Pulsed Field Facility at LANL
Jaime, M.	*Board of Directors, US Calorimetry Conference*	Pulsed Field Facility at LANL
Liu, P.	*Best Poster Award at CASS Mass Spectrometry Conference*	ICR Facility
Niles, S.	*How Grad Student Niles Gets to Know Crude Oil at a Molecular Level*	ICR Facility
Sillitoe-Kukas, S.	*Dwornik Award - Planetary Geology DivisionUndergraduate Poster Honorable Mention (2nd Place)*	Geochemistry Facility
Spencer, Robert G.M.	*The 2019 Yentsch-Schindler Award recipient recognized by the Association for the Sciences of Limnology and Oceanography (ASLO)*	Geochemistry Facility
Tarantini, C.	*Elevation to the grade of IEEE Senior member*	ASC
Tarantini, C.	*IOP-Superconductor Science and Technology Executive Board member*	ASC
Villa, C.R.	*National Selection Committee (NSC) review panel for the 2019 Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST)*	Education (NHMFL only)

Authors	Title	Facilities
Wang, T.	*Ralph E. Powe Junior Faculty Enhancement Award*	NMR Facility
Zapf, V.	*American Physical Society Outstanding Referee*	Pulsed Field Facility at LANL

Grants (11)

Authors	Title	Facilities
Beekman, C.	*CAREER:Study of Degeneracy Breaking Effects and Emergent Phenomena in Heterostructures of Frustrated Antiferromagnets*	CMT/E
Cross, T., Hendrickson, C. and Vanderlaan, M.	*Helium Recovery for the ICR and NMR/MRI Facilities at the National High Magnetic Field Laboratory in Tallahassee, FL*	DC Field Facility, ICR Facility, NMR Facility
Guo, W.	*Liquid Helium Fluid Dynamics Studies*	MS & T
Hall, C.K. and Paravastu, A.K.	*Element: Computational Toolkit to Discover Peptides that Self-assemble into User-selected Structures.*	NMR Facility
Hill, S.	*A route to molecular quantum technologies using endohedral metallofullerenes*	EMR Facility
Jaime, M.	*Non-invasive pipe pressure monitoring for safeguards*	Pulsed Field Facility at LANL
Nilsson, B.L. and Dias, C.	*Collaborative Research: Comparative Studies of Pleated beta-Sheet and Rippled beta-Sheet Peptide Nanofibrils*	NMR Facility
Schurko, R.W.	*Start-up grant, Florida State University and National High Magnetic Field Laboratory*	NMR Facility
Sitther, V. and Chen, H.	*Excellence in Research: Oxidative stress induced impact of cell-penetrating nanoparticles on cellular constituents in a cyanobacterial model*	ICR Facility
Tian, F.	*Structural and Molecular Basis of Human ATG3 Activation and Regulation for LC3 Lipid Conjugation in Autophagy*	NMR Facility
Yang, K.	*Exotic Phases and Their Interfaces in Correlated Many-Particle Systems*	CMT/E

M.S. Theses (17)

Authors	Title	Facilities	University	Department	Theses
Audu, Meshack Adejoh	*Hydrothermal Liquefaction of Algae Grown on Alternative Dairy Wastewaters*	ICR Facility	New Mexico State University	Chemical and Materials Engineering	M.S.
Bagdasarian, Frederick	*Quantitative Analysis of Aggregated Human Mesenchymal Stem Cell Spheroids Applied to A Rodent Model of Ischemic Stroke Using 1H and 23Na Mri at 21.1T*	NMR Facility	FSU	Chemical & Biomedical Engineering	M.S.
Bandy, Terryl	*Environmental Controls on Organic Carbon Productivity in the Midland Basin*	Geochemistry Facility	FSU	Earth, Ocean, and Atmospheric Science	M.S.
Bijonowski, Brent	*MS by Courses*	NMR Facility	FSU	Chemical & Biomedical Engineering	M.S.

Authors	Title	Facilities	University	Department	Theses
Bojan, Olivia	*Exposing New Compositional Coverage of Weathered Petroleum Hydrocarbons Through a Tiered Analytical Approach*	ICR Facility	Colorado State University	Department of Civil & Environmental Engineering	M.S.
Brown, Alec	*Pharmacokinetics of Molecular Transport Across the Blood-Brain Barrier in Pontine Gliomas*	MBI-UF	UF	Biochemistry and Molecular Biology	M.S.
Canzano, Joseph	*New Techniques for in Vivo Optical Imaging of Nervous System Activity in Rodents*	AMRIS Facility at UF	UF	Medicine	M.S.
Carter, Alan	*Measuring Hepatic Ketogenesis With Hyperpolarized [2-^{13}C]Dihydroxyacetone*	AMRIS Facility at UF	UF	Biochemistry and Molecular Biology	M.S.
Francis, Ashleigh	*Variable Temperature Transport Critical Current Measurements on REBCO Coated Conductors*	Applied Superconductivity Center	FSU	Mechanical Engineering	M.S.
Hannold, Chance	*Isotopic Evidence for Diets and Environments of Late Miocene-Early Pliocene Mammals in Yepomera, Mexico*	Geochemistry Facility	FSU	EOAS & NHMFL	M.S.
Helsper McCafferty, Shannon	*Master's by Courses*	NMR Facility	FSU	Chemical & Biomedical Engineering	M.S.
Holder, Samuel	*Master's by Coursework*	NMR Facility	FSU	Chemical & Biomedical Engineering	M.S.
Lin, Binyang	*Amino acid-type specific incorporation of stable 17O isotopes into yeast ubiquitin*	NMR Facility	Queen's University	Chemistry	M.S.
Marxen, Stephanie	*MS by Courses*	NMR Facility	FSU	Chemical & Biomedical Engineering	M.S.
Michalak, Hannah,	*Dimensions of Depression and Cerebellar Subregion Volumes in Older Adults*	AMRIS Facility at UF	Georgia State University	Psychology	M.S.
Ramirez Mata, Andrea	*Evidence That Beta-Caryophyllene Influences Membrane Composition and Permeability in Triple Negative Breast Cancer*	AMRIS Facility at UF	UF	Biochemistry and Molecular Biology	M.S.
White, Meghan	*Investigating the Oxidative Potential of Toluene Secondary Organic Aerosols on Polyunsaturated Fatty Acids and Cellular Membranes*	AMRIS Facility at UF	UF	Chemistry and Biochemistry	M.S.

Ph.D. Dissertations (local) (34)

Authors	Title	Facilities	University	Department	Theses
Abad, Nastaren	*Acute NTG Triggered Migraine: Evaluating The Holy Trinity In Neurological Disorders*	NMR Facility	FSU	Chemical & Biomedical Engineering	Ph.D.
Amouzandeh, Ghoncheh	*Electrical Properties Mapping and Coil Characterization at High Magnetic Fields*	NMR Facility	FSU	Physics	Ph.D.
Bindra, Jasleen Kaur	*Magnetic and Spectroscopic Properties of Fe^{3+} and Mn^{2+} Doped in Model Quantum Dots*	EMR Facility	FSU	Chemistry and Biochemistry	Ph.D.
Bionowski, Brent	*Cellular Stress Response Induced buy Aggregation in Mesenchymal Stem Cells Activates Cellular Rejuvenation Pathways*	NMR Facility	FSU	Chemical & Biomedical Engineering	Ph.D.
Brown, Shannon	*Advancing Targeted Intra-Articular Drug Delivery Systems : Understanding and Controlling Nanoparticle Biodistribution within Osteoarthritic Joints*	AMRIS Facility at UF	UF	Biomedical Engineering	Ph.D.
Bryant, Vaughn	*The Relationship between Working Memory and Alcohol Consumption during Period of Heaviest Use*	AMRIS Facility at UF	UF	Psychology	Ph.D.
Chen, Kuan-Wen	*De Haas-van Alphen Measurements in Topological Metals and Semimetals*	DC Field Facility, CMT/E	FSU	Physics	Ph.D.
Chien, Po-Hsiu	*Solid-state NMR and MRI Studies of Structure-property Correlations in Fast Li/Na-Ion Conductors*	NMR Facility	FSU	Chemistry and Biochemistry	Ph.D.
Davis, Daniel	*Quench Protection of Bi2Sr2CaCu2O8+x High Temperature Superconducting Magnets*	DC Field Facility, ASC	FSU	Physics	Ph.D.
DeSimone, Jesse	*In vivo Multi-Modal Neuroimaging in Mouse Models of DYT1 Dystonia*	AMRIS Facility at UF	UF	Health and Human Performance	Ph.D.
Grippin, Adam	*N/A: Record for a UF thesis. Title & abstract won't display until Thesis is accessible after 2021-05-31.*	AMRIS Facility at UF	UF	Biomedical Engineering	Ph.D.
Hayati, Zahra	*Developing Multi-Frequency EPR Methods for Studying Protein-Lipid Interactions on the HIV Membrane*	EMR Facility	FSU	Physics	Ph.D.
Hu, Zhenhong	*Neural Basis of Verbal Working Memory*	AMRIS Facility at UF	UF	Biomedical Engineering	Ph.D.
Jiang, Guangde	*Restricted access: Title & abstract won't display until thesis is accessible after 2021-08-31.*	AMRIS Facility at UF	UF	Medicinal Chemistry	Ph.D.

Authors	Title	Facilities	University	Department	Theses
Lai, You	*Tuning Intertwined Energy Scales in f-electron Systems by Chemical Substitution*	DC Field Facility	FSU	Physics	Ph.D.
Li, Xiang	*Solid-state NMR Studies on Battery Materials*	NMR Facility	FSU	Chemistry and Biochemistry	Ph.D.
Liou, Shiuan-Fan	*Topological Phase Transitions and Quench Dynamics in Quantum Hall Systems*	CMT/E	FSU	Physics	Ph.D.
Majewski, Allen	*Density Functional Theory Calculations of Temperature Dependent NQR Parameters in Solid Crystalline Materials*	High B/T Facility at UF	UF	Physics	Ph.D.
Maye, Jacqueline	*A 14 Week Study of Mindfulness Effects on Attentional Control in Older Adults*	AMRIS Facility at UF	UF	Psychology	Ph.D.
McLaren, Molly	*Identification of Age and Mood-Associated Brain Differences in Reward Network Functioning*	AMRIS Facility at UF	UF	Psychology	Ph.D.
Nissim, Nicole	*Neural Effects of Transcranial Direct Current Stimulation Paired with Cognitive Training on Working Memory*	AMRIS Facility at UF	UF	Neuroscience	Ph.D.
Nunez, Claribel	*A Functional Azasugar Biosynthetic Cluster from Chitinophaga pinensis*	AMRIS Facility at UF	UF	Chemistry	Ph.D.
Park, Seoung Hoon	*UF Restricted access: Title & abstract won't display until thesis is accessible after 2021-08-31.*	AMRIS Facility at UF	UF	Health and Human Performance	Ph.D.
Schwab, Nadine	*N/A: Record for a UF thesis. Title & abstract won't display until thesis is accessible after 2021-08-31.*	AMRIS Facility at UF	UF	Psychology	Ph.D.
Shin, Yiseul	*Structural and Dynamic Characterization of CrgA; A Small Helical Membrane Protein in a Lipid Bilayer Using Solid-State NMR*	NMR Facility	FSU	Chemistry	Ph.D.
Singh, Prashant	*Restricted access: Title & abstract won't display until thesis is accessible after 2021-05-31.*	AMRIS Facility at UF	UF	Chemistry	Ph.D.
Spearman, Benjamin	*Advanced Uses for Methacrylated Hyaluronic Acid in Peripheral Nerve Tissue Engineering*	AMRIS Facility at UF	UF	Biomedical Engineering	Ph.D.
Sullan, Molly	*Determining the Effect of Poor Sleep on Cognitive, Psychological, and Functional Outcomes in Neurotrauma Patients in an Inpatient Multi-Disciplinary Rehabilitation Setting*	AMRIS Facility at UF	UF	Psychology	Ph.D.

Authors	Title	Facilities	University	Department	Theses
Tan, Yalun	*N/A: Record for a UF thesis. Title & abstract won't display until thesis is accessible after 2021-08-31.*	AMRIS Facility at UF	UF	Pharmacy	Ph.D.
Tokarski, John	*Optically Pumped Nuclear Magnetic Resonance Investigation of Strain and Doping Effects in Gallium Arsenide*	AMRIS Facility at UF	UF	Chemistry	Ph.D.
Tran, Nhi	*Pulmonary Surfactant: A Model System for Solid-State NMR Applications and Methods Development*	AMRIS Facility at UF	UF	Chemistry	Ph.D.
Trujillo, Matthias	*Fabrication and Characterization of Nanoporous Templates with Pores Near Atomic Dimensions*	AMRIS Facility at UF	UF	Chemical Engineering	Ph.D.
Wildes, Tyler	*N/A: Record for a UF thesis. Title & abstract won't display until thesis is accessible after 2021-05-31.*	AMRIS Facility at UF	UF	Immunology and Microbiology	Ph.D.
Zhang, Yi	*UF has Restricted Access: Title & abstract won't display until thesis is accessible after 2021-08-31.*	AMRIS Facility at UF	UF	Medicinal Chemistry	Ph.D.

Ph.D. Dissertations (external) (17)

Authors	Title	Facilities	University	Department	Theses
Boykin, Tommy	*Self-assembly of reflecting protein probed by solid-state nuclear magnetic resonance*	NMR Facility	University of Central Florida	Physics	Ph.D.
Campbell, Daniel James	*Electronic and Magnetic Properties of MnP-Type Binary Compounds*	DC Field Facility	University of Maryland	Department of Physics	Ph.D.
Che, Shi	*Quantum Transport in Few-layer Graphene*	DC Field Facility	The Ohio State University	Physics	Ph.D.
Chen, Chia-Hsin	*Solid-state NMR study on solid amine sorbents*	NMR Facility	Washington University	Chemistry	Ph.D.
Cui, Jinlei	*Solid-State NMR of CO_2 Mineralization and NMR Crystallography*	DC Field Facility, NMR Facility	Washington University	Chemistry	Ph.D.
DeHaven, Baillie	*Emergent properties and applications of self-assembled benzophenone-containing materials*	AMRIS Facility at UF	South Carolina	Chemistry	Ph.D.
Fathabad, Somayeh Gharaie	*Genetic Engineering and Nanotechnological Approaches to Enhance Lipid Production in Fremyella Diplosiphon, a Model Cyanobacterium*	ICR Facility	Morgan State University	School of Computer Mathematical, and Natural Sciences	Ph.D.
Ge, Yuwei	*Measurements of Chemical Shift Anisotropy and Quadrupolar Couplings Using Solid State Nuclear Magnetic Resonance*	NMR Facility	Wuhan institute of physics and mathematics, Chinese AS	NMR	Ph.D.

Authors	Title	Facilities	University	Department	Theses
Goh, Tian Wei	*Atomic-level engineering and in-situ spectroscopy studies of metal-organic frameworks in heterogeneous catalysis*	AMRIS Facility at UF	Iowa State University	Inorganic Chemistry	Ph.D.
Grant, Lauren,	*Exploring the Use of Transition Metals in the Synthesis of Novel Metal-Ligand Multiple Bonds, Azide Complexes, and Unprecedented Reactivity with the Phosphaethynolato Reagent*	EMR Facility	University of Pennsylvania	Chemistry	Ph.D.
Guo, Chenyu	*The search of Kondo Weyl semimetals and pressure-induced topological phase transitions.*	DC Field Facility	Zhejiang University	Center for Correlated Matter and Department of Physics	Ph.D.
Kaniewska, Kinga,	*Phosphido Complexes of Iron: Synthesis, Structure and Properties*	EMR Facility	Gdansk University of Technology, Poland	Chemistry	Ph.D.
McDonough, Liza	*Investigating groundwater dissolved organic carbon on global, regional and local scales*	ICR Facility	University of NSW	Biological, Earth and Environmental Sciences	Ph.D.
Mograbi, Michael	*Tuning the Electronic Structure of the SrTiO3/LaAlO3 (111) Interface: from Superconductor to Bose-Insulator*	DC Field Facility	Tel Aviv University	Physics	Ph.D.
Nowak, Jeremy,	*Unraveling Chemical Compositional Changes of Biodegraded Crude Oil using Novel Chromatographic and Mass Spectrometric Techniques*	ICR Facility	University of California-Berkeley	Department of Environmental, Science, Policy, and Management	Ph.D.
Rasheed, Waqas,	*Structural- and Spectroscopic- Reactivity Correlations of Oxoiron(IV) Complexes*	DC Field Facility, EMR Facility	University of Minnesota	Chemistry	Ph.D.
Vaidya, Priyanka	*Sub-Terahertz Spin Pumping from an Insulating Antiferromagnet*	EMR Facility	University of Central Florida	Department of Physics	Ph.D.

APPENDIX I – PERSONNEL

Key Personnel

Name	Position Title
Bird, Mark	Research Faculty III
Booth, Debra	Business Systems Director
Bosque, Ernesto	Research Faculty I
Braunwart, Jeffrey	Assistant Director, Science & Research (Safety Director)
Cooley, Lance	Professor - 9 month
Cross, Tim	Professor - 9 month
Engel, Lloyd	Research Faculty III
Frydman, Lucio	Chief Scientist, Chem/Bio
Greene, Laura	Chief Scientist, Professor - 9 month
Hannahs, Scott	Research Faculty III
Hendrickson, Christopher	Research Faculty III/Director of ICR Program
Hill, Stephen	Professor - 9 month
Hughes, Roxanne	Research Faculty II
Larbalestier, David	Chief Materials Scientist
Lunger, David	Project Management Director
Meisel, Mark	Director - High B/T, UF
Murphy, Timothy	Director, DC Field Facility
Roberts, Kristin	Director of Public Affairs

Other Senior Personnel

Name	Position Title
Abraimov, Dmytro	Research Faculty III
Anderson, Lissa	Research Faculty I
Bai, Hongyu	Research Faculty II
Balachandran, Shreyas	Visiting Scientist/Researcher
Balakirev, Fedor	Staff Member
Balicas, Luis	Research Faculty III
Bangura, Alimamy	Research Faculty II
Baumbach, Ryan	Research Faculty II
Beekman, Christianne	Assistant Professor
Betts, Jonathan	Director of Operations
Blackband, Stephen	Professor, Neuroscience
Blakney, Gregory	Research Faculty II
Bonesteel, Nicholas	Professor
Bowers, Clifford	Professor

Name	Position Title
Brey, William	Research Faculty III
Chan, Mun Keat	Staff Member
Cheggour, Najib	Research Faculty II
Chen, Huan	Visiting Research Faculty I
Chikara, Shalinee	Research Faculty I
Chiorescu, Irinel	Professor
Choi, Eun Sang	Research Faculty III
Clark, Eric	Assistant Director, Technology Services
Coniglio, William	Research Faculty I
Crooker, Scott	Staff Member
Dalton, Bryon	Scientific Research Specialist
Dixon, Iain	Research Faculty III
Dubroca, Thierry	Visiting Research Faculty
Dunk, Paul	Visiting Research Faculty I
Eddy, Matthew	Assistant Professor
Fanucci, Gail	Professor
Fu, Riqiang	Research Faculty III
Gan, Zhehong	Research Faculty III
Gavrilin, Andrey	Research Faculty III
Gor'kov, Peter	Sr Research Associate
Graf, David	Research Faculty II
Grant, Samuel	Associate Professor
Green, Bertram	Research Faculty I
Green, Elizabeth	Research Faculty I
Griffin, Van	Senior Research Associate
Grockowiak, Audrey	Visiting Research Faculty I
Guo, Wei	Professor
Hamlin, James	Associate Professor
Han, Ke	Research Faculty III
Harrison, Neil	Staff Member
Hellstrom, Eric	Professor
Hung, Ivan	Associate in Research
Jaime, Marcelo	Staff Member
Jaroszynski, Jan	Research Faculty III
Jensen, Peter	Network Administrator
Jiang, Jianyi	Research Faculty III
Kim, Kwang Lok	Visiting Scientist/Researcher
Kim, Kwangmin	Visiting Scientist/Researcher
Kim, Youngjae	Research Faculty I
Kovalev, Alexey	Associate in Research

Name	Position Title
Krzystek, Jerzy	Research Faculty III
Kynoch, John	Assistant Director
Lee, Peter	Research Faculty III
Lee, Yoonseok	Professor
Litvak, Ilya	Associate In Research
Lu, Jun	Research Faculty III
Maiorov, Boris	Staff Member
Mareci, Thomas	Professor
Markiewicz, William	Research Assistant
Marshall, William	Sr Research Associate
McDonald, Ross	Deputy Director - LANL
McEachern, Judy	Assistant Director, Business Systems
McGill, Stephen	Research Faculty III
McKenna, Amy	Research Faculty II
Mehta, Anil	Core Research Facility Manager
Mentink-Vigier, Frederic	Research Faculty I
Morton, Peter	Visiting Assistant in
Nguyen, Doan	Director of Pulsed Field Facility Magnet Science and Technology
Niu, Rongmei	Visiting Research Faculty I
Ozarowski, Andrzej	Research Faculty III
Ozerov, Mykhaylo	Research Faculty I
Painter, Thomas	Sr Research Associate
Park, Wan Kyu	Research Faculty II
Popovic, Dragana	Research Faculty III
Powell, James	Research Engineer
Qin, Huajun	Associate in Research
Ravindra, Harsha	Associate in Research
Reyes, Arneil	Research Faculty III
Ritter, Tiffany	Assistant Director, UBA Program
Roberson, Bettina	Assistant Director, Administrative Services
Rodgers, Ryan	Research Faculty III
Rosenberg, Jens	Core Research Facility Manager/ AMRIS facilities manager of Clinical MRI instrumentation
Schepkin, Victor	Research Faculty II
Schurko, Rob	Professor - 9 month
Shehter, Arkady	Research Faculty I
Siegrist, Theo	Professor
Singleton, John	Staff Member and LANL Fellow
Smirnov, Dmitry	Research Faculty III
Smith, Donald	Research Faculty II

Name	Position Title
Smith, Julia	Research Faculty I
Song, Likai	Research Faculty II
Starch, William	Senior Research Associate
Steinke, Lucia	Associate Scientist
Sullivan, Neil	Professor of Physics
Sullivan, Neil	Professor - 9 month
Suslov, Alexey	Research Faculty III
Takano, Yasumasa	Professor
Tarantini, Chiara	Research Faculty II
Toth, Anke	Program Manager
Toth, Jack	Research Faculty III, Resistive Magnet Program Leader
Tozer, Stanley	Research Faculty III
Trociewitz, Ulf	Research Faculty III
Vafek, Oskar	Associate Professor
van Tol, Johan	Research Faculty III
Vanderlaan, Mark	Research Engineer, Cryogenic Operations
Walsh, Robert	Sr Research Associate
Walter, Glenn	Professor
Weijers, Hubertus	Research Faculty III
Weisbrod, Chad	Research Faculty I
Wi, Sungsool	Research Faculty II
Williams, Vaughan	Research Engineer
Winter, Laurel	Magnet Operations and Scientific Techniques Team Leader
Xin, Yan	Research Faculty III
Zapf, Vivien	Staff Member
Zavion, Sheryl	Sr Research Associate (MS&T Operations Manager)

APPENDIX II – USER FACILITY STATISTIC

Seven user facilities — AMRIS (NMR-MRI@UF), DC Field, EMR, High B/T, ICR, NMR-MRI@FSU, and Pulsed Field — each with exceptional instrumentation and highly qualified staff scientists and staff, comprise the magnet lab's user program. In this appendix, each facility presents detailed information about its user demographics, operations statistics and requests for magnet time.

A user is an individual or a member of a research group that is allocated magnet time. The user does not have to be "on site" for the experiment. A researcher who sends samples for analysis; a scientist who uses new lab technologies to conduct experiments remotely; or a PI who sends students to the magnet lab, are all considered users. All user numbers reflect distinct individuals, i.e. if a user has multiple proposals (different scientific thrusts) or is allocated magnet time more than once during the year, he/she is counted only once. All user data in the user facility statistics is as of March 16, 2020.

1. AMRIS Facility

Table 1a. Users by Demographic – NSF-Funded

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**49**	5	32	12	31	8	0	10
Senior Personnel, non-U.S.	**8**	3	5	0	7	1	0	0
Postdocs, U.S.	**11**	1	6	4	4	4	0	3
Postdocs, non-U.S.	**2**	0	1	1	2	0	0	0
Students, U.S.	**33**	1	22	10	17	9	0	7
Students, non-U.S.	**0**	0	0	0	0	0	0	0
Technician, U.S.	**13**	0	8	5	3	7	0	3
Technician, non-U.S.	**0**	0	0	0	0	0	0	0
TOTAL	**116**	**10**	**74**	**32**	**64**	**29**	**0**	**23**

Table 1b. Users by Demographic – Non-NHMFL-Funded

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**109**	6	54	49	48	17	0	44
Senior Personnel, non-U.S.	**3**	1	1	1	1	1	0	1
Postdocs, U.S.	**44**	7	23	14	15	16	0	13
Postdocs, non-U.S.	**0**	0	0	0	0	0	0	0
Students, U.S.	**90**	6	48	36	32	28	0	30
Students, non-U.S.	**0**	0	0	0	0	0	0	0
Technician, U.S.	**44**	6	18	20	9	17	0	18
Technician, non-U.S.	**1**	0	1	0	1	0	0	0
TOTAL	**291**	**26**	**145**	**120**	**106**	**79**	**0**	**106**

Table 1c. Users by Demographic – Summary

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
NSF-FUNDED	116	10	74	32	64	29	0	23
NON-NHMFL-FUNDED	291	26	145	120	106	79	0	106
TOTAL	**407**	**36**	**219**	**152**	**170**	**108**	**0**	**129**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2a. Users by Participation – NSF-Funded

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**49**	28	0	2	19
Senior Personnel, non-U.S.	**8**	0	0	0	8
Postdocs, U.S.	**11**	7	0	0	4
Postdocs, non-U.S.	**2**	0	0	0	2
Students, U.S.	**33**	27	0	0	6
Students, non-U.S.	**0**	0	0	0	0
Technician, U.S.	**13**	12	0	0	1
Technician, non-U.S.	**0**	0	0	0	0
TOTAL	**116**	**74**	**0**	**2**	**40**

Table 2b. Users by Participation – Non-NHMFL-Funded

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**109**	72	0	1	36
Senior Personnel, non-U.S.	**3**	0	0	0	3
Postdocs, U.S.	**44**	38	0	0	6
Postdocs, non-U.S.	**0**	0	0	0	0
Students, U.S.	**90**	80	0	0	10
Students, non-U.S.	**0**	0	0	0	0
Technician, U.S.	**44**	42	0	0	2
Technician, non-U.S.	**1**	1	0	0	0
TOTAL	**291**	**233**	**0**	**1**	**57**

Table 2c. Users by Participation - Summary

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
NSF-FUNDED	116	74	0	2	40
NON-NHMFL-FUNDED	291	233	0	1	57
TOTAL	**407**	**307**	**0**	**3**	**97**

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3a. Users by Organization – NSF-Funded

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	**49**	25	10	14	1	47	1
Senior Personnel, non-U.S.	**8**	8	0	0	0	8	0
Postdocs, U.S.	**11**	6	4	1	0	10	1
Postdocs, non-U.S.	**2**	2	0	0	0	2	0
Students, U.S.	**33**	15	18	0	0	32	1
Students, non-U.S.	**0**	0	0	0	0	0	0
Technician, U.S.	**13**	4	2	7	0	13	0
Technician, non-U.S.	**0**	0	0	0	0	0	0
TOTAL	**116**	**60**	**34**	**22**	**1**	**112**	**3**

Table 3b. Users by Organization – Non-NHMFL-Funded

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	**109**	48	45	16	1	105	3
Senior Personnel, non-U.S.	**3**	3	0	0	0	3	0
Postdocs, U.S.	**44**	23	19	2	0	44	0
Postdocs, non-U.S.	**0**	0	0	0	0	0	0
Students, U.S.	**90**	44	46	0	0	90	0
Students, non-U.S.	**0**	0	0	0	0	0	0
Technician, U.S.	**44**	20	17	7	0	44	0
Technician, non-U.S.	**1**	0	1	0	0	0	1
TOTAL	**291**	**138**	**128**	**25**	**1**	**286**	**4**

Table 3c. Users by Organization - Summary

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
NSF-FUNDED	116	60	34	22	1	112	3
NON-NHMFL-FUNDED	291	138	128	25	1	286	4
TOTAL	**407**	**198**	**162**	**47**	**2**	**398**	**7**

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4a. Users by Discipline – NSF-Funded

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	**49**	0	5	5	1	38
Senior Personnel, non-U.S.	**8**	0	1	1	0	6
Postdocs, U.S.	**11**	0	0	0	1	10
Postdocs, non-U.S.	**2**	1	1	0	0	0
Students, U.S.	**33**	1	10	9	1	12

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Students, non-U.S.	**0**	0	0	0	0	0
Technician, U.S.	**13**	0	0	4	4	5
Technician, non-U.S.	**0**	0	0	0	0	0
TOTAL	**116**	**2**	**17**	**19**	**7**	**71**

Table 4b. Users by Discipline – Non-NHMFL-Funded

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	**109**	0	8	7	6	88
Senior Personnel, non-U.S.	**3**	0	1	0	0	2
Postdocs, U.S.	**44**	0	4	5	2	33
Postdocs, non-U.S.	**0**	0	0	0	0	0
Students, U.S.	**90**	1	7	14	10	58
Students, non-U.S.	**0**	0	0	0	0	0
Technician, U.S.	**44**	0	0	4	9	31
Technician, non-U.S.	**1**	0	0	0	0	1
TOTAL	**291**	**1**	**20**	**30**	**27**	**213**

Table 4c. Users by Discipline - Summary

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NSF-FUNDED	116	2	17	19	7	71
NON-NHMFL-FUNDED	291	1	20	30	27	213
TOTAL	**407**	**3**	**37**	**49**	**34**	**284**

[1] Users using multiple facilities are counted in each facility listed.

Table 5 Subscription Rate – Summary

	Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiments Subscription Percentage
NSF-FUNDED	15	22	36	97.3 %	1	2.7 %	37	102.8 %
NON-NHMFL-FUNDED	35	84	112	94.1 %	7	5.9 %	119	106.3 %
TOTAL	**50**	**106**	**148**		**8**		**156**	

Table 6. Research Proposals [1] Profile with Magnet Time – Summary

	Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	CMP	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
NSF-FUNDED	34	6	23	5	11	20	0	3	0	3	4	0	27
NON-NHMFL-FUNDED	80	7	45	28	17	40	0	23	0	0	0	0	80
TOTAL	**114**	**13**	**68**	**33**	**28**	**60**	**0**	**26**	**0**	**3**	**4**	**0**	**107**

[1] A “proposal” may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our website

Table 7a. Operations by Magnet System Group – NSF-Funded

	Total Days Used	Percentage of Total Days Used	500MHz NMR Spectrometer	600MHz NMR Spectrometer with Cryoprobe	600MHz NMR Spectrometer - Warm Bore Applications	600MHz NMR Spectrometer	750MHz Wide Bore Spectrometer	800MHz, 63mm bore NMR Spectrometer	4.7T/ 33 MRI System	11T/ 40 MRI System
NHMFL-Affiliated	**91**	7.3 %	0	14	50	0	0	25	1	1
Local	**3.2**	0.4 %	0	0	0	0	0	0	3.2	0
U.S. University	**382.5**	30.8 %	18.5	55	126.5	6.2	151.5	22.8	0	2
U.S. Govt. Lab.	**10.3**	0.8 %	0	0	0	0	0	0	5.8	4.5
U.S. Industry	**23.5**	1.9 %	0	0	14	0	0	0	0	9.5
Non-U.S.	**123.6**	9.9 %	0	32.9	10.5	48	16	0	5.2	11
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**608**	48.9 %	57.5	79.1	39	84.8	35.5	103.2	99.8	109
TOTAL	**1,242**	**100 %**	**76**	**181**	**240**	**139**	**203**	**151**	**115**	**137**

Table 7b. Operations by Magnet System Group – Non-NHMFL-Funded

	Total Days Used	Percentage of Total Days Used	500MHz NMR Spectrometer	600MHz NMR Spectrometer with Cryoprobe	600MHz NMR Spectrometer - Warm Bore Applications	600MHz NMR Spectrometer	750MHz Wide Bore Spectrometer	800MHz, 63mm bore NMR Spectrometer	3T Philips Whole Body System	3T Siemens Whole Body System	4.7T/ 33 MRI System	11T/ 40 MRI System
NHMFL-Affiliated	**390.4**	23.2 %	91.3	36.3	4	0	97	13	1.9	39.4	12	95.5
Local	**135.7**	8.1 %	1	2	0	0	0	0	22.8	43.9	31.5	34.5
U.S. University	**1,038.4**	61.7 %	13.5	168.7	43	365	8	6	217.4	139.3	47.5	30
U.S. Govt. Lab.	**0.5**	0 %	0	0	0	0	0	0	0	0.5	0	0
U.S. Industry	**0**	0 %	0	0	0	0	0	0	0	0	0	0
Non-U.S.	**0**	0 %	0	0	0	0	0	0	0	0	0	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**117**	7 %	27.3	0	0	0	0	45	15.9	28.9	0	0
TOTAL	**1,682**	**100 %**	**133**	**207**	**47**	**365**	**105**	**64**	**258**	**252**	**91**	**160**

Table 7c. Operations by Magnet Systems - Summary

	Total Days Used	500MHz NMR Spectrometer	600MHz NMR Spectrometer with Cryoprobe	600MHz NMR Spectrometer - Warm Bore Applications	600MHz NMR Spectrometer	750MHz Wide Bore Spectrometer	800MHz, 63mm bore NMR Spectrometer	3T Philips Whole Body System	3T Siemens Whole Body System	4.7T/ 33 MRI System	11T/ 40 MRI System
NSF-FUNDED	1,242	76	181	240	139	203	151	0	0	115	137
NON-NHMFL-FUNDED	1,682	133	207	47	365	105	64	258	252	91	160
TOTAL	**2,924**	**209**	**388**	**287**	**504**	**308**	**215**	**258**	**252**	**206**	**297**

[1] User Units are defined as magnet days.One magnet day is defined as 24 hours in superconducting magnets.

Table 8a. Operations by Discipline – NSF-Funded

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**91**	0	0	0	1	90
Local	**3.2**	0	0	0	0	3.2
U.S. University	**382.5**	0	57.3	220	0	105.2

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
U.S. Govt. Lab.	**10.3**	0	0	0	0	10.3
U.S. Industry	**23.5**	0	0	0	0	23.5
Non-U.S.	**123.6**	0	0	0	0	123.6
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**608**	0	0	0	291.7	316.3
TOTAL	**1,242**	**0**	**57**	**220**	**293**	**672**

Table 8b. Operations by Discipline – Non-NHMFL-Funded

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**390.4**	0	0	3.3	0	387.1
Local	**135.7**	0	0	0	0	135.7
U.S. University	**1,038.4**	0	297.4	0	0	741
U.S. Govt. Lab.	**0.5**	0	0	0	0	0.5
U.S. Industry	**0**	0	0	0	0	0
Non-U.S.	**0**	0	0	0	0	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**117**	0	0	0	0	117
TOTAL	**1,682**	**0**	**297**	**3.3**	**0**	**1,381.3**

Table 8c. Operations by Discipline - Summary

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NSF-FUNDED	1,242	0	57	220	293	672
NON-NHMFL-FUNDED	1,682	0	297	3.3	0	1,381.3
TOTAL	**2,924**	**0**	**354**	**223**	**293**	**2,053**

[1] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

Table 9a. New PIs[1] and New Users – NSF-Funded

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**37**	7	11	26	**49**	5	6	43
Senior Personnel, non-U.S.	**6**	5	5	1	**8**	0	0	8
Postdocs, U.S.	**2**	0	0	2	**11**	0	2	9
Postdocs, non-U.S.	**1**	0	0	1	**2**	0	0	2
Students, U.S.	**0**	0	0	0	**33**	12	16	17
Students, non-U.S.	**0**	0	0	0	**0**	0	0	0
Technician, U.S.	**0**	0	0	0	**13**	0	0	13
Technician, non-U.S.	**0**	0	0	0	**0**	0	0	0
TOTAL	**46**	**12**	**16**	**30**	**116**	**17**	**24**	**92**

Table 9b. New PIs[1] and New Users – Non-NHMFL-Funded

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**78**	13	13	65	**109**	5	5	104

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, non-U.S.	**1**	0	0	1	**3**	1	1	2
Postdocs, U.S.	**11**	2	2	9	**44**	0	0	44
Postdocs, non-U.S.	**0**	0	0	0	**0**	0	0	0
Students, U.S.	**1**	1	1	0	**90**	3	4	86
Students, non-U.S.	**0**	0	0	0	**0**	0	0	0
Technician, U.S.	**0**	0	0	0	**44**	1	1	43
Technician, non-U.S.	**0**	0	0	0	**1**	0	0	1
TOTAL	**91**	**16**	**16**	**75**	**291**	**10**	**11**	**280**

Table 9c. New PIs[1] and New Users - Summary

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
NSF-FUNDED	46	12	16	30	116	17	24	92
NON-NHMFL-FUNDED	91	16	16	75	291	10	11	280
TOTAL	**137**	**28**	**32**	**105**	**407**	**27**	**35**	**372**

[1] PIs who received magnet time for the first time.

Table 10a. New [1] User PIs – NSF-Funded

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Anastasios Angel-opoulos	University of Cincinnati	P17443	Received 2019	Yes
Pascal Bernatchez	University of British Columbia	P18061	Received 2019	Yes
David Blackburn	University of Florida	P17834	Received 2019	Yes
Luis Colon-Perez	University of California, Irvine	P18050	Received 2019	Yes
Matthew Eddy	University of Florida	P19106	Received 2019	Yes
John Jones	Center for Neurosciences and Cell Biology	P17827	Received 2019	Yes
Kyle McCommis	Saint Louis University (SLU)	P19214	Received 2019	Yes
Jamie Near	McGill University	P17950	Received 2019	Yes
Evren Özarslan	Linköping University	P17744	Received 2019	Yes
Andrew Palmer	Florida Institute of Technology	P19156	Received 2019	Yes
Benjamin Philmus	Oregon State University	P17583	Received 2019	No
Linda Shimizu	University of South Carolina	P17929	Received 2019	No
Daniel R. Talham	University of Florida	P17951	Received 2019	No
Baldwyn Torto	International Centre of Insect Physiology and Ecology	P18083	Received 2019	Yes
Adam Veige	University of Florida	P19170	Received 2019	No
Benjamin Wylie	Texas Tech University Department of Chemistry and Biochemistry	P19164	Received 2019	Yes

Table 10b. New [1] User PIs – Non-NHMFL-Funded

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Jose Abisambra	University of Florida	P18060	Received 2019	Yes

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Michael Bubb	University of Florida	P19297	Received 2019	Yes
Sara Burke	University of Florida	P18088	Received 2019	Yes
Virginia Clark	University of Florida	P18068	Received 2019	Yes
Rhoel Dinglasan	University of Florida	P19303	Received 2019	Yes
Daniel Ferris	University of Florida	P19294	Received 2019	Yes
Roberto Firpi-Morell	University of Florida	P18066	Received 2019	Yes
David Fuller	University of Florida	P19301	Received 2019	Yes
Leslie Gaynor	University of Florida	P18052	Received 2019	Yes
Walter O'Dell	University of Florida	P19312	Received 2019	Yes
Catherine Price	University of Florida	P17994	Received 2019	Yes
Leah Reznikov	University of Florida	P18053	Received 2019	Yes
Nicola Sambuco	University of Florida	P18063	Received 2019	Yes
Sub Subramony	University of Florida	P18072	Received 2019	Yes
Ellen Terry	University of Florida	P19293	Received 2019	Yes
Zheng Wang	University of Florida	P17963	Received 2019	Yes

2. DC Field Facility

Table 1. Users by Demographic

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**219**	9	185	25	169	37	0	219
Senior Personnel, non-U.S.	**70**	5	51	14	59	6	0	70
Postdocs, U.S.	**88**	2	73	13	69	14	0	88
Postdocs, non-U.S.	**22**	1	14	7	12	4	0	22
Students, U.S.	**250**	11	190	49	176	51	0	250
Students, non-U.S.	**46**	4	29	13	31	10	0	46
Technician, U.S.	**11**	2	7	2	8	2	0	11
Technician, non-U.S.	**2**	0	1	1	2	0	0	2
TOTAL	**708**	**34**	**550**	**124**	**526**	**124**	**0**	**708**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2. Users by Participation

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**219**	112	0	28	79
Senior Personnel, non-U.S.	**70**	20	0	13	37
Postdocs, U.S.	**88**	66	0	1	21
Postdocs, non-U.S.	**22**	12	0	3	7
Students, U.S.	**250**	184	0	12	54
Students, non-U.S.	**46**	32	0	0	14
Technician, U.S.	**11**	11	0	0	0

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Technician, non-U.S.	2	0	0	0	2
TOTAL	708	437	0	57	214

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3. Users by Organization

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	219	151	9	59	24	186	9
Senior Personnel, non-U.S.	70	70	0	0	16	50	4
Postdocs, U.S.	88	71	5	12	8	75	5
Postdocs, non-U.S.	22	22	0	0	6	16	0
Students, U.S.	250	209	28	13	4	246	0
Students, non-U.S.	46	46	0	0	3	43	0
Technician, U.S.	11	3	2	6	0	10	1
Technician, non-U.S.	2	2	0	0	0	2	0
TOTAL	708	574	44	90	61	628	19

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4. Users by Discipline

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	219	143	24	19	14	19
Senior Personnel, non-U.S.	70	42	19	4	3	2
Postdocs, U.S.	88	74	4	3	5	2
Postdocs, non-U.S.	22	18	3	0	1	0
Students, U.S.	250	192	30	18	10	0
Students, non-U.S.	46	35	7	3	1	0
Technician, U.S.	11	5	0	1	5	0
Technician, non-U.S.	2	1	1	0	0	0
TOTAL	708	510	88	48	39	23

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments)

Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
480	32	319	62.3 %	193	37.7 %	512	1.6	160.5 %

Table 5b. Subscription Rate (Magnet Days)

Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Days Used for Inst., Dev., Test and Maint.	Total Days Used	Days Subscription Rate	Days Subscription Percentage
3,711	1,429.6	14	375.8	48.4	1,867.7	2.0	198.7 %

Table 6. Research Proposals [1] Profile with Magnet Time

Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
187	10	156	21	32	147	0	8	138	20	3	19	7

[1] A "proposal" may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our **website**

Table 7. Operations by Magnet System Group

	Total Days Used	Percentage of Total Days Used	45T	Resistive	SCH	Superconducting
NHMFL-Affiliated	375.8	20.1 %	22	104.8	8	241
Local	14	0.7 %	0	0	0	14
U.S. University	1,013.4	54.3 %	56	214.4	69	674
U.S. Govt. Lab.	124	6.6 %	8	32	0	84
U.S. Industry	7	0.4 %	0	0	0	7
Non-U.S.	285.1	15.3 %	54	57.1	50	124
Test, Calibration, Set-up, Maintenance, Inst. Dev.	48.4	2.6 %	0	25.4	13	10
TOTAL	**1,867.7**	**100 %**	**140**	**433.7**	**140**	**1,154**

[1] Each 20 MW resistive magnet requires two power supplies to run, the 45 T hybrid magnet requires three power supplies and the 36 T Series Connected Hybrid requires one power supply. Thus there can be four resistive magnets + three superconducting magnets operating or the 45 T hybrid, series connected hybrid, two resistive magnets and three superconducting magnets. User Units are defined as magnet days. Users of water-cooled resistive or hybrid magnets can typically expect to receive enough energy for 7 hours a day of magnet usage so a magnet day is defined as 7 hours. Superconducting magnets are scheduled typically 24 hours a day. There is an annual four week shutdown in fall of powered DC resistive and hybrid magnets for infrastructure maintenance and a two week shutdown period for the university mandated holiday break.

Table 8. Operations by Discipline

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**375.8**	312.4	0	0	63.4	0
Local	**14**	14	0	0	0	0
U.S. University	**1,013.4**	871.4	86.1	11	16	28.9
U.S. Govt. Lab.	**124**	110	0	0	14	0
U.S. Industry	**7**	0	0	0	7	0
Non-U.S.	**285.1**	196.3	73	7	8.8	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**48.4**	28.1	0	4	16.3	0
TOTAL	**1,867.7**	1,532.2	159	22	125	28.9

[1] Each 20 MW resistive magnet requires two power supplies to run, the 45 T hybrid magnet requires three power supplies and the 36 T Series Connected Hybrid requires one power supply. Thus there can be four resistive magnets + three superconducting magnets operating or the 45 T hybrid, series connected hybrid, two resistive magnets and three superconducting magnets. User Units are defined as magnet days. Users of water-cooled resistive or hybrid magnets can typically expect to receive enough energy for 7 hours a day of magnet usage so a magnet day is defined as 7 hours. Superconducting magnets are scheduled typically 24 hours a day. There is an annual four week shutdown in fall of powered DC resistive and hybrid magnets for infrastructure maintenance and a two week shutdown period for the university mandated holiday break.

Table 9. New PIs[1] and New Users

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**162**	23	30	132	219	14	15	204
Senior Personnel, non-U.S.	**44**	4	10	34	70	3	9	61
Postdocs, U.S.	**0**	0	0	0	88	25	30	58
Postdocs, non-U.S.	**2**	1	1	1	22	7	12	10
Students, U.S.	**0**	0	0	0	250	99	109	141
Students, non-U.S.	**0**	0	0	0	46	22	26	20
Technician, U.S.	**1**	0	0	1	11	3	3	8
Technician, non-U.S.	**0**	0	0	0	2	1	2	0
TOTAL	**209**	**28**	**41**	**168**	**708**	**174**	**206**	**502**

[1] PIs who received magnet time for the first time.

Table 10. New [1] User PIs

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Vittorio Bellani	University of Pavia	P17862	Received 2019	Yes
Alina Bienko	University of Wroclaw	P17642	Received 2019	No
Nicholas Butch	National Institute of Standards and Technology	P17928	Received 2019	No
Joan Cano	University of Valencia	P17379	Received 2019	No
Jak Chakhalian	Rutgers University, New Brunswick	P18007	Received 2019	Yes
Pashupati Dhakal	Jefferson Lab	P17893	Received 2019	Yes
Chetan Dhital	Kennesaw State University	P18004	Received 2019	Yes
Iain Dixon	National High Magnetic Field Laboratory	P17899	Received 2019	Yes
Serena Eley	Colorado School of Mines	P17835	Received 2019	Yes
Adam Fiedler	Marquette University	P18030	Received 2019	Yes
Byron Freelon	University of Louisville	P17898	Received 2019	Yes
Swee Goh	Chinese University of Hong Kong	P17646	Received 2019	No
Ryan Hadt	Caltech	P19129	Received 2019	Yes
Maximilian Hirschberger	RIKEN	P18037	Received 2019	Yes
Patrick Holland	Yale University	P17841	Received 2019	No
Guangjin Hou	Dalian Institute of Chemical Physics	P19138	Received 2019	Yes
Susan Kauzlarich	University of California, Davis	P17890	Received 2019	Yes
Rajeswari Kolagani	Towson University	P19134	Received 2019	Yes
Seng Huat Lee	Pennsylvania State University	P18018	Received 2019	Yes
Wei-Tsung Lee	Loyola University Chicago	P17840	Received 2019	No
Jia Li	Brown University	P18016	Received 2019	Yes
Xi Ling	Boston University	P17901	Received 2019	Yes
Jian Liu	University of Tennessee	P18024	Received 2019	Yes
TIm Mewes	University of Alabama	P18005	Received 2019	Yes
Jagadeesh Moodera	MIT Plasma Science & Fusion Center	P18014	Received 2019	Yes

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Emilia Morosan	Rice University	P18011	Received 2019	No
Roberto Myers	Ohio State University	P17814	Received 2019	Yes
Alexander Nevzorov	North Carolina State University	P17825	Received 2019	No
Luming Peng	Nanjing University	P17924	Received 2019	No
Pratap Raychaudhuri	Tata Institute of Fund. Research	P19110	Received 2019	Yes
Jeffrey Schiano	Pennsylvania State University	P17819	Received 2019	Yes
Sabyasachi Sen	University of California, Davis	P14934	Received 2019	No
Zhi-Xun Shen	Stanford University	P18038	Received 2019	Yes
Alexander Vasiliev	Lomonosov Moscow State University	P17703	Received 2019	No
Jairo Velasco	University of California, Santa Cruz	P17915	Received 2019	Yes
Tuo Wang	Louisiana State University	P17348	Received 2019	No
Michael Whittlesey	University of Bath	P17779	Received 2019	Yes
Liang Wu	University of Pennsylvania	P17918	Received 2019	Yes
Sanfeng Wu	Princeton University	P17871	Received 2019	Yes
Jun Xu	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	P16062	Received 2019	No
Miha Zakotnik	Urban Mining Company	P18071	Received 2019	Yes

[1] PIs who received magnet time for the first time.

3. EMR Facility

Table 1. Users by Demographic

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**65**	5	47	13	45	9	0	11
Senior Personnel, non-U.S.	**25**	3	18	4	15	8	0	2
Postdocs, U.S.	**14**	0	11	3	11	2	0	1
Postdocs, non-U.S.	**4**	1	2	1	3	1	0	0
Students, U.S.	**46**	2	32	12	28	13	0	5
Students, non-U.S.	**8**	0	5	3	4	4	0	0
Technician, U.S.	**0**	0	0	0	0	0	0	0
Technician, non-U.S.	**0**	0	0	0	0	0	0	0
TOTAL	**162**	**11**	**115**	**36**	**106**	**37**	**0**	**19**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2. Users by Participation

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**65**	35	0	9	21
Senior Personnel, non-U.S.	**25**	6	0	8	11
Postdocs, U.S.	**14**	12	0	2	0
Postdocs, non-U.S.	**4**	1	0	0	3

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Students, U.S.	**46**	30	0	5	11
Students, non-U.S.	**8**	5	0	1	2
Technician, U.S.	**0**	0	0	0	0
Technician, non-U.S.	**0**	0	0	0	0
TOTAL	**162**	**89**	**0**	**25**	**48**

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3. Users by Organization

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	**65**	36	6	23	2	60	3
Senior Personnel, non-U.S.	**25**	25	0	0	2	22	1
Postdocs, U.S.	**14**	5	7	2	0	12	2
Postdocs, non-U.S.	**4**	4	0	0	1	3	0
Students, U.S.	**46**	33	10	3	0	46	0
Students, non-U.S.	**8**	7	0	1	0	8	0
Technician, U.S.	**0**	0	0	0	0	0	0
Technician, non-U.S.	**0**	0	0	0	0	0	0
TOTAL	**162**	**110**	**23**	**29**	**5**	**151**	**6**

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4. Users by Discipline

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	**65**	18	32	2	1	12
Senior Personnel, non-U.S.	**25**	6	16	0	3	0
Postdocs, U.S.	**14**	6	7	0	0	1
Postdocs, non-U.S.	**4**	1	3	0	0	0
Students, U.S.	**46**	10	29	0	0	7
Students, non-U.S.	**8**	1	4	0	2	1
Technician, U.S.	**0**	0	0	0	0	0
Technician, non-U.S.	**0**	0	0	0	0	0
TOTAL	**162**	**42**	**91**	**2**	**6**	**21**

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments)

Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
114	24	120	87.0 %	18	13.0 %	138	1.2	115.0 %

Table 5b. Subscription Rate (Magnet Days)

Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Days Used for Inst., Dev., Test and Maint.	Total Days Used	Days Subscription Rate	Days Subscription Percentage
999	492.0	29.0	69.5	188.5	779.0	1.3	128.2 %

Table 6. Research Proposals [1] Profile with Magnet Time

Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
62	5	51	6	13	45	0	4	13	28	0	8	13

[1] A "proposal" may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our **website**

Table 7. Operations by Magnet System

	Total Days Used	Percentage of Total Days Used	12.5T Superconducting Magnet, Pulsed EPR	17T Superconducting Magnet	Bruker	HiPER
NHMFL-Affiliated	**69.5**	8.9 %	24.5	18	10	17
Local	**29**	3.7 %	0	4	3	22
U.S. University	**379.5**	48.7 %	112.5	42.5	149	75.5
U.S. Govt. Lab.	**4**	0.5 %	4	0	0	0
U.S. Industry	**0**	0 %	0	0	0	0
Non-U.S.	**108.5**	13.7 %	25	70.5	3	10
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**27**	3.5 %	8	0	0	19
Dev. EPR Methods	**161.5**	21 %	0	0	69	92.5
TOTAL	**779**	**100 %**	**174**	**135**	**234**	**236**

[1] User Units are defined as magnet days.One magnet day is defined as 24 hours in superconducting magnets.

Table 8. Operations by Discipline

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**69.5**	12	6.5	0	15	36
Local	**29**	0	27	0	0	2
U.S. University	**379.5**	65.5	137	0	9	168
U.S. Govt. Lab.	**4**	0	0	0	4	0
U.S. Industry	**0**	0	0	0	0	0
Non-U.S.	**108.5**	25	81.5	0	2	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**188.5**	5	0	0	22	161.5
TOTAL	**779**	**107.5**	**252**	**0**	**52**	**367.5**

[1] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

Table 9. New PIs[1] and New Users

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**48**	7	10	38	**65**	5	12	53
Senior Personnel, non-U.S.	**16**	2	3	13	**25**	1	2	23
Postdocs, U.S.	**0**	0	0	0	**14**	4	6	8
Postdocs, non-U.S.	**3**	1	1	2	**4**	1	1	3
Students, U.S.	**0**	0	0	0	**46**	17	20	26
Students, non-U.S.	**0**	0	0	0	**8**	4	4	4
Technician, U.S.	**0**	0	0	0	**0**	0	0	0
Technician, non-U.S.	**0**	0	0	0	**0**	0	0	0
TOTAL	**67**	**10**	**14**	**53**	**162**	**32**	**45**	**117**

[1] PIs who received magnet time for the first time.

Table 10. New [1] User PIs

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Jason Campbell	National Institute of Standards and Technology	P19206	Received 2019	Yes
Erik Cizmar	P.J.Safarik University	P17843	Received 2019	Yes
Wu-Min Deng	Florida State University	P17712	Received 2019	Yes
Adam Fiedler	Marquette University	P18030	Received 2019	Yes
Sossina Haile	Northwestern University	P19180	Received 2019	No
Oc Hee Han	Korea Basic Science Institute	P17974	Received 2019	No
Sandrine Heutz	Imperial College London	P18041	Received 2019	Yes
Alvin Holder	Old Dominion University	P17737	Received 2019	Yes
Dmytro Nesterov	Technical University of Lisbon	P19177	Received 2019	Yes
Aaron Rossini	Iowa State University	P18077	Received 2019	No
Linda Shimizu	University of South Carolina	P17929	Received 2019	No
Benjamin Stein	Los Alamos National Laboratory	P17990	Received 2019	Yes
Eric Vejerano	University of South Carolina	P17716	Received 2019	Yes
Jianyuan Zhang	Rutgers University	P18049	Received 2019	Yes

[1] PIs who received magnet time for the first time.

4. High B/T Facility

Table 1. Users by Demographic

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**7**	0	5	2	6	0	0	1
Senior Personnel, non-U.S.	**1**	0	1	0	1	0	0	0
Postdocs, U.S.	**5**	0	3	2	3	1	0	1
Postdocs, non-U.S.	**0**	0	0	0	0	0	0	0
Students, U.S.	**4**	0	4	0	2	1	0	1
Students, non-U.S.	**0**	0	0	0	0	0	0	0
Technician, U.S.	**0**	0	0	0	0	0	0	0

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Technician, non-U.S.	0	0	0	0	0	0	0	0
TOTAL	17	0	13	4	12	2	0	3

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2. Users by Participation

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	7	3	0	1	3
Senior Personnel, non-U.S.	1	1	0	0	0
Postdocs, U.S.	5	4	0	0	1
Postdocs, non-U.S.	0	0	0	0	0
Students, U.S.	4	4	0	0	0
Students, non-U.S.	0	0	0	0	0
Technician, U.S.	0	0	0	0	0
Technician, non-U.S.	0	0	0	0	0
TOTAL	17	12	0	1	4

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3. Users by Organization

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	7	4	1	2	0	7	0
Senior Personnel, non-U.S.	1	1	0	0	0	1	0
Postdocs, U.S.	5	2	1	2	0	5	0
Postdocs, non-U.S.	0	0	0	0	0	0	0
Students, U.S.	4	0	4	0	0	4	0
Students, non-U.S.	0	0	0	0	0	0	0
Technician, U.S.	0	0	0	0	0	0	0
Technician, non-U.S.	0	0	0	0	0	0	0
TOTAL	17	7	6	4	0	17	0

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4. Users by Discipline

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem-istry, Biophysics
Senior Personnel, U.S.	7	4	0	2	0	1

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, non-U.S.	**1**	1	0	0	0	0
Postdocs, U.S.	**5**	4	0	0	0	1
Postdocs, non-U.S.	**0**	0	0	0	0	0
Students, U.S.	**4**	4	0	0	0	0
Students, non-U.S.	**0**	0	0	0	0	0
Technician, U.S.	**0**	0	0	0	0	0
Technician, non-U.S.	**0**	0	0	0	0	0
TOTAL	**17**	**13**	**0**	**2**	**0**	**2**

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments)

Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
5	0	3	60 %	2	40 %	5	1.7	166.7 %

Table 5b. Subscription Rate (Magnet Days)

Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Days Used for Inst., Dev., Test and Maint.	Total Days Used	Days Subscription Rate	Days Subscription Percentage
923	700	0	0	119	819	1.1	112.7 %

Table 6. Research Proposals [1] Profile with Magnet Time

Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
3	0	2	1	0	3	0	0	3	0	0	0	0

[1] A “proposal” may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.
Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our **website**

Table 7. Operations by Magnet System

	Total Days Used	Percentage of Total Days Used	Bay 2 (UF Microkelvin Lab) 0.02mK, 8T	Bay 3 (UF Microkelvin Lab) 0.3mK, 16T	Williamson Hall (UF Physics) 40mK, 10T (fast cycling)
NHMFL-Affiliated	**0**	0 %	0	0	0
Local	**0**	0 %	0	0	0
U.S. University	**335**	40.9 %	214	0	121
U.S. Govt. Lab.	**0**	0 %	0	0	0
U.S. Industry	**0**	0 %	0	0	0
Non-U.S.	**365**	44.6 %	0	365	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**119**	14.5 %	119	0	0
TOTAL	**819**	**100 %**	**333**	**365**	**121**

[1] User Units are defined as magnet days.One magnet day is defined as 24 hours in superconducting magnets.

Table 8. Operations by Discipline

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**0**	0	0	0	0	0
Local	**0**	0	0	0	0	0
U.S. University	**335**	335	0	0	0	0
U.S. Govt. Lab.	**0**	0	0	0	0	0
U.S. Industry	**0**	0	0	0	0	0
Non-U.S.	**365**	365	0	0	0	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**119**	119	0	0	0	0
TOTAL	**819**	**819**	**0**	**0**	**0**	**0**

[1] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

Table 9. New PIs[1] and New Users

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**2**	0	0	2	**7**	0	0	7
Senior Personnel, non-U.S.	**1**	0	0	1	**1**	0	0	1
Postdocs, U.S.	**2**	0	0	2	**5**	0	0	5
Postdocs, non-U.S.	**0**	0	0	0	**0**	0	0	0
Students, U.S.	**0**	0	0	0	**4**	0	0	4
Students, non-U.S.	**0**	0	0	0	**0**	0	0	0
Technician, U.S.	**0**	0	0	0	**0**	0	0	0
Technician, non-U.S.	**0**	0	0	0	**0**	0	0	0
TOTAL	**5**	**0**	**0**	**5**	**17**	**0**	**0**	**17**

[1] PIs who received magnet time for the first time.

Table 10. New [1] User PIs

none

5. ICR Facility

Table 1. Users by Demographic

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**99**	7	74	18	62	24	0	99
Senior Personnel, non-U.S.	**55**	3	28	24	22	12	0	55
Postdocs, U.S.	**27**	3	19	5	14	11	0	27
Postdocs, non-U.S.	**7**	1	6	0	1	5	0	7
Students, U.S.	**66**	11	41	14	23	34	0	66
Students, non-U.S.	**22**	3	8	11	11	2	0	22
Technician, U.S.	**11**	0	4	7	4	0	0	11
Technician, non-U.S.	**21**	0	2	19	2	0	0	21
TOTAL	**308**	**28**	**182**	**98**	**139**	**88**	**0**	**308**

[1] Users using multiple facilities are counted in each facility listed.

[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition

also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2. Users by Participation

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	99	29	0	9	61
Senior Personnel, non-U.S.	55	4	2	3	46
Postdocs, U.S.	27	12	0	3	12
Postdocs, non-U.S.	7	3	0	1	3
Students, U.S.	66	40	0	6	20
Students, non-U.S.	22	5	1	1	15
Technician, U.S.	11	2	0	0	9
Technician, non-U.S.	21	0	0	1	20
TOTAL	308	95	3	24	186

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3. Users by Organization

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	99	84	3	12	8	83	8
Senior Personnel, non-U.S.	55	55	0	0	8	44	3
Postdocs, U.S.	27	21	2	4	0	27	0
Postdocs, non-U.S.	7	6	0	1	3	4	0
Students, U.S.	66	36	19	11	1	65	0
Students, non-U.S.	22	22	0	0	0	21	1
Technician, U.S.	11	9	0	2	3	5	3
Technician, non-U.S.	21	21	0	0	1	17	3
TOTAL	308	254	24	30	24	266	18

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4. Users by Discipline

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	99	0	63	15	2	19
Senior Personnel, non-U.S.	55	0	41	4	0	10
Postdocs, U.S.	27	0	16	6	0	5
Postdocs, non-U.S.	7	0	6	0	0	1
Students, U.S.	66	0	44	15	0	7

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Students, non-U.S.	**22**	0	15	3	0	4
Technician, U.S.	**11**	0	4	1	1	5
Technician, non-U.S.	**21**	0	5	7	0	9
TOTAL	**308**	**0**	**194**	**51**	**3**	**60**

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments)

Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
120	33	139	90.8 %	14	9.2 %	153	1.1	110.1 %

Table 5b. Subscription Rate (Magnet Days)

Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Method Development	Total Days Used	Days Subscription Rate	Days Subscription Percentage
1,746	339.2	34.5	140.2	331.2	845.0	2.1	206.6 %

Table 6. Research Proposals [1] Profile with Magnet Time

Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
85	5	72	8	19	62	0	4	0	60	4	3	18

[1] A "proposal" may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our website

Table 7. Operations by Magnet System

	Total Days Used	Percentage of Total Days Used	9.4T, 155mm bore, 1ppm, actively-shielded	9.4T, 220mm bore, 1ppm, passively-shielded	14.5 Tesla	21T Hybrid
NHMFL-Affiliated	140.2	16.6 %	0	89.8	10	40.3
Local	34.5	4.1 %	0	16.2	5.5	12.8
U.S. University	208.2	24.6 %	1	76.7	23	107.5
U.S. Govt. Lab.	3	0.4 %	0	3	0	0
U.S. Industry	6	0.7 %	0	4	0	2
Non-U.S.	122	14.4 %	0	35.5	9.5	77
Method Development	331.2	39.2 %	0	23.8	252	55.3
TOTAL	**845**	**100 %**	**1**	**249**	**300**	**295**

[1] User Units are defined as magnet days.One magnet day is defined as 24 hours in superconducting magnets.

Table 8. Operations by Discipline

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**140.2**	0	96.7	0	43.5	0
Local	**34.5**	0	33.5	0	1	0
U.S. University	**208.2**	0	106.3	12.5	0	89.3

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineer-ing	Magnets, Materials	Biology, Biochemistry, Biophysics
U.S. Govt. Lab.	**3**	0	3	0	0	0
U.S. Industry	**6**	0	4	0	0	2
Non-U.S.	**122**	0	45	2.5	0	74.5
Method Development	**331.2**	0	41.5	0	286.7	3
TOTAL	**845**	**0**	**330**	**15**	**331**	**168.8**

[1] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

Table 9. New PIs[1] and New Users

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**57**	15	15	42	**99**	17	17	82
Senior Personnel, non-U.S.	**21**	9	9	12	**55**	10	10	45
Postdocs, U.S.	**4**	1	1	3	**27**	11	11	16
Postdocs, non-U.S.	**1**	1	1	0	**7**	6	6	1
Students, U.S.	**0**	0	0	0	**66**	23	23	43
Students, non-U.S.	**0**	0	0	0	**22**	6	6	16
Technician, U.S.	**1**	0	0	1	**11**	1	1	10
Technician, non-U.S.	**0**	0	0	0	**21**	8	8	13
TOTAL	**84**	**26**	**26**	**58**	**308**	**82**	**82**	**226**

[1] PIs who received magnet time for the first time.

Table 10. New [1] User PIs

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Carlos Afonso	Normandy University	P17828	Received 2019	Yes
Stephen Blanksby	Queensland University of Technology	P19112	Received 2019	Yes
Christian Bleiholder	Florida State University	P17804	Received 2019	Yes
Chris Boreham	Geoscience Australia	P17983	Received 2019	Yes
Jose Cerrato	University of New Mexico	P19179	Received 2019	Yes
Meilian Chen	Guangdong Technion	P18102	Received 2019	Yes
Francisco Fernandez-Lima	Florida International Unversity	P19108	Received 2019	Yes
David Griffith	Willamette University	P19215	Received 2019	Yes
David Harbottle	University of Leeds	P19176	Received 2019	Yes
Cynthia Heil	Mote Marine Laboratory	P19223	Received 2019	Yes
Sarah Johnston	University of Lethbridge	P19190	Received 2019	Yes
Boris Lau	University of Massachusetts	P19198	Received 2019	Yes
Franklin Leach	University of Georgia	P17979	Received 2019	Yes
Mark Nimlos	National Renewable Energy Laboratory	P18047	Received 2019	Yes
Allison Oliver	Skeena Fisheries Commission	P19184	Received 2019	Yes
Isabel Romero	University of South Florida	P17709	Received 2019	Yes
Gayan Rubasinghege	New Mexico Tech	P19192	Received 2019	Yes
Nobuaki Takemori	Ehime University	P17980	Received 2019	Yes

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Youneng Tang	Florida State University	P17822	Received 2019	Yes
Nishanth Tharayil	Clemson University	P19212	Received 2019	Yes
Collin Ward	Woods Hole Oceanographic Institution	P19124	Received 2019	Yes
Andrew Wozniak	University of Delaware	P19159	Received 2019	Yes
Zhenghe Xu	University of Alberta	P17937	Received 2019	Yes
Mary Zeller	Florida International University (FIU)	P19274	Received 2019	Yes
Yuanhui Zhang	University of Illinois at Urbana-Champaign	P17988	Received 2019	Yes
Mengqiang Zhu	University of Wyoming	P18048	Received 2019	Yes

[1] PIs who received magnet time for the first time.

6. NMR Facility

Table 1. Users by Demographic

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**103**	5	84	14	74	20	0	9
Senior Personnel, non-U.S.	**44**	1	27	16	22	11	0	11
Postdocs, U.S.	**24**	4	14	6	8	11	0	5
Postdocs, non-U.S.	**5**	0	3	2	3	0	0	2
Students, U.S.	**84**	3	59	22	46	22	0	16
Students, non-U.S.	**20**	1	8	11	8	5	0	7
Technician, U.S.	**5**	1	4	0	4	1	0	0
Technician, non-U.S.	**2**	0	1	1	1	0	0	1
TOTAL	**287**	**15**	**200**	**72**	**166**	**70**	**0**	**51**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2. Users by Participation

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**103**	49	2	17	35
Senior Personnel, non-U.S.	**44**	4	2	7	31
Postdocs, U.S.	**24**	16	1	3	4
Postdocs, non-U.S.	**5**	1	2	0	2
Students, U.S.	**84**	51	4	16	13
Students, non-U.S.	**20**	4	0	2	14
Technician, U.S.	**5**	3	0	0	2
Technician, non-U.S.	**2**	0	0	0	2
TOTAL	**287**	**128**	**11**	**45**	**103**

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3. Users by Organization

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	**103**	66	13	24	1	96	6
Senior Personnel, non-U.S.	**44**	44	0	0	5	36	3
Postdocs, U.S.	**24**	10	10	4	1	22	1
Postdocs, non-U.S.	**5**	5	0	0	2	3	0
Students, U.S.	**84**	50	21	13	0	84	0
Students, non-U.S.	**20**	18	0	2	1	19	0
Technician, U.S.	**5**	2	0	3	0	4	1
Technician, non-U.S.	**2**	2	0	0	1	1	0
TOTAL	**287**	**197**	**44**	**46**	**11**	**265**	**11**

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4. Users by Discipline

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	**103**	2	33	15	2	51
Senior Personnel, non-U.S.	**44**	0	25	3	1	15
Postdocs, U.S.	**24**	0	7	1	3	13
Postdocs, non-U.S.	**5**	0	2	0	0	3
Students, U.S.	**84**	1	42	14	4	23
Students, non-U.S.	**20**	0	9	7	0	4
Technician, U.S.	**5**	0	1	1	1	2
Technician, non-U.S.	**2**	0	2	0	0	0
TOTAL	**287**	**3**	**121**	**41**	**11**	**111**

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments)

Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
585	25	570	93.4 %	40	6.6 %	610	1.1	107 %

Table 5b. Subscription Rate (Magnet Days)

Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Days Used for Inst., Dev., Test and Maint.	Total Days Used	Days Subscription Rate	Days Subscription Percentage
3,520	1,796	135.5	1,486.5	93	3,511	1	100.3 %

Table 6. Research Proposals [1] Profile with Magnet Time

Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
104	5	87	12	27	73	0	4	3	29	5	8	59

[1] A “proposal” may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our website

Table 7. Operations by Magnet System

	Total Days Used	Percentage of Total Days Used	900MHz, 105mm bore, 21.1T	830MHz, 31mm bore, 19.6T	800MHz, 63mm bore, (MB) 18.8T #1	800MHz, 63mm bore, (MB) 18.8T #2	800MHz, 54mm bore (NB), 18.8T	600MHz, 89mm bore, 14T #1	600MHz, 89mm bore, 14T #2	600MHz, 89mm bore MAS DNP	500MHz, 89mm bore, 11.7T	600MHz, 52mm bore, 14T	500MHz, 89mm bore, 11.7T (Engineering School)	Cell 14 36T 40mm SCH
NHMFL-Affiliated	1,486.5	42.3 %	134.5	29	107	309	284	166	243	54.5	84	41	30.5	4
Local	135.5	3.9 %	7	0	3	0	0	14	34	0	11	0	66.5	0
U.S. University	1,179	33.6 %	26	259	192	26	77	145	61	87.0	193	0	77	36
U.S. Govt. Lab.	27	0.8 %	8	0	0	0	0	0	0	0	0	0	19	0
U.S. Industry	100.5	2.9 %	57	0	0	0	0	0	0	7.0	0	0	36.5	0
Non-U.S.	489.5	13.9 %	75.5	72	45	7	4	33	18	74	70	40	13	38
Test, Calibration, Set-up, Maintenance, Inst. Dev.	93	2.6 %	5	0	0	0	0	0	0	28.5	0	0	46.5	13
TOTAL	3,511	100 %	313	360	347	342	365	358	356	251	358	81	289	91

[1] User Units are defined as magnet days.One magnet day is defined as 24 hours in superconducting magnets.

Table 8. Operations by Discipline

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	1,486.5	103	79	0	251	1,053.5
Local	135.5	0	88	12	0	35.5
U.S. University	1,179	15	603	4	14	543
U.S. Govt. Lab.	27	0	0	0	0	27
U.S. Industry	100.5	0	0	0	0	100.5
Non-U.S.	489.5	0	327.5	15	21	126
Test, Calibration, Set-up, Maintenance, Inst. Dev.	93	0	6.5	4	57.5	25
TOTAL	3,511	118	1,104	35	344	1,910.5

[1] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

Table 9. New PIs[1] and New Users

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	70	8	8	62	103	11	11	92
Senior Personnel, non-U.S.	21	7	7	14	44	7	7	37
Postdocs, U.S.	1	1	1	0	24	5	5	19
Postdocs, non-U.S.	1	0	0	1	5	2	2	3
Students, U.S.	1	1	1	0	84	32	34	50
Students, non-U.S.	0	0	0	0	20	7	7	13
Technician, U.S.	1	0	0	1	5	0	0	5

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Technician, non-U.S.	**0**	0	0	0	**2**	1	1	1
TOTAL	**95**	**17**	**17**	**78**	**287**	**65**	**67**	**220**

[1] PIs who received magnet time for the first time.

Table 10. New [1] User PIs

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Diana Bernin	Chalmers University of Technology	P17969	Received 2019	Yes
Shuhui Cai	Xiamen University	P18057	Received 2019	Yes
Guangjin Hou	Dalian Institute of Chemical Physics	P19138	Received 2019	Yes
Yan-Yan Hu	Florida State University	P19111	Received 2019	Yes
Xueqian Kong	Zhejiang University	P19234	Received 2019	Yes
Gary Meints	Missouri State University	P17938	Received 2019	Yes
Dylan Murray	University of California Davis	P17941	Received 2019	Yes
Bradley Nilsson	University of Rochester	P17957	Received 2019	Yes
Jeffrey Schiano	Pennsylvania State University	P17819	Received 2019	Yes
Faith Scott	National High Magnetic Field Laboratory	P18089	Received 2019	Yes
Ansgar Siemer	University of Southern California	P19109	Received 2019	Yes
Robert Silvers	Florida State University	P19107	Received 2019	Yes
Neeraj Sinha	Centre of Bio-Medical Research (CBMR)	P18099	Received 2019	Yes
John Stringer	PhoenixNMR	P18065	Received 2019	Yes
Daniel Topgaard	University of Lund	P19104	Received 2019	Yes
Xiangwu Zhang	North Carolina State University	P19119	Received 2019	Yes
Guiming Zhong	Chinese Academy of Sciences	P18086	Received 2019	Yes

[1] PIs who received magnet time for the first time.

7. Pulsed Field Facility

Table 1. Users by Demographic

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**67**	3	56	8	46	15	0	6
Senior Personnel, non-U.S.	**25**	1	19	5	20	2	0	3
Postdocs, U.S.	**44**	0	39	5	35	5	0	4
Postdocs, non-U.S.	**9**	1	6	2	5	2	0	2
Students, U.S.	**48**	1	33	14	26	13	0	9
Students, non-U.S.	**13**	1	10	2	9	2	0	2
Technician, U.S.	**1**	0	1	0	1	0	0	0
Technician, non-U.S.	**0**	0	0	0	0	0	0	0
TOTAL	**207**	**7**	**164**	**36**	**142**	**39**	**0**	**26**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2. Users by Participation

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**67**	41	0	3	23
Senior Personnel, non-U.S.	**25**	6	0	5	14
Postdocs, U.S.	**44**	38	0	0	6
Postdocs, non-U.S.	**9**	5	0	0	4
Students, U.S.	**48**	35	0	2	11
Students, non-U.S.	**13**	9	0	0	4
Technician, U.S.	**1**	1	0	0	0
Technician, non-U.S.	**0**	0	0	0	0
TOTAL	**207**	**135**	**0**	**10**	**62**

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3. Users by Organization

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	**67**	37	8	22	19	40	8
Senior Personnel, non-U.S.	**25**	25	0	0	3	22	0
Postdocs, U.S.	**44**	26	9	9	14	20	10
Postdocs, non-U.S.	**9**	9	0	0	0	9	0
Students, U.S.	**48**	44	4	0	5	43	0
Students, non-U.S.	**13**	13	0	0	0	13	0
Technician, U.S.	**1**	0	1	0	0	0	1
Technician, non-U.S.	**0**	0	0	0	0	0	0
TOTAL	**207**	**154**	**22**	**31**	**41**	**147**	**19**

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4. Users by Discipline

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	**67**	55	5	2	0	5
Senior Personnel, non-U.S.	**25**	23	1	0	0	1
Postdocs, U.S.	**44**	41	1	0	2	0
Postdocs, non-U.S.	**9**	6	1	0	2	0
Students, U.S.	**48**	42	5	0	1	0
Students, non-U.S.	**13**	11	2	0	0	0
Technician, U.S.	**1**	1	0	0	0	0

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Technician, non-U.S.	**0**	0	0	0	0	0
TOTAL	**207**	**179**	**15**	**2**	**5**	**6**

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments)

Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
114	24	91	65.9 %	47	34.1 %	138	1.5	151.6 %

Table 5b. Subscription Rate (Magnet Days)

Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Days Used for Inst., Dev., Test and Maint.	Total Days Used	Days Subscription Rate	Days Subscription Percentage
1,019	398	93	144	0	635	1.6	160.5 %

Table 6. Research Proposals [1] Profile with Magnet Time

Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
60	3	53	4	12	46	0	2	54	1	0	3	2

[1] A "proposal" may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.
[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our **website**

Table 7. Operations by Magnet System Group

	Total Days Used	Percentage of Total Days Used	100T	Short Pulse	Single Turn
NHMFL-Affiliated	**144**	22.7 %	0	132	12
Local	**93**	14.6 %	5	88	0
U.S. University	**207**	32.6 %	15	192	0
U.S. Govt. Lab.	**72**	11.3 %	0	72	0
U.S. Industry	**0**	0 %	0	0	0
Non-U.S.	**119**	18.7 %	5	114	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**0**	0 %	0	0	0
TOTAL	**635**	**100 %**	**25**	**598**	**12**

[1] User Units are defined as magnet days.One magnet day is defined as 24 hours in superconducting magnets.

Table 8. Operations by Discipline

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**144**	112	0	0	32	0
Local	**93**	93	0	0	0	0
U.S. University	**207**	197	10	0	0	0
U.S. Govt. Lab.	**72**	72	0	0	0	0
U.S. Industry	**0**	0	0	0	0	0

	Total Days Used[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Non-U.S.	**119**	119	0	0	0	0
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**0**	0	0	0	0	0
TOTAL	**635**	**593**	**10**	**0**	**32**	**0**

[1] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

Table 9. New PIs[1] and New Users

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	**44**	2	6	38	67	6	10	57
Senior Personnel, non-U.S.	**15**	0	1	14	**25**	4	5	20
Postdocs, U.S.	**9**	3	3	6	**44**	10	15	29
Postdocs, non-U.S.	**1**	0	0	1	**9**	3	3	6
Students, U.S.	**1**	1	1	0	**48**	13	23	25
Students, non-U.S.	**0**	0	0	0	**13**	6	9	4
Technician, U.S.	**0**	0	0	0	**1**	1	1	0
Technician, non-U.S.	**0**	0	0	0	**0**	0	0	0
TOTAL	**70**	**6**	**11**	**59**	**207**	**43**	**66**	**141**

[1] PIs who received magnet time for the first time.

Table 10. New [1] User PIs

Name	Organization	Proposal	Year of Magnet Time	Is New to MagLab
Tomoya Asaba	Los Alamos National Laboratory	P18035	Received 2019	Yes
John DiTusa	Louisiana State University	P17911	Received 2019	No
Takao Ebihara	Shizuoka University	P17751	Received 2019	No
Nirmal Ghimire	George Mason University	P19163	Received 2019	Yes
Na Hyun Jo	Ames Laboratory	P19250	Received 2019	Yes
Minhyea Lee	University of Colorado, Boulder	P17906	Received 2019	No
Qi Li	Pennsylvania State University	P17849	Received 2019	No
Joonbum Park	Los Alamos National Laboratory	P17717	Received 2019	Yes
Athena Safa-Sefat	Oak Ridge National Laboratory	P19173	Received 2019	Yes
Susanne Stemmer	University of California, Santa Barbara	P17876	Received 2019	No
Hsinhan Tsai	Los Alamos National Laboratory	P19141	Received 2019	Yes

[1] PIs who received magnet time for the first time.

APPENDIX III – USER FACILITIES OVERVIEW

Table 1a. Users by Demographic of All Facilities

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
Senior Personnel, U.S.	**718**	40	537	141	481	130	0	107
Senior Personnel, non-U.S.	**231**	17	150	64	147	41	0	43
Postdocs, U.S.	**257**	17	188	52	159	64	0	34
Postdocs, non-U.S.	**49**	4	32	13	26	12	0	11
Students, U.S.	**621**	35	429	157	350	171	0	100
Students, non-U.S.	**109**	9	60	40	63	23	0	23
Technician, U.S.	**85**	9	42	34	29	27	0	29
Technician, non-U.S.	**26**	0	5	21	6	0	0	20
TOTAL	**2,096**	**131**	**1,443**	**522**	**1,261**	**468**	**0**	**367**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 1b. Users by Demographic by Facilities

	Users[1]	Minority[2]	Non-Minority[2]	No Response to Race[3]	Male	Female	Other	No Response to Gender[3]
AMRIS – NSF-Funded	**116**	10	74	32	64	29	0	23
AMRIS – Non-NHMFL-Funded	**291**	26	145	120	106	79	0	106
DC Field	**708**	34	550	124	526	124	0	58
EMR	**162**	11	115	36	106	37	0	19
High B/T	**17**	0	13	4	12	2	0	3
ICR	**308**	28	182	98	139	88	0	81
NMR	**287**	15	200	72	166	70	0	51
Pulsed Field	**207**	7	164	36	142	39	0	26
TOTAL	**2,096**	**131**	**1,443**	**522**	**1,261**	**468**	**0**	**367**

[1] Users using multiple facilities are counted in each facility listed.
[2] NSF Minority status includes the following races: American Indian, Alaska Native, Black or African American, Hispanic, Native Hawaiian or other Pacific Islander. The definition also includes Hispanic Ethnicity as a minority group. Minority status excludes Asian and White-Not of Hispanic Origin.
[3] Includes pending user account activations.

Table 2a. Users by Participation of All Facilities

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Senior Personnel, U.S.	**718**	369	2	70	277
Senior Personnel, non-U.S.	**231**	41	4	36	150
Postdocs, U.S.	**257**	193	1	9	54
Postdocs, non-U.S.	**49**	22	2	4	21
Students, U.S.	**621**	451	4	41	125
Students, non-U.S.	**109**	55	1	4	49

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
Technician, U.S.	**85**	71	0	0	14
Technician, non-U.S.	**26**	1	0	1	24
TOTAL	**2,096**	**1,203**	**14**	**165**	**714**

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 2b. Users by Participation by Facilities

	Users[1]	Users Present	Users Operating Remotely[2]	Users Sending Sample[3]	Off-Site Collaborators[4]
AMRIS – NSF-Funded	**116**	74	0	2	40
AMRIS – Non-NHMFL-Funded	**291**	233	0	1	57
DC Field	**708**	437	0	57	214
EMR	**162**	89	0	25	48
High B/T	**17**	12	0	1	4
ICR	**308**	95	3	24	186
NMR	**287**	128	11	45	103
Pulsed Field	**207**	135	0	10	62
TOTAL	**2,096**	**1,203**	**14**	**165**	**714**

[1] Users using multiple facilities are counted in each facility listed.
[2] "Users Operating Remotely" refers to users who operate the magnet system from a remote location. Remote operations are not currently available in all facilities.
[3] "Users Sending Sample" refers to users who send the sample to the facility and/or research group and the experiment is conducted by other collaborators on the experiment. Users at UF, FSU, and LANL cannot be "sample senders" for facilities located on their campuses.
[4] "Off-Site Users" are scientific or technical participants on the experiment; who will not be present, sending sample, or operating the magnet system remotely; and who are not located on the campus of that facility (i.e., they are off-site).

Table 3a. Users by Organization of All Facilities

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
Senior Personnel, U.S.	**718**	451	95	172	56	624	38
Senior Personnel, non-U.S.	**231**	231	0	0	34	186	11
Postdocs, U.S.	**257**	164	57	36	23	215	19
Postdocs, non-U.S.	**49**	48	0	1	12	37	0
Students, U.S.	**621**	431	150	40	10	610	1
Students, non-U.S.	**109**	106	0	3	4	104	1
Technician, U.S.	**85**	38	22	25	3	76	6
Technician, non-U.S.	**26**	25	1	0	2	20	4
TOTAL	**2,096**	**1,494**	**325**	**277**	**144**	**1,872**	**80**

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 3b. Users by Organization by Facilities

	Users[1]	External Users	Local Users[2]	NHMFL-Affiliated Users[2,3,4]	Laboratory[3,5]	University[4,5]	Industry[5]
AMRIS – NSF-Funded	**116**	60	34	22	1	112	3
AMRIS – Non-NHMFL-Funded	**291**	138	128	25	1	286	4
DC Field	**708**	574	44	90	61	628	19
EMR	**162**	110	23	29	5	151	6
High B/T	**17**	7	6	4	0	17	0
ICR	**308**	254	24	30	24	266	18
NMR	**287**	197	44	46	11	265	11
Pulsed Field	**207**	154	22	31	41	147	19
TOTAL	**2,096**	**1,494**	**325**	**277**	**144**	**1,872**	**80**

[1] Users using multiple facilities are counted in each facility listed.
[2] NHMFL-Affiliated users are defined as anyone in the lab's personnel system (i.e. on our web site/directory), even if they travel to another site. Local users are defined as any non-NHMFL-Affiliated researchers originating at any of the institutions in proximity to the MagLab sites (i.e. researchers at FSU, UF, FAMU, or LANL), even if they travel to another site.
[3] Users with primary affiliations at NHMFL/LANL are reported in NHMFL-Affiliated Users and National Laboratory.
[4] Users with primary affiliations at FSU, UF, or FAMU are reported in NHMFL-Affiliated Users and National University.
[5] The total of university, industry, and national lab users will equal the total number of users.

Table 4a. Users by Discipline of All Facilities

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
Senior Personnel, U.S.	**718**	222	170	67	26	233
Senior Personnel, non-U.S.	**231**	72	104	12	7	36
Postdocs, U.S.	**257**	125	39	15	13	65
Postdocs, non-U.S.	**49**	26	16	0	3	4
Students, U.S.	**621**	251	167	70	26	107
Students, non-U.S.	**109**	47	37	13	3	9
Technician, U.S.	**85**	6	5	11	20	43
Technician, non-U.S.	**26**	1	8	7	0	10
TOTAL	**2,096**	**750**	**546**	**195**	**98**	**507**

[1] Users using multiple facilities are counted in each facility listed.

Table 4b. Users by Discipline by Facilities

	Users[1]	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
AMRIS – NSF-Funded	**116**	2	17	19	7	71
AMRIS – Non-NHMFL-Funded	**291**	1	20	30	27	213
DC Field	**708**	510	88	48	39	23
EMR	**162**	42	91	2	6	21
High B/T	**17**	13	0	2	0	2
ICR	**308**	0	194	51	3	60
NMR	**287**	3	121	41	11	111
Pulsed Field	**207**	179	15	2	5	6
TOTAL	**2,096**	**750**	**546**	**195**	**98**	**507**

[1] Users using multiple facilities are counted in each facility listed.

Table 5a. Subscription Rate (Experiments) by Facilities

	Experiments Submitted (Current Year)	Experiments Submitted (Deferred from prev. year)	Experiments With Usage	Experiments With Usage Percentage	Experiments Declined	Experiments Declined Percentage	Experiments Reviewed	Experiment Subscription Rate	Experiments Subscription Percentage
AMRIS – NSF-Funded	15	22	**36**	97.3 %	1	2.7 %	**37**	1.0	102.8 %
AMRIS – Non-NHMFL-Funded	35	84	**112**	94.1 %	7	5.9 %	**119**	1.1	106.3 %
DC Field	480	32	**319**	62.3 %	193	37.7 %	**512**	1.6	160.5 %
EMR	114	24	**120**	87 %	18	13 %	**138**	1.2	115 %
High B/T	5	0	**3**	60 %	2	40 %	**5**	1.7	166.7 %
ICR	120	33	**139**	90.8 %	14	9.2 %	**153**	1.1	110.1 %
NMR	555	55	**570**	93.4 %	40	6.6 %	**610**	1.1	107 %
Pulsed Field	114	24	**91**	65.9 %	47	34.1 %	**138**	1.5	151.6 %
TOTAL	**1,438**	**274**	**1,390**	**81.2**	**322**	**18.8**	**1,712**	1.23	123.1 %

Table 5b. Subscription Rate (Magnet Days) by Facilities

	Days Submitted	Days Used by External User	Days Used by Local User	Days Used by NHMFL-Affiliated User	Days Used for Inst., Dev., Test and Maint.	Total Days Used	Days Subscription Rate	Days Subscription Percentage
AMRIS – NSF-Funded	1,242	539.9	3.2	91	608	1,242	1.0	100 %
AMRIS – Non-NHMFL-Funded	1,682	1,038.9	135.7	390.4	117	1,682	1.0	100 %
DC Field	3,711	1,429.6	14	375.8	48.4	1,867.7	2.0	198.7 %
EMR	999	492	29	69.5	188.5	779	1.3	128.2 %
High B/T	923	700	0	0	119	819	1.1	112.7 %
ICR	1,746	339.2	34.5	140.2	331.2	845	2.1	206.6 %
NMR	3,520	1,796	135.5	1,486.5	93	3,511	1.0	100.3 %
Pulsed Field	1,019	398	93	144	0	635	1.6	160.5 %
TOTAL	**14,842**	**6,733.5**	**444.9**	**2,697.3**	**1,504.9**	**11,380.7**	**1.3**	**130.4 %**

Table 6. Research Proposals [1] Profile with Magnet Time by Facilities

	Total Proposals[1]	Minority[2]	Non-Minority	No Race Response	Female[3]	Male	Other	No Gender Response	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochem, Biophys.
AMRIS – NSF-Funded	**34**	6	23	5	11	20	0	3	0	3	4	0	27
AMRIS – Non-NHMFL-Funded	**80**	7	45	28	17	40	0	23	0	0	0	0	80
DC Field	**187**	10	156	21	32	147	0	8	138	20	3	19	7
EMR	**62**	5	51	6	13	45	0	4	13	28	0	8	13
High B/T	**3**	0	2	1	0	3	0	0	3	0	0	0	0
ICR	**85**	5	72	8	19	62	0	4	0	60	4	3	18
NMR	**104**	5	87	12	27	73	0	4	3	29	5	8	59
Pulsed Field	**60**	3	53	4	12	46	0	2	54	1	0	3	2
TOTAL	**615**	**41**	**489**	**85**	**131**	**436**	**0**	**48**	**211**	**141**	**16**	**41**	**206**

[1] A "proposal" may have associated with it a single experiment or a group of closely related experiments. A PI may have more than one proposal.
[2] The number of proposals satisfying the following condition: The PI is a minority.

[3] The number of proposals satisfying the following condition: The PI is a female.

Note: The table refers to proposal disciplines.

Find the list of user proposals in **Appendix V** and on our **website**

Table 7. Operations by User Type by Facilities

	Total Days Used	Days Used by External User[8]	Days Used by NHMFL-Affiliated User[9]	Days Used for Inst., Dev., Test and Maint.[10]	Days Used by Local User[11]
AMRIS – NSF-Funded[1]	**1,242**	539.9	91.0	608.0	3.2
AMRIS – Non-NHMFL-Funded[1]	**1,682**	1,038.9	390.4	117.0	135.7
DC Field[2]	**1,867.7**	1,429.6	375.8	48.4	14
EMR[3]	**779**	492.0	69.5	188.5	29.0
High B/T[4]	**819**	700.0	0	119.0	0
ICR[5]	**845**	339.2	140.2	331.2	34.5
NMR[6]	**3,511**	1,796.0	1,486.5	93.0	135.5
Pulsed Field[7]	**635**	398	144	0	93
TOTAL	**11,380.7**	**6,733.5**	**2,697.3**	**1,504.9**	**444.9**

[1] User Units are defined as magnet days; time utilized is recorded to the nearest 15 minutes. Magnet day definitions for AMRIS instruments: Verticals (500, 600s, & 750 MHz), 1 magnet day = 24 hours. Horizontals (4.7 and 11.1 T), 1 magnet day = 8 hours. This accounts for the difficulty in running animal or human studies overnight. Magnet days were calculated by adding the total number of real used for each instrument and dividing by 24 (vertical) or 8 (horizontal). Note: Due to the nature of the 4.7 T and 11 T studies, almost all studies with external users were collaborative with UF investigators.

[2] Each 20 MW resistive magnet requires two power supplies to run, the 45 T hybrid magnet requires three power supplies and the 36 T Series Connected Hybrid requires one power supply. Thus there can be four resistive magnets + three superconducting magnets operating or the 45 T hybrid, series connected hybrid, two resistive magnets and three superconducting magnets. User Units are defined as magnet days. Users of water-cooled resistive or hybrid magnets can typically expect to receive enough energy for 7 hours a day of magnet usage so a magnet day is defined as 7 hours. Superconducting magnets are scheduled typically 24 hours a day. There is an annual four week shutdown in fall of powered DC resistive and hybrid magnets for infrastructure maintenance and a two week shutdown period for the university mandated holiday break.

[3, 4, 5, 6] User Units are defined as magnet days. One magnet day is defined as 24 hours in superconducting magnets.

[7] User Units are defined as magnet days. Magnets are scheduled typically 12 hours a day.

[8] Days to external users at facility => all U.S. University, U.S. Govt. Lab., U.S. Industry, Non-U.S. excluding NHMFL Affiliated, Local, Test, Calibration, Set-up, Maintenance, Inst. Dev.

[9] Days to NHMFL-Affiliated (in-house) research => NHMFL-Affiliated only

[10] Days to instrument development and maintenance (combined) => test, calibration, set-up, maintenance, inst. Dev.

[11] Days to local => local only

Table 8. Operations by Discipline of All Facilities

	Total Days Used	Condensed Matter Physics	Chemistry, Geochemistry	Engineering	Magnets, Materials	Biology, Biochemistry, Biophysics
NHMFL-Affiliated	**2,697.3**	539.4	182.2	3.3	405.9	1,566.6
Local	**444.9**	107	148.5	12	1	176.4
U.S. University	**4,743**	1,483.9	1,297.2	247.5	39	1,675.3
U.S. Govt. Lab.	**240.9**	182	3	0	18	37.8
U.S. Industry	**137**	0	4	0	7	126
Non-U.S.	**1,612.7**	705.3	527	24.5	31.8	324.1
Test, Calibration, Set-up, Maintenance, Inst. Dev.	**1,504.9**	152.1	48	8	674.1	622.7
Total	**11,380.7**	**3,169.7**	**2,210**	**295.4**	**1,177**	**4,528.9**

Table 9a. New PIs[1] and New Users of All Facilities

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Senior Personnel, U.S.	498	75	93	405	718	63	76	642
Senior Personnel, non-U.S.	125	27	35	90	231	26	34	197
Postdocs, U.S.	29	7	7	22	257	55	69	188

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
Postdocs, non-U.S.	9	3	3	6	49	19	24	25
Students, U.S.	3	3	3	0	621	199	229	392
Students, non-U.S.	0	0	0	0	109	45	52	57
Technician, U.S.	3	0	0	3	85	6	6	79
Technician, non-U.S.	0	0	0	0	26	10	11	15
TOTAL	**667**	**115**	**141**	**526**	**2,096**	**423**	**501**	**1,595**

[1] PIs who received magnet time for the first time.

Table 9b. New PIs[1] and New Users by Facilities

	PIs	New PIs at the MagLab	New PIs at Facility	Returning PIs at Facility	All Users	New Users at the MagLab	New Users at Facility	Returning Users at Facility
AMRIS – NSF-Funded	**46**	12	16	30	116	17	24	92
AMRIS – Non-NHMFL-Funded	**91**	16	16	75	291	10	11	280
DC Field	**209**	28	41	168	708	174	206	502
EMR	**67**	10	14	53	162	32	45	117
High B/T	**5**	0	0	5	17	0	0	17
ICR	**84**	26	26	58	308	82	82	226
NMR	**95**	17	17	78	287	65	67	220
Pulsed Field	**70**	6	11	59	207	43	66	141
TOTAL	**667**	**115**	**141**	**526**	**2,096**	**423**	**501**	**1,595**

[1] PIs who received magnet time for the first time.

Table 10a. Funding Source of Users' Research-Day Allotted (Counts) by Facilities

	Total Days Used	NSF[1]	NIH	DOE	DOD[2]	VSP	FFI	UF MBI	EPA	Interna-tional	National	Indus-try[3]	Other
AMRIS – NSF-Funded	1,242	910.4	141.3	13	0	0	0	4.5	0	48.7	113.8	0	0
AMRIS – Non-NHMFL-Funded	1,682	128.8	769.7	0	3.2	0	0	27.2	0	0	565	34.1	1.0
DC Field	1,867.7	783.3	25	410.4	59.5	5	0	0	0	235.8	306.2	37.5	5
EMR	779	627.5	6	38.5	0	0	0	0	0	68	39	0	0
High B/T	819	454	0	0	0	0	0	0	0	365	0	0	0
ICR	845	608.9	45.9	2.2	9.0	0	4	0	0	86.3	81.9	6.9	0
NMR	3,511	1,637.3	1,187.5	1	0	0	0	0	0	524.5	101.7	150	10
Pulsed Field	635	166.0	0	253.8	2.5	5	0	0	0	64.5	140.7	2.5	0
TOTAL	**11,380.7**	**5,316.2**	**2,175.4**	**718.9**	**74.2**	**10**	**4**	**31.7**	**0**	**1,392.8**	**1,348.2**	**231**	**16**

[1] Includes NSF, UCGP, and 'No other support'.
[2] Includes NASA, US Army, US Navy, and US Airforce.
[3] Includes US Industry and Non-US Industry.

Table 10b. Funding Source of Users' Research-Day Allotted (Percentage) by Facilities

	NSF[1]	NIH	DOE	DOD[2]	VSP	FFI	UF MBI	EPA	Interna-tional	National	Indus-try[3]	Other
AMRIS – NSF-Funded	73.3	11.4	1	0	0	0	0.4	0	3.9	9.2	0	0
AMRIS – Non-NHMFL-Funded	7.7	45.8	0	0.2	0	0	1.6	0	0	33.6	2	0.1
DC Field	41.9	1.3	22	3.2	0.3	0	0	0	12.6	16.4	2	0.3

	NSF[1]	NIH	DOE	DOD[2]	VSP	FFI	UF MBI	EPA	International	National	Industry[3]	Other
EMR	80.6	0.8	4.9	0	0	0	0	0	8.7	5	0	0
High B/T	55.4	0	0	0	0	0	0	0	44.6	0	0	0
ICR	72.1	5.4	0.3	1.1	0	0.5	0	0	10.2	9.7	0.8	0
NMR	46.6	33.8	0	0	0	0	0	0	14.9	2.9	4.3	0.3
Pulsed Field	26.1	0	40	0.4	0.8	0	0	0	10.2	22.2	0.4	0
TOTAL	**46.7**	**19.1**	**6.3**	**0.7**	**0.1**	**0**	**0.3**	**0**	**12.2**	**11.8**	**2**	**0.1**

1 Includes NSF, UCGP, and 'No other support'.
2 Includes NASA, US Army, US Navy, and US Airforce.
3 Includes US Industry and Non-US Industry.

APPENDIX IV – GEOGRAPHIC DISTRIBUTION

I. AMRIS Facility
NSF-Funded - National Users

Name	User Type	Organization Name	Country
Agbandje-McKenna, Mavis	S	University of Florida	USA
Angelopoulos, Anastasios	S	University of Cincinnati	USA
Barton, Elisabeth	S	University of Florida	USA
Bizon, Jen	S	University of Florida	USA
Blackband, Steve	S	University of Florida	USA
Blackburn, David	S	University of Florida	USA
Bowers, Clifford	S	University of Florida	USA
Brady, Jeanine	S	University of Florida	USA
Burke, Sara	S	University of Florida	USA
Candelario-Jalil, Eduardo	S	University of Florida	USA
Caudle, Robert	S	University of Florida	USA
Colon-Perez, Luis	S	University of California, Irvine	USA
Dave, Kunjan	S	University of Miami	USA
Dinglasan, Rhoel	S	University of Florida	USA
Eddy, Matthew	S	University of Florida	USA
Febo, Marcelo	S	University of Florida	USA
Flint, Jeremy	S	University of Florida	USA
Forder, John	S	University of Florida	USA
Gatto , Rodolfo	S	University of Illinois at Chicago	USA
Jeong, Hae-Kwon	S	Texas A&M University	USA
Kaczorowski, Catherine	S	The Jackson Laboratory	USA
Lively, Ryan	S	Georgia Institute of Technology	USA
Long, Joanna	S	University of Florida	USA
Luesch, Hendrik	S	University of Florida	USA
Magin, Richard	S	University of Illinois at Chicago	USA
Mareci, Thomas	S	University of Florida	USA
Mattfeld, Aaron	S	Florida International University	USA
Maurer, Andrew	S	University of Florida	USA
McCommis, Kyle	S	Saint Louis University (SLU)	USA
Merritt, Matthew	S	University of Florida	USA
Palmer, Andrew	S	Florida Institute of Technology	USA
Philmus, Benjamin	S	Oregon State University	USA
Porges, Eric	S	University of Florida	USA
Rocca, James	S	University of Florida	USA

Name	User Type	Organization Name	Country
Rosenberg, Jens	S	National High Magnetic Field Laboratory	USA
Shimizu, Linda	S	University of South Carolina	USA
Stanley, Edward	S	University of Florida	USA
Sumerlin, Brent	S	University of Florida	USA
Talham, Daniel R.	S	University of Florida	USA
Vasenkov, Sergey	S	University of Florida	USA
Veige, Adam	S	University of Florida	USA
Verne, G.	S	Tulane University	USA
Walter, Glenn	S	University of Florida	USA
Wu, Yu-Chien	S	Indiana University	USA
Wylie, Benjamin	S	Texas Tech University Department of Chemistry and Biochemistry	USA
Zeng, Huadong	S	University of Florida	USA
Zhang, Fengli	S	National High Magnetic Field Laboratory	USA
Zhou, QiQi	S	Malcom Randall VA Medical Center	USA
Zuo, Jian	S	University of Florida	USA
Barran-Berdon, Ana	P	University of Florida	USA
Collins, James H.P.	P	University of Florida	USA
Dunn, Amy	P	The Jackson Laboratory	USA
Falk, Darin	P	University of Florida	USA
Huang, Chongyang	P	university of florida	USA
Khattri, Ram	P	University of Florida	USA
Mahar, Rohit	P	University of Florida	USA
Mustafi, Sourajit	P	Indiana University	USA
Ragavan, Mukundan	P	University of Florida	USA
Riviere, Gwladys	P	University of Florida	USA
Vardanyan, Lilit	P	University of Florida	USA
Amin, Manish	G	University of Florida	USA
Anazia, Kara	G	University of Florida	USA
Banan, Guita	G	University of Florida	USA
Baniani, Amineh	G	University of Florida	USA
Batra, Abhinandan	G	University of Florida	USA
Berens, Samuel	G	University of Florida	USA
Burg, Matthew	G	University of Florida	USA
Col, Taylor	G	Vasenkov Lab	USA
DeHaven, Baillie	G	University of South Carolina	USA
Dutta, Akshita	G	University of Florida	USA
Esper, Alec	G	University of Florida	USA
Fan, Lei	G	University of Florida	USA
Forman, Evan	G	University of Florida	USA

Name	User Type	Organization Name	Country
Gao, Jin	G	University of Illinois at Chicago	USA
Gopal Pour, Niloofar	G	University of Florida	USA
Hillman, Febrian	G	Texas A&M University	USA
McLeod, Marc	G	University of Florida College of Medicine	USA
Menon, Kannan	G	University of Florida	USA
Miao, Zhihui	G	University of Florida	USA
Mulry, Emma	G	University of Florida	USA
Neuner, Sarah	G	The Jackson Laboratory	USA
Perera, Leronne	G	University of Florida	USA
Pompilus, Marjory	G	University of Florida	USA
Ray, Arka Prabha	G	University of Florida	USA
Roy, Pratik	G	University of Florida	USA
Sindt, Ammon	G	University of South Carolina	USA
Tampu, Iulian	G	University of Florida	USA
Thakur, Naveen	G	University of Florida	USA
Tokarski, John	G	University of Florida	USA
Turner, Sean	G	University of Florida	USA
Zhou, Erkang	G	Georgia Institute of Technology	USA
Ziegler, Eric	G	Florida Institute of Technology	USA
Brotgandel, Albert	U	University of Florida	USA
Chatfield, Shane	T	University of Florida	USA
Elumalai, Malathy	T	University of Florida	USA
Jenkins, Kelly	T	University of Florida	USA
Lakshmanan, Renuk	T	University of Florida	USA
Li, Weiguo	T	University of Illinois at Chicago	USA
Lovett, Sarah	T	University of Florida	USA
Nicholson, Tammy	T	University of Florida	USA
Nick, Jerelyn	T	University of Florida	USA
Robertson, Kimberly	T	University of Florida	USA
Slade, Joshua	T	University of Florida	USA
Steadman, Judith	T	University of Florida	USA
Swiers, Christi	T	University of Florida	USA
Vaught, Lauren	T	University of Florida	USA

NSF-Funded - National Users

Name	User Type	Organization Name	Country
Baligand, Celine	S	Leiden University Medical Center	Netherland
Bernatchez, Pascal	S	University of British Columbia	Canada
Diaz-Manera, Jordi	S	University of Barcelona	Spain

Name	User Type	Organization Name	Country
Jones, John	S	Center for Neurosciences and Cell Biology	Portugal
Kaerger, Joerg	S	Leipzig University	Germany
Near, Jamie	S	McGill University	Canada
Özarslan, Evren	S	Linköping University	Sweden
Torto, Baldwyn	S	International Centre of Insect Physiology and Ecology	Kenya
Chmelik, Christian	P	Leipzig University	Germany
Mostafa, Ahmad	P	Al-Azhar University	Egypt

Non-NHMFL Funded - National Users

Name	User Type	Organization Name	Country
Abisambra, Jose	S	University of Florida	USA
Atluri, Venkata	S	Florida International University	USA
Barton, Elisabeth	S	University of Florida	USA
Blackband, Steve	S	University of Florida	USA
Bowers, Clifford	S	University of Florida	USA
Bowers, Dawn	S	University of Florida	USA
Brady, Jeanine	S	University of Florida	USA
Bril, Fernando	S	University of Florida	USA
Bubb, Michael	S	University of Florida	USA
Burke, Sara	S	University of Florida	USA
Butcher, Rebecca	S	University of Florida	USA
Byrne, Barry	S	University of Florida	USA
Candelario-Jalil, Eduardo	S	University of Florida	USA
Cao, Yunwei Charles	S	University of Florida	USA
Carney, Paul	S	University of Florida	USA
Clark, Virginia	S	University of Florida	USA
Cohen, Ron	S	University of Florida	USA
Collins, James F.	S	University of Florida	USA
Colon-Perez, Luis	S	University of California, Irvine	USA
Coombes, Stephen	S	University of Florida	USA
Cousins, Robert	S	University of Florida	USA
Cruz-Almeida, Yenisel	S	University of Florida	USA
Cusi, Kenneth	S	University of Florida	USA
Dastmalchi, Farhad	S	University of Florida	USA
de Kloet, Annette	S	University of Florida	USA
Ding, Mingzhou	S	University of Florida	USA
Ding, Yousong	S	University of Florida	USA
Dinglasan, Rhoel	S	University of Florida	USA
Dobson, Jon	S	University of Florida	USA

Name	User Type	Organization Name	Country
Donahoo, William	S	University of Florida	USA
Ebner, Natalie	S	University of Florida	USA
Febo, Marcelo	S	University of Florida	USA
Ferris, Daniel	S	University of Florida	USA
Fillingim, Roger	S	University of Florida	USA
Firpi-Morell, Roberto	S	University of Florida	USA
Flint, Jeremy	S	University of Florida	USA
Forder, John	S	University of Florida	USA
Foster, Thomas	S	University of Florida	USA
Frazier, Charles	S	University of Florida	USA
Fuller, David	S	University of Florida	USA
Ghiviriga, Ion	S	University of Florida	USA
Guo, Zhongwu	S	University of Florida	USA
Hamerly, Timothy	S	University of Florida	USA
Hayward, Linda	S	University of Florida	USA
Horenstein, Nicole	S	University of Florida	USA
Jayant, Rahul	S	Texas Tech University	USA
Kaczorowski, Catherine	S	The Jackson Laboratory	USA
Kalamangalam, Giridhar	S	University of Florida	USA
Kaplan, Fatma	S	Kaplan Schiller Research, LLC	USA
Keeley, Ellen	S	University of Florida	USA
Keil, Andreas	S	University of Florida	USA
Kem, Wiliam R.	S	University of Florida	USA
Khoshbouei, Habibeh	S	University of Florida	USA
Krause, Eric	S	University of Florida	USA
Kumar, Ashok	S	University of Florida	USA
Lamb, Damon	S	University of Florida	USA
Lewis, Mark	S	University of Florida	USA
Li, Hong	S	Florida State University	USA
Lin, Landon	S	University of Florida	USA
Long, Joanna	S	University of Florida	USA
Lott, Donovan	S	University of Florida	USA
Luesch, Hendrik	S	University of Florida	USA
Mareci, Thomas	S	University of Florida	USA
McFarland, Nikolaus	S	University of Florida	USA
Mehrad, Borna	S	University of Florida	USA
Merritt, Matthew	S	University of Florida	USA
Mislovic, Ann	S	University of Florida	USA
Mitchell, Duane	S	University of Florida	USA

Name	User Type	Organization Name	Country
Nair, Madhavan	S	Florida International University	USA
Neubert, John	S	University of Florida	USA
Nixon, Sara	S	University of Florida	USA
Norton, Luke	S	University of Texas Health Science Center, San Antonio	USA
Nyasembe, Vincent	S	University of Florida	USA
O,Dell, Walter	S	University of Florida	USA
Okun, Michael	S	University of Florida	USA
Oweiss, Karim	S	University of Florida	USA
Paul, Valerie	S	Smithsonian Institution	USA
Porges, Eric	S	University of Florida	USA
Price, Catherine	S	University of Florida	USA
Reznikov, Leah	S	University of Florida	USA
Robinson, Michael	S	University of Florida	USA
Rocca, James	S	University of Florida	USA
Rosenberg, Jens	S	National High Magnetic Field Laboratory	USA
Sadleir, Rosalind	S	Arizona State University	USA
Sarntinoranont, Malisa	S	University of Florida	USA
Satyal, Prabodh	S	Aromatic Plant Research Center	USA
Sayour, Elias	S	University of Florida	USA
Schär , Michael	S	Johns Hopkins University	USA
Schmidt, Christine	S	University of Florida	USA
Segal, Mark	S	University of Florida	USA
Seidler, Rachael	S	University of Florida	USA
Setlow, Barry	S	University of Florida	USA
Smith, Glenn	S	University of Florida	USA
Stock, S. Patricia	S	University of Arizona	USA
Subramanian, Narayan	S	University of Florida	USA
Subramony, Sub	S	University of Florida	USA
Sweeney, Lee	S	University of Florida	USA
Talham, Daniel R.	S	University of Florida	USA
Tran, David	S	University of Florida	USA
Vaillancourt, David	S	University of Florida	USA
VANDENBORNE, K.	S	University of Florida	USA
Wagle Shukla, Aparna	S	University of Florida	USA
Walter, Glenn	S	University of Florida	USA
Wang, Zheng	S	University of Florida	USA
White, Keith	S	University of Florida	USA
Williamson, John	S	University of Florida	USA
Woods, Adam	S	University of Florida	USA

Name	User Type	Organization Name	Country
Yang, Zhihui	S	University of Florida	USA
Zeng, Huadong	S	University of Florida	USA
Aydemir , Tolunay Beker	P	University of Florida	USA
Barran-Berdon, Ana	P	University of Florida	USA
Boissoneault, Jeff	P	University of Florida	USA
Burciu, Roxana	P	University of Florida	USA
Chakrabarty, Paramita	P	University of Florida	USA
Chauhan , Munish	P	Arizona State University	USA
Collins, James H.P.	P	University of Florida	USA
Corti, Manuela	P	University of Florida	USA
Falk, Darin	P	University of Florida	USA
Fettrow, Tyler	P	University of Florida	USA
Flores, Shireen	P	University of Florida	USA
Forbes, Sean	P	University of Florida	USA
Ibarra, Bryan	P	University of Florida	USA
Indahlastari, Aprinda	P	University of Florida	USA
Jones, Rachel	P	University of Florida	USA
Khattri, Ram	P	University of Florida	USA
Lee, Brittany	P	Stanford University	USA
Li, Qingjiang	P	University of Florida	USA
Lopez, Christopher	P	University of Florida	USA
Mahar, Rohit	P	University of Florida	USA
Matthews, James	P	University of Florida	USA
Mobini, Sahba	P	University of Florida	USA
Monsalve, Adam	P	University of Florida	USA
Ofori, Edward	P	University of Florida	USA
Orsini , Caitlin	P	University of Florida	USA
Ragavan, Mukundan	P	University of Florida	USA
Rahman, Maryam	P	University of Florida	USA
Riviere, Gwladys	P	University of Florida	USA
Sambuco, Nicola	P	University of Florida	USA
Shou, Qingyao	P	University of Florida	USA
Shukla, Priyank	P	University of Florida	USA
Sirusi Arvij, Ali	P	University of Florida	USA
Stennett, Bethany	P	University of Florida	USA
Terry, Ellen	P	University of Florida	USA
Todd, Adrian	P	University of Florida	USA
Tomitaka, Asahi	P	Florida International University	USA
Tschosik , Monica	P	University of Florida	USA

Name	User Type	Organization Name	Country
Wang, Kevin	P	University of Florida	USA
Willcocks, Rebecca	P	University of Florida	USA
Yegla , Brittney	P	University of Florida	USA
Zhao, Qing	P	University of Florida	USA
Zhu, Sanyong	P	University of Florida	USA
Zhu, Tian	P	University of Florida	USA
Zubcevic, Jasenka	P	University of Florida	USA
Agrawal , Nikunj	G	University of Florida	USA
Amin, Manish	G	University of Florida	USA
Banan, Guita	G	University of Florida	USA
Barnard, Alison	G	University of Florida	USA
Barter, Jolie	G	University of Florida	USA
Batra, Abhinandan	G	University of Florida	USA
Boutzoukas, Emanuel	G	University of Florida	USA
Cai, Weijing	G	University of Florida	USA
Canzano, Joe	G	University of Florida	USA
Carter, Alan	G	University of Florida	USA
Chrzanowski, Stephen	G	University of Florida	USA
Chu, Winston	G	University of Florida	USA
Chung, Jae Woo	G	University of Florida	USA
Cobb, Asia	G	University of Florida	USA
de Wit, Liselotte	G	University of Florida	USA
DeFeis, Brittany	G	University of Florida	USA
DeSimone, Jesse	G	University of Florida	USA
Downes, Daniel	G	University of Florida	USA
Dragone, Joe	G	University of Florida	USA
Dyson, Kyle	G	University of Florida	USA
Feng, Likui	G	University of Florida	USA
Gaynor, Leslie	G	University of Florida	USA
Gillett, Drew	G	University of Florida	USA
Grippin, Adam	G	University of Florida	USA
Guess, Danielle	G	University of Florida	USA
Gullett, Joseph	G	University of Florida	USA
Hamm, Matthew	G	University of Florida	USA
Harden, Scott	G	University of Florida	USA
Hu, Zhenhong	G	University of Florida	USA
Huang, Haiqing	G	University of Florida	USA
Hupfeld, Kathleen	G	University of Florida	USA
James, Belita	G	University of Florida	USA

Name	User Type	Organization Name	Country
Jiang, Guangde	G	University of Florida	USA
Kasinadhuni, Aditya	G	University of Florida	USA
Kasper, Mary	G	University of Florida	USA
Kraft, Jessica	G	University of Florida	USA
Kulam Najmudeen, Magdoom Mohamed	G	University of Florida	USA
Lebowitz, Joseph	G	University of Florida	USA
Lubke, Katherine	G	University of Florida	USA
Mangal, Paul	G	University of Florida	USA
Menon, Kannan	G	University of Florida	USA
Meyyappan, Sreenivasan	G	University of Florida	USA
Miller, Doug	G	University of Florida	USA
Moslemi, Zahra	G	University of Florida	USA
Nguyen, Dan-Tam	G	University of Florida	USA
Nissim, Nicole	G	University of Florida	USA
O,Connell, Rebecca	G	UF Cognitive Neuroscience Lab	USA
O,Shea, Deirdre	G	University of Florida	USA
Peng, Qingqing (Emily)	G	University of Florida	USA
Perera, Leronne	G	University of Florida	USA
Petro, Nathan	G	University of Florida	USA
Pompilus, Marjory	G	University of Florida	USA
Rajan, Abhijit	G	University of Florida	USA
Ray, Alyssa	G	UF Cognitive Neuroscience Lab	USA
Rey, Julian	G	University of Florida	USA
Rezaei, Roxanne	G	University of Florida	USA
Roder, Alexandra	G	University of Arizona	USA
Roy, Pratik	G	University of Florida	USA
Salabarria, Stephanie	G	University of Florida	USA
Sambo, Danielle	G	University of Florida	USA
Singh, Prashant	G	University of Florida	USA
Spearman, Benjamin	G	University of Florida	USA
Sunshine, Michael	G	University of Florida	USA
Symeonidou, Evangelia-Regkina	G	University of Florida	USA
Tan, Yalun	G	University of Florida	USA
Tiwari, Sneham	G	Florida International University	USA
Tran, Nhi	G	University of Florida	USA
Turner, Sean	G	University of Florida	USA
Vohra, Ravneet	G	University of Florida	USA
Wang, Lei	G	University of Florida	USA
Wang, Yuting	G	University of Florida	USA

Name	User Type	Organization Name	Country
Wildes, Tyler	G	University of Florida	USA
Wilkes, Bradley	G	University of Florida	USA
Yang, Tao	G	University of Florida	USA
Yin, Siyang	G	University of Florida	USA
Zhang, Xinxing	G	University of Florida	USA
Zhang, Yi	G	University of Florida	USA
Zhao, Tommy	G	University of Florida	USA
Adderley, Qutell	U	Fisk University	USA
Agan , Verda	U	University of Florida	USA
Brotgandel, Albert	U	University of Florida	USA
Carhill, Karlena	U	University of Florida	USA
Guice, Kimberly	U	University of Florida	USA
Hatcher, Abigail	U	University of Florida	USA
Hey, Matthew	U	University of Florida	USA
Marr, Kelsey	U	University of Florida	USA
McConn, Susanna	U	University of Florida	USA
McCracken, Johanna	U	University of Florida	USA
Mendez, David	U	University of Florida	USA
Wummer, Brandon	U	University of Florida	USA
Akbar, Maisha	T	University of Florida	USA
Bryan, Madison	T	University of Florida	USA
Cardoso, Josue	T	University of Florida	USA
Castro, Rebeca	T	University of Florida	USA
Chatfield, Shane	T	University of Florida	USA
Cousins, Tina	T	University of Florida	USA
Deleyrolle, Phuong	T	University of Florida	USA
Elumalai, Malathy	T	University of Florida	USA
Forbes, Megan	T	University of Florida	USA
Garcia, Vanessa	T	University of Florida	USA
Giacalone, Anthony	T	University of Florida	USA
Gonzalez, Hector	T	University of Florida	USA
Gullett, Stephen	T	University of Florida	USA
Heshmati , Sara	T	University of Florida	USA
Hiller , Helmut	T	University of Florida	USA
Jenkins, Kelly	T	University of Florida	USA
Johnson, Keyanni	T	University of Florida	USA
Khalaf, Saher	T	University of Florida	USA
Kim, Gee	T	University of Florida	USA
Kugelmann, Lee	T	University of Florida	USA

Name	User Type	Organization Name	Country
Lysne, Paige	T	University of Florida	USA
Malphurs, Wendi	T	University of Florida	USA
McNally, Caitlin	T	University of Florida	USA
Mejia, Marlin	T	University of Florida	USA
Morgan, Rebecca	T	University of Florida	USA
Murphy, Aidan	T	Center for Cognitive Aging & Memory	USA
Nicholson, Tammy	T	University of Florida	USA
Norman, Samantha	T	University of Florida	USA
O,Shea, Andrew	T	University of Florida	USA
Poulton, Danielle	T	University of Florida	USA
Powers, Cathy	T	University of Florida	USA
Redler , Ty	T	University of Florida	USA
Saavedra, Andres	T	University of Florida	USA
Slade, Joshua	T	University of Florida	USA
Slater, Amanda	T	University of Florida	USA
Steadman, Judith	T	University of Florida	USA
Swiers, Christi	T	University of Florida	USA
Thomas, Nagheme	T	University of Florida	USA
Thompson, Grace	T	University of Florida	USA
Trahan , Yvette	T	University of Florida	USA
Tsarova, Tatsiana	T	University of Florida	USA
Watkins, Jacqueline	T	University of Florida	USA
Yndart, Adriana	T	Florida International University	USA
Zaidi, Zareen	T	University of Florida	USA
Zulich, Abigail	T	University of Florida	USA

Non-NHMFL Funded - International Users

Name	User Type	Organization Name	Country
Baligand, Celine	S	Leiden University Medical Center	Netherland
Hansen, Brian	S	Aarhus University	Denmark
Torto, Baldwyn	S	International Centre of Insect Physiology and Ecology	Kenya

2. DC Field Facility

National Users

Name	User Type	Organization Name	Country
Abraimov, Dmytro	S	National High Magnetic Field Laboratory	USA
Agosta, Charles	S	Clark University	USA
Analytis, James	S	University of California, Berkeley	USA
Andrei, Petru	S	College of Engineering	USA
Ashcroft, Neil	S	Cornell University	USA

Name	User Type	Organization Name	Country
Baek, Hongwoo	S	National High Magnetic Field Laboratory	USA
Bai, Hongyu	S	National High Magnetic Field Laboratory	USA
Balakirev, Fedor	S	National High Magnetic Field Laboratory	USA
Balicas, Luis	S	National High Magnetic Field Laboratory	USA
Bangura, Alimamy	S	National High Magnetic Field Laboratory	USA
Bauer, Eric	S	Los Alamos National Laboratory	USA
Baumbach, Ryan	S	National High Magnetic Field Laboratory	USA
Beekman, Christianne	S	National High Magnetic Field Laboratory	USA
Belenky, Gregory	S	State University of New York at Stony Brook	USA
Berry, John	S	University of Wisconsin, Madison	USA
Betts, Jonathan	S	National High Magnetic Field Laboratory	USA
Bhattacharya, Anand	S	Argonne National Laboratory	USA
Bird, Mark	S	National High Magnetic Field Laboratory	USA
Boebinger, Greg	S	National High Magnetic Field Laboratory	USA
Bonev, Stanimir	S	Lawrence Livermore National Laboratory	USA
Brey, William	S	National High Magnetic Field Laboratory	USA
Butch, Nicholas	S	National Institute of Standards and Technology	USA
Cao, Gang	S	University of Colorado, Boulder	USA
Centeno, Silvia	S	The Metropolitan Museum of Art	USA
Chakhalian, Jak	S	Rutgers University, New Brunswick	USA
Chang, Robert	S	Northwestern University	USA
Checkelsky, Joseph	S	Massachusetts Institute of Technology	USA
Cheong, Sang Wook	S	Rutgers University, New Brunswick	USA
Choi, Eun Sang	S	National High Magnetic Field Laboratory	USA
Chu, Jiun-Haw	S	University of Washington	USA
Churchill, Hugh	S	University of Arkansas	USA
Coniglio, William	S	National High Magnetic Field Laboratory	USA
Corvalan Moya, Carolina	S	Los Alamos National Laboratory	USA
Cross, Tim	S	National High Magnetic Field Laboratory	USA
Dai, Pengcheng	S	University of Tennessee, Knoxville	USA
Dean, Cory	S	City College of New York	USA
Deemyad, Shanti	S	University of Utah	USA
Deshpande, Vikram	S	University of Utah	USA
Dhakal, Pashupati	S	Jefferson Lab	USA
Dhital, Chetan	S	Kennesaw State University	USA
DiTusa, John	S	Louisiana State University	USA
Dixon, Iain	S	National High Magnetic Field Laboratory	USA
Dordevic, Sasa	S	University of Akron	USA
Dybowski, Cecil	S	University of Delaware	USA

Name	User Type	Organization Name	Country
Eley, Serena	S	Colorado School of Mines	USA
Engel, Lloyd	S	National High Magnetic Field Laboratory	USA
Fiedler, Adam	S	Marquette University	USA
Fisher, Ian	S	Stanford University	USA
Fisk, Zachary	S	University of California, Irvine	USA
Fortune, Nathanael	S	Smith College	USA
Freelon, Byron	S	University of Louisville	USA
Fu, Riqiang	S	National High Magnetic Field Laboratory	USA
Galstyan, Eduard	S	University of Houston	USA
Gan, Zhehong	S	National High Magnetic Field Laboratory	USA
Gleeson, James	S	Kent State University	USA
Gofryk, Krzysztof	S	Idaho National Laboratory	USA
Graf, David	S	National High Magnetic Field Laboratory	USA
Grayson, Matthew	S	Northwestern University	USA
Greene, Laura	S	National High Magnetic Field Laboratory	USA
Greene, Richard	S	University of Maryland, College Park	USA
Grockowiak, Audrey	S	National High Magnetic Field Laboratory	USA
Guptasarma, Prasenjit	S	University of Wisconsin, Milwaukee	USA
Hadt, Ryan	S	Caltech	USA
Hahn, Seungyong	S	National High Magnetic Field Laboratory	USA
Hannahs, Scott	S	National High Magnetic Field Laboratory	USA
Haravifard, Sara	S	Duke University	USA
Heinz, Tony	S	Stanford University	USA
Hellstrom, Eric	S	National High Magnetic Field Laboratory	USA
Hill, Stephen	S	National High Magnetic Field Laboratory	USA
Hilton, David	S	University of Alabama, Birmingham	USA
Ho, Pei-Chun	S	California State University, Fresno	USA
Hoffmann, Roald	S	Cornell University	USA
Holland, Patrick	S	Yale University	USA
Hone, James	S	Columbia University	USA
Hu, Jin	S	University of Arkansas	USA
Huang, Chien-Lung	S	Rice University	USA
Hung, Ivan	S	National High Magnetic Field Laboratory	USA
Jaime, Marcelo	S	National High Magnetic Field Laboratory	USA
Jakli, Antal	S	Kent State University	USA
Jaroszynski, Jan	S	National High Magnetic Field Laboratory	USA
Jena, Debdeep	S	Cornell University	USA
Jiang, Xiaomei	S	University of South Florida	USA
Jiang, Zhigang	S	Georgia Institute of Technology	USA

Name	User Type	Organization Name	Country
Jin, Rongying	S	Louisiana State University	USA
Kar, Soumen	S	University of Houston	USA
Karaiskaj, Denis	S	University of South Florida	USA
Katzer, Scott	S	U.S. Naval Research Laboratory	USA
Kauzlarich, Susan	S	University of California, Davis	USA
Kim, Philip	S	Harvard University	USA
Kolagani, Rajeswari	S	Towson University	USA
Koshelev, Alexei	S	Argonne National Laboratory	USA
Kovalev, Alexey	S	National High Magnetic Field Laboratory	USA
Krzystek, Jurek	S	National High Magnetic Field Laboratory	USA
Kynoch, John	S	National High Magnetic Field Laboratory	USA
Larbalestier, David	S	National High Magnetic Field Laboratory	USA
Lau, Chun Ning (Jeanie)	S	Ohio State University	USA
Lee, David	S	Gordon College	USA
Lee, Ho Nyung	S	Oak Ridge National Laboratory	USA
Lee, Minhyea	S	University of Colorado, Boulder	USA
Lee, Seng Huat	S	Pennsylvania State University	USA
Lee, Wei-Tsung	S	Loyola University Chicago	USA
Lee, Young	S	Stanford University	USA
Li, Jia	S	Brown University	USA
Li, Lu	S	University of Michigan	USA
Li, Qi	S	Pennsylvania State University	USA
Ling, Xi	S	Boston University	USA
Litvak, Ilya	S	National High Magnetic Field Laboratory	USA
Liu, Jian	S	University of Tennessee	USA
Lu, Jun	S	National High Magnetic Field Laboratory	USA
Lu, Tzu-Ming	S	Sandia National Laboratories	USA
Lui, Chun Hung	S	University of California, Riverside	USA
Mak, Kin Fai	S	Pennsylvania State University	USA
Mandrus, David	S	University of Tennessee, Knoxville	USA
Manfra, Michael	S	Nokia Bell Labs	USA
Manousakis, Efstratios	S	Florida State University	USA
Manson, Jamie	S	Eastern Washington University	USA
Mao, Zhiqiang	S	Pennsylvania State University	USA
Maple, Brian	S	University of California, San Diego	USA
Marassi, Francesca	S	Sanford Burnham Prebys Medical Discovery Institute	USA
Martin, Rachel	S	University of California, Irvine	USA
McDonald, Ross	S	National High Magnetic Field Laboratory	USA
McGill, Stephen	S	National High Magnetic Field Laboratory	USA

Name	User Type	Organization Name	Country
McQueen, Tyrel	S	Johns Hopkins University	USA
Mentink, Frederic	S	National High Magnetic Field Laboratory	USA
Mewes, Claudia	S	The University of Alabama	USA
Mewes, TIm	S	University of Alabama	USA
Meyer, David	S	U.S. Naval Research Laboratory	USA
Mitrovic, Vesna	S	Brown University	USA
Moodera, Jagadeesh	S	MIT Plasma Science & Fusion Center	USA
Morosan, Emilia	S	Rice University	USA
Mueller, Leonard	S	University of California, Riverside	USA
Murphy, Tim	S	National High Magnetic Field Laboratory	USA
Musfeldt, Janice	S	University of Tennessee, Knoxville	USA
Myers, Roberto	S	Ohio State University	USA
Nagler, Stephen	S	Oak Ridge National Laboratory	USA
Nakajima, Yasuyuki	S	University of Central Florida	USA
Nevzorov, Alexander	S	North Carolina State University	USA
Ni, Ni	S	University of California, Los Angeles	USA
Ong, N. Phuan	S	Princeton University	USA
Ozarowski, Andrew	S	National High Magnetic Field Laboratory	USA
Ozerov, Mykhaylo	S	National High Magnetic Field Laboratory	USA
Paglione, Johnpierre	S	University of Maryland, College Park	USA
Palmstrom, Chris	S	University of California, Santa Barbara	USA
Pan, Wei	S	Sandia National Laboratories	USA
Park, Ju-Hyun	S	National High Magnetic Field Laboratory	USA
Park, Wan Kyu	S	National High Magnetic Field Laboratory	USA
Pasupathy, Abhay	S	Columbia University	USA
Petrovic, Cedomir	S	Brookhaven National Laboratory	USA
Pfeiffer, Loren	S	Princeton University	USA
Popovic, Dragana	S	National High Magnetic Field Laboratory	USA
Powell, Andy	S	National High Magnetic Field Laboratory	USA
Ramirez, Arthur	S	University of California, Santa Cruz	USA
Ramshaw, Brad	S	Cornell University	USA
Read, Dan	S	University of California, Santa Barbara	USA
Reyes, Arneil	S	National High Magnetic Field Laboratory	USA
Rhodes, Daniel	S	University of Wisconsin, Madison	USA
Ronning, Filip	S	Los Alamos National Laboratory	USA
Ross, Kate	S	Colorado State University	USA
Rupnik, Kresimir	S	Louisiana State University	USA
Salamon, Myron	S	University of Texas, Dallas	USA
Schiano, Jeffrey	S	Pennsylvania State University	USA

Name	User Type	Organization Name	Country
Schlueter, John	S	Argonne National Laboratory	USA
Schoop, Leslie	S	Princeton University	USA
Selvamanickam, Venkat	S	University of Houston	USA
Sen, Sabyasachi	S	University of California, Davis	USA
Shabani, Javad	S	New York University	USA
Shan, Jie	S	Pennsylvania State University	USA
Shayegan, Mansour	S	Princeton University	USA
Shehter, Arkady	S	National High Magnetic Field Laboratory	USA
Shen, Zhi-Xun	S	Stanford University	USA
Shi, Sufei	S	Rensselaer Polytechnic Institute	USA
Siegrist, Theo	S	National High Magnetic Field Laboratory	USA
Singh, David	S	Oak Ridge National Laboratory	USA
Singleton, John	S	National High Magnetic Field Laboratory	USA
Smirnov, Alex	S	North Carolina State University	USA
Smirnov, Dmitry	S	National High Magnetic Field Laboratory	USA
Smith, Julia	S	National High Magnetic Field Laboratory	USA
Sparks, Taylor	S	University of Utah	USA
Sprunt, Sam	S	Kent State University	USA
Stemmer, Susanne	S	University of California, Santa Barbara	USA
Strouse, Geoffrey	S	National High Magnetic Field Laboratory	USA
Suchalkin, Sergey	S	State University of New York at Stony Brook	USA
Sumption, Mike	S	Ohio State University	USA
Suslov, Alexey	S	National High Magnetic Field Laboratory	USA
svitelskiy, oleksiy	S	Gordon College	USA
Tafti, Fazel	S	Boston College	USA
Takano, Yasu	S	University of Florida	USA
Tanatar, Makariy	S	Ames Laboratory	USA
Tarantini, Chiara	S	National High Magnetic Field Laboratory	USA
Taufour, Valentin	S	University of California, Davis	USA
Telser, Joshua	S	Roosevelt University	USA
Theodoropoulou, Nikoleta	S	Texas State University	USA
Thirunavukkuarasu, Komalavalli	S	Florida Agricultural and Mechanical University	USA
Thompson, Joe	S	Los Alamos National Laboratory	USA
Tozer, Stan	S	National High Magnetic Field Laboratory	USA
Vardeny, Z. Valy	S	University of Utah	USA
Velasco , Jairo	S	University of California, Santa Cruz	USA
Wang, Tuo	S	Louisiana State University	USA
Weickert, Dagmar	S	National High Magnetic Field Laboratory	USA
Wen, Jiajia	S	Stanford University	USA

Name	User Type	Organization Name	Country
West, Ken	S	Princeton University	USA
Wood, Marshall	S	National High Magnetic Field Laboratory	USA
Wu, Liang	S	University of Pennsylvania	USA
Wu, Sanfeng	S	Princeton University	USA
Xie, Weiwei	S	Louisiana State University	USA
Xing, Huili	S	Cornell University	USA
Xu, Xiaodong	S	University of Washington	USA
Xu, Xingchen	S	Fermi National Accelerator Laboratory	USA
Xue, Ziling	S	University of Tennessee, Knoxville	USA
Yankowitz, Matthew	S	University of Washington	USA
Ye, Peide	S	Purdue University	USA
Young, Andrea	S	University of California, Santa Barbara	USA
Young, David	S	Louisiana State University	USA
Zakotnik, miha	S	Urban Mining Company	USA
Zapf, Vivien	S	National High Magnetic Field Laboratory	USA
Zhou, Haidong	S	University of Tennessee, Knoxville	USA
Zhu, Jun	S	Pennsylvania State University	USA
Zudov, Michael	S	University of Minnesota, Twin Cities	USA
Zumbulyadis, Nicholas	S	Independent Scholar and Consultant	USA
Antonio, Daniel	P	Idaho National Laboratory	USA
Bag, Rabindranath	P	Duke University	USA
Balachandran, Shreyas	P	Florida State University	USA
Benyamini, Avishai	P	Columbia University	USA
Brahlek, Matthew	P	Oak Ridge National Laboratory	USA
Bretz-Sullivan, Terence	P	Argonne National Laboratory	USA
Chatterjee, Shouvik	P	University of California Santa Barbara	USA
Chen, Kuizhi	P	National High Magnetic Field Laboratory	USA
Datta, Biswajit	P	University of California, Santa Barbara	USA
De Greve, Kristiaan	P	Harvard University	USA
Di Tullio, Valeria	P	The Metropolitan Museum of Art	USA
Ding, Xiaxin	P	Idaho National Laboratory	USA
Dissanayake, Sachith	P	Duke University	USA
Elatresh, Sabri	P	Cornell University	USA
Fei, Zaiyao	P	University of Washington	USA
Ferrari Silveira Rosa, Priscila	P	Los Alamos National Laboratory	USA
Follmer, Alec	P	California Institute of Technology	USA
Fu, Hailong	P	Pennsylvania State University	USA
Galletti, Luca	P	University of California, Santa Barbara	USA
Greer, Samuel	P	Los Alamos National Laboratory	USA

Name	User Type	Organization Name	Country
Gul, Onder	P	Harvard University	USA
Higgins, Joshua	P	University of Maryland, College Park	USA
Ikeda, Matthias	P	Stanford University	USA
Inoue, Hisashi	P	Massachusetts Institute of Technology	USA
Island, Joshua	P	University of California, Santa Barbara	USA
Jauregui, Luis	P	Harvard University	USA
Jiang, Yuxuan	P	National High Magnetic Field Laboratory	USA
Jung, Younghun	P	Columbia University	USA
Karna, Sunil	P	Louisiana State University	USA
Karni, Ouri	P	Stanford University	USA
Khalsa, Guru	P	Cornell University	USA
Kim, Kwangmin	P	National High Magnetic Field Laboratory	USA
Kumari, Shalini	P	Pennsylvania State University	USA
Kurumaji, Takashi	P	Massachusetts Institute of Technology	USA
Li, Tingxin	P	Cornell University	USA
Li, Zhipeng	P	Rensselaer Polytechnic Institute	USA
Liu, Changjiang	P	Argonne National Laboratory	USA
Liu, Erfu	P	University of California, Riverside	USA
Liu, Haoliang	P	University of Utah	USA
Liu, Jinyu	P	University of California, Los Angeles	USA
Liu, Xiaoran	P	Rutgers University, New Brunswick	USA
Liu, Xiaoxue	P	Brown University	USA
Liu, Yu	P	Brookhaven National Laboratory	USA
Liu, Zhaoyu	P	University of Washington	USA
Lu, Hongcheng	P	Duke University	USA
Maniv, Eran	P	University of California, Berkeley	USA
Mao, Wenping	P	National High Magnetic Field Laboratory	USA
Mozaffari, Shirin	P	National High Magnetic Field Laboratory	USA
Ning, Wei	P	Pennsylvania State University	USA
Ou, Yunbo	P	Massachusetts Institute of Technology	USA
Park, Joon Young	P	Harvard University	USA
Paulino, Joana	P	National High Magnetic Field Laboratory	USA
Polshyn, Hryhoriy	P	University of California, Santa Barbara	USA
Poudel, Narayan	P	Idaho National Laboratory	USA
Qiu, Gang	P	University of California, Los Angeles	USA
Ran, Sheng	P	University of Maryland, College Park	USA
Rebar, Drew	P	National High Magnetic Field Laboratory	USA
Ronen, Yuval	P	Harvard University	USA
Saha, Shanta	P	University of Maryland, College Park	USA

Name	User Type	Organization Name	Country
Saito, Yu	P	University of California, Santa Barbara	USA
Sarkar, Tarapada	P	University of Maryland, College Park	USA
Säubert, Steffen	P	Colorado State University	USA
Schoenemann, Rico	P	Los Alamos National Laboratory	USA
Schumann, Timo	P	University of California, Santa Barbara	USA
Shi, Qianhui	P	Columbia University	USA
Shi, Zhenzhong	P	Duke University	USA
Shrestha, Keshav	P	National High Magnetic Field Laboratory	USA
Skoropata, Elizabeth	P	Oak Ridge National Laboratory	USA
Spanton, Eric	P	University of California, Santa Barbara	USA
Sun, Dan	P	Los Alamos National Laboratory	USA
Sung, Jiho	P	Harvard university	USA
Suri, Dhavala	P	Massachusetts Institute of Technology	USA
Suzuki, Takehito	P	Massachusetts Institute of Technology	USA
Terzic, Jasminka	P	National High Magnetic Field Laboratory	USA
Walmsley, Philip	P	Stanford University	USA
Wang, Kefeng	P	University of Maryland, College Park	USA
Wang, Pengjie	P	Princeton University	USA
Wang, Xiaoling	P	National High Magnetic Field Laboratory	USA
Wang, Xingzhi	P	Boston University	USA
Wei, Kaya	P	National High Magnetic Field Laboratory	USA
Xiang, Ziji	P	University of Michigan	USA
Xing, Lingyi	P	Louisiana State University	USA
Yan, Rusen	P	Cornell University	USA
Yang, Fangyuan	P	University of California, Santa Barbara	USA
Yoo, Hyobin	P	Harvard University	USA
Zhang, Han	P	University of Tennessee	USA
Zhang, Rongfu	P	National High Magnetic Field Laboratory	USA
Zhou, You	P	Harvard University	USA
Akintola, John	G	Florida State University	USA
Alfailakawi, Alaa	G	University of Louisville	USA
Altaiary, Mashael	G	University of California, Riverside	USA
Anderson, Laurel	G	Harvard University	USA
Antony, Abhinandan	G	Columbia University	USA
Aygen, Can	G	Northwestern University	USA
Badger, Jackson	G	University of California, Davis	USA
Barré, Elyse	G	Stanford University	USA
Barry, Kevin	G	Florida State University	USA
Barth, Alexandra	G	California Institute of Technology	USA

Name	User Type	Organization Name	Country
Barua, Arup	G	University of South Florida	USA
Basnet, Rabindra	G	University of Arkansas	USA
Bertini , Isabella	G	Florida State University	USA
Bhowmick, Tushar	G	University of Utah	USA
Blockmon, Avery	G	University of Tennessee, Knoxville	USA
Bone, Alexandria	G	University of Tennessee, Knoxville	USA
Campbell, Daniel	G	University of Maryland, College Park	USA
Cao, Jun	G	Boston University	USA
Cartelli, Joseph	G	Towson University	USA
Chakraborty, Arnab	G	Louisiana State University	USA
Chapai, Ramakanta	G	Louisiana State University	USA
Chaudhuri, Reet	G	Cornell University	USA
Che, Shi	G	University of California, Riverside	USA
Chen, Lu	G	University of Michigan	USA
Chen, Shaowen	G	Columbia University	USA
Chien, Po-Hsiu	G	Florida State University	USA
Chiu, Yu Che	G	National High Magnetic Field Laboratory	USA
Chong, Su Kong	G	University of Utah	USA
Clune, Amanda	G	University of Tennessee, Knoxville	USA
Cochran, Josiah	G	National High Magnetic Field Laboratory	USA
Codecido, Emilio	G	Ohio State University	USA
Cong, Rong	G	Brown University	USA
Conti, Carl	G	Florida State University	USA
Dang, Phillip	G	Cornell University	USA
Davenport, John	G	UC Santa Cruz	USA
Dempsey, Connor	G	University of California, Santa Barbara	USA
Deng, Hao	G	Princeton University	USA
DeRosha, Daniel	G	Yale University	USA
Devarakonda, Aravind	G	Massachusetts Institute of Technology	USA
Devlin, Kasey	G	University of California, Davis	USA
Dickwella Widanage, Malitha	G	Louisiana State University	USA
Dwivedi, Anand	G	University of Wisconsin, Milwaukee	USA
Engelke, Rebecca	G	Harvard University	USA
Ennis, Matthew	G	Duke University	USA
Eo, Yun Suk	G	University of Michigan	USA
Ermolaev, Maksim	G	State University of New York at Stony Brook	USA
Fan, Shiyu	G	University of Tennessee, Knoxville	USA
Fang, Yawen	G	Cornell University	USA
Fereidouni Ghaleh Minab, Arash	G	University of Arkansas	USA

Name	User Type	Organization Name	Country
Freeman, Matthew	G	National High Magnetic Field Laboratory	USA
Fu, XIaojun	G	University of Minnesota, Twin Cities	USA
Gao, Tong	G	Princeton University	USA
Gao, Xueshi	G	Ohio State University	USA
Garcia, Carlos	G	Florida State University	USA
Garcia, Erick	G	Brown University	USA
Garg, Uma	G	University of Wisconsin, Milwaukee	USA
Gelly, Ryan	G	Harvard University	USA
Ghimire, Raju	G	Clark University	USA
Ghiotto, Augusto	G	Columbia University	USA
Ghosh, Rittik	G	University of California, Riverside	USA
Gui, Xin	G	Louisiana State University	USA
Guo, Yanbo	G	University of Florida	USA
Gyawali, Prabesh	G	Kent State University	USA
Haley, Shannon	G	University of California, Berkeley	USA
Han, Minyong	G	Massachusetts Institute of Technology	USA
Han, Xingyue	G	University of Pennsylvania	USA
Hao, Zeyu	G	Harvard University	USA
Hardy, David	G	Florida State University	USA
Hatefipour, Mehdi	G	New York University	USA
He, Wei	G	Stanford University	USA
Hettiaratchy, Elline	G	The Ohio State University	USA
Holleman, Jade	G	Florida State University	USA
Hossain, Md Shafayat	G	Princeton University	USA
Hossain, Mohammad Tomal	G	University of Utah	USA
Hristov, Alexander	G	Stanford University	USA
Hu, Chaowei	G	University of California, Los Angeles	USA
Hu, Xinbo	G	National High Magnetic Field Laboratory	USA
Hu, Xinzhe	G	University of Florida	USA
Hu, Zhixiang	G	Brookhaven National Laboratory	USA
Huang, Katie	G	Harvard University	USA
Huang, Ke	G	Pennsylvania State University	USA
Huang, Qing	G	University of Tennessee, Knoxville	USA
Hughey, Kendall	G	University of Tennessee, Knoxville	USA
Inbar, Hadass	G	University of California, Santa Barbara	USA
Jia, Yanyu	G	Princeton University	USA
Jiang, Mingde	G	Stanford University	USA
Jiang, Qianni	G	University of Washington	USA
Jindal, Apoorv	G	Columbia University	USA

Name	User Type	Organization Name	Country
Joe, Andrew	G	Harvard University	USA
Kang, Kaifei	G	Cornell University	USA
Karki, Bhupendra	G	University of Louisville	USA
Kealhofer, David	G	University of California, Santa Barbara	USA
Kettell, Brian	G	University of Tennessee Space Institute	USA
Khanal, Dipak	G	University of Utah	USA
Kim, Sangsoo	G	Florida State University	USA
Kirui, Alex	G	Louisiana State University	USA
Knight, Gary	G	Florida Agricultural and Mechanical University	USA
Kochat, Mehdi	G	University of Houston	USA
Koehne, Barry	G	Texas State University	USA
Kuszynski, Jason	G	Florida State University	USA
LaBarre, Patrick	G	University of California, Santa Cruz	USA
Lai, You	G	National High Magnetic Field Laboratory	USA
Laramee, Brett	G	Clark University	USA
Leahy, Ian	G	University of Colorado, Boulder	USA
Li, Yanan	G	University of Wisconsin, Milwaukee	USA
Lian, Zhen	G	Rensselaer Polytechnic Institute	USA
Liang, Sihang	G	Princeton University	USA
Lin, Jingjing	G	Princeton University	USA
Lin, Wen-Chen	G	University of Maryland College Park	USA
Lin, Wen-Chen	G	University of Maryland, College Park	USA
Liu, Xiaojie	G	University of Utah	USA
Liu, Xiaomeng	G	Harvard University	USA
Liu, Yulu	G	Ohio State University	USA
Lu, Zhengguang	G	National High Magnetic Field Laboratory	USA
Luo, Wenbo	G	University of HOuston	USA
Lygo, Alexander	G	University of California, Santa Barbara	USA
Ma, Meng	G	Princeton University	USA
Macy, Juan	G	National High Magnetic Field Lab	USA
Maksimovic, Nikola	G	University of California, Berkeley	USA
Malinowski, Paul	G	University of Washington	USA
Mapara, Varun	G	University of South Florida	USA
Marbey, Jonathan	G	National High Magnetic Field Laboratory	USA
Mardani, Masoud	G	Florida State University	USA
Marple, Maxwell	G	University of California, Davis	USA
McFadden, Tony	G	University of California, Santa Barbara	USA
Meng, Xinxing	G	Pennsylvania State University	USA
Miao, Shengnan	G	Rensselear Polytechnic Institute	USA

Name	User Type	Organization Name	Country
Mihaliov, Dmitri	G	University of Michigan	USA
Min, Lujin	G	Pennsylvania State University	USA
Mings, Clay	G	University of Tennessee, Knoxville	USA
Miracle, John	G	Texas State University	USA
Modic, Kimberly	G	National High Magnetic Field Laboratory	USA
Moon, Seongphill	G	National High Magnetic Field Laboratory	USA
Moseley, Duncan	G	University of Tennessee, Knoxville	USA
Mutch, Joshua	G	University of Washington	USA
Nagarajan, Vikram	G	University of California, Berkeley	USA
Nagelski, Alexandra	G	Yale University	USA
Neal, Sabine	G	University of Tennessee, Knoxville	USA
Neu, Jennifer	G	National High Magnetic Field Laboratory	USA
Nguyen, Edward	G	Florida State University	USA
Ni, Zhuoliang	G	University of Pennsylvania	USA
Nimlos, Danika	G	California Institute of Technology	USA
Niu, Chang	G	Purdue University	USA
O,Beirne, Aidan	G	Stanford University	USA
Ok, Jong Mok	G	Oak Ridge National Laboratory	USA
Onyszczak, Michael	G	Princeton University	USA
Ortega, Raul	G	Florida State University	USA
Palmstrom, Johanna	G	Stanford University	USA
Park, Kiman	G	University of Tennessee, Knoxville	USA
Parsons, Christian	G	University of Wisconsin - Milwaukee	USA
Paudel, Nawaraj	G	Florida State University	USA
Pistunova, Kateryna	G	Stanford University	USA
Pocs, Christopher	G	University of Colorado, Boulder	USA
Pokharel, Bal	G	National High Magnetic Field Laboratory	USA
Popovic, Brodie	G	Duke University	USA
Quirk, Nicholas	G	Princeton University	USA
Radcliff, Kyle	G	National High Magnetic Field Laboratory	USA
Rai, Anish	G	The University of Alabama	USA
Rama Krishna, Sanath Kumar	G	Florida State University	USA
Rexhausen, William	G	University of Wisconsin, Milwaukee	USA
Richardson, Rachael	G	Florida Agricultural and Mechanical University	USA
Rochester, Jacob	G	Ohio State University	USA
Rosenberg, Elliott	G	Stanford University	USA
Saha, Rony	G	Kent State University	USA
Sarkis, Colin	G	Colorado State University	USA
Schiela, William	G	New York University	USA

Name	User Type	Organization Name	Country
Scuri, Giovanni	G	Harvard University	USA
Shao, Qing	G	Northwestern University	USA
Shcherbakov, Dmitry	G	Ohio State University	USA
Shih, En-Min	G	Columbia University	USA
Siddiquee, K A M Hasan	G	University of Central Florida	USA
Siegfried, Peter	G	University of Colorado, Boulder	USA
Singh, Siddharth Kumar	G	Princeton University	USA
Smaha, Rebecca	G	Stanford University	USA
Smith, Kevin	G	University of Tennessee, Knoxville	USA
Sohn, Egon	G	Cornell University	USA
Song, Tiancheng	G	University of Washington	USA
Sorensen, Matthew	G	Stanford University	USA
Stanley, Lily	G	National High Magnetic Field Laboratory	USA
Stavinoha, Macy	G	Rice University	USA
Steinhardt, William	G	Duke University	USA
Stensberg, Jonathan	G	University of Pennsylvania	USA
Stepanov, Petr	G	University of California, Riverside	USA
Stevens, Christopher	G	University of South Florida	USA
Straquadine, Joshua	G	Stanford University	USA
Strickland, William	G	New York University	USA
Sushko, Andrey	G	Harvard University	USA
Swann, Josh	G	Columbia University	USA
Tangbampensountorn, Waroch	G	Pennsylvania State University	USA
Telford, Evan	G	Columbia University	USA
Thekke Madathil, Pranav	G	Princeton University	USA
Thompson, Christie	G	Florida State University	USA
Tian, Haidong	G	Ohio State University	USA
Tin, Pagnareach	G	University of Tennessee, Knoxville	USA
Tinsman, Colin	G	University of Michigan	USA
Tran, Son	G	University of California, Riverside	USA
van Baren, Jeremiah	G	University of California, Riverside	USA
Villegas Rosales, Kevin	G	Princeton University	USA
Vishwanath, Suresh	G	Cornell University	USA
Wakefield, Joshua	G	Massachusetts Institute of Technology	USA
Wang, Da	G	Columbia University	USA
Wang, Jingyue	G	Georgia Institute of Technology	USA
Wang, Lei	G	Columbia University	USA
Wang, Qi	G	Brookhaven National Laboratory	USA
Wang, Tianmeng	G	Rensselaer Polytechnic Institute	USA

Name	User Type	Organization Name	Country
Wang, Wudi	G	Princeton University	USA
Wang, Yuxin	G	Florida State University	USA
Wang, Ziqiao	G	Pennsylvania State University	USA
Wen, Fangdi	G	Rutgers University, New Brunswick	USA
Werkmeister, Thomas	G	Harvard University	USA
Wickramasinghe, Kaushini	G	University of Oklahoma	USA
Widener, Chelsea	G	University of Tennessee, Knoxville	USA
Wilfong, Brandon	G	University of Maryland, College Park	USA
Wilson, Matthew	G	University of California, Riverside	USA
Xing, Chengkun	G	University of Tennessee, Knoxville	USA
Xu, Kejun	G	Stanford University	USA
Yadav, Lalit	G	Duke University	USA
Yang, Hung-Yu	G	Boston College	USA
Yang, Jiawei	G	University of California, Riverside	USA
Ye, Linda	G	Massachusetts Institute of Technology	USA
Yuan, Joseph	G	New York University	USA
Zauberman, Jonathan	G	Harvard University	USA
Zeng, Yihang	G	Columbia University	USA
Zhang, Biwen	G	Florida State University	USA
Zhang, Shengzhi	G	Florida State University	USA
Zhang, Zhuocheng	G	Purdue University	USA
Zhao, Tianhao	G	Georgia Institute of Technology	USA
Zheng, WenKai	G	National High Magnetic Field Laboratory	USA
Zhou, Haoxin	G	University of California, Santa Barbara	USA
Zhu, Junbo	G	Massachusetts Institute of Technology	USA
Zhu, Yanglin	G	Tulane University	USA
Zibrov, Alexander	G	University of California, Santa Barbara	USA
Bales, Camille	U	Clark University	USA
Cui, Xiaomeng	U	University of California, Santa Barbara	USA
Ghosh, Olivia	U	Columbia University	USA
Haei Najafabadi , Danial	U	Harvard University	USA
Heltman, Autumn	U	Penn State University	USA
Jones, Sarah	U	Colorado School of Mines	USA
Kim, Jonathan	U	Colorado School of Mines	USA
Mann, Chris	U	National High Magnetic Field Laboratory	USA
Nagarajan, Vikram	U	University of Minnesota, Twin Cities	USA
Neves, Paul	U	University of Maryland, College Park	USA
Noordhoek, Kyle	U	University of Tennessee, Knoxville	USA
Okounkova, Anna	U	Columbia University	USA

Name	User Type	Organization Name	Country
Schundelmier, Benny	U	University of West Florida	USA
Schwarck, Joanna	U	Florida State University	USA
Shields, Dakota	U	Northwest Missouri State University	USA
Si, Wenda	U	Duke University	USA
Villalobos Meza, Alejandro	U	University of South Florida	USA
Zhou, Xilin	U	Harvard University	USA
Bai, Ruiheng	T	University of California, Santa Barbara	USA
Billings, Jonathan	T	National High Magnetic Field Laboratory	USA
Francis, Ashleigh	T	National High Magnetic Field Laboratory	USA
Goss, Noah	T	New York University	USA
Hicks, Michael	T	National High Magnetic Field Laboratory	USA
Jones, Glover	T	National High Magnetic Field Laboratory	USA
Maier, Scott	T	National High Magnetic Field Laboratory	USA
Pullum, Bobby	T	National High Magnetic Field Laboratory	USA
Semenov, Dmitry	T	National High Magnetic Field Laboratory	USA
Thomas, Sean	T	Los Alamos National Laboratory	USA
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International Users

Name	User Type	Organization Name	Country
Alloul, Henri	S	French National Center for Scientific Research	France
Aronzon, Boris	S	Lebedev Physical Institute of the Russian Academy of Sciences	Russia
Balakrishnan, Geetha	S	University of Warwick	United Kingdom
Bellani, Vittorio	S	University of Pavia	Italy
Bienko, Alina	S	University of Wroclaw	Poland
Bildsoe, Henrik	S	Aarhus University	Denmark
Boehmer, Anna	S	Karlsruhe Institute of Technology	Germany
Bonhomme, Christian	S	Pierre and Marie Curie University	France
Brorson, Michael	S	Haldor Topsoe	Denmark
Cano, Joan	S	University of Valencia	Spain
Cardwell, David	S	University of Cambridge	United Kingdom
Choi, Kwang Yong	S	Chung Ang University	South Korea
Davydov, Alexandr	S	Lebedev Physical Institute of the Russian Academy of Sciences	Russia
De Paepe, Gael	S	The French Alternative Energies and Atomic Energy Commission	France
Doiron-Leyraud, Nicolas	S	University of Sherbrooke	Canada
Drichko, Irina	S	Ioffe Physical-Technical Institute of the Russian Academy of Sciences	Russia
Durrell, John	S	University of Cambridge	United Kingdom

Name	User Type	Organization Name	Country
Ebihara, Takao	S	Shizuoka University	Japan
Eremets, Mijkhail	S	Max Planck Institute for Chemistry, Mainz	Germany
Goddard, Paul	S	University of Warwick	United Kingdom
Goh, Swee	S	Chinese University of Hong Kong	Hong Kong
Haenisch, Jens	S	Karlsruhe Institute of Technology	Germany
Halbedel, Bernd	S	Ilmenau University of Technology	Germany
Horvatic, Mladen	S	National Laboratory for Intense Magnetic Fields, Grenoble	France
Hou, Guangjin	S	Dalian Institute of Chemical Physics	China
Huang, Yining	S	University of Western Ontario	Canada
Hussey, Nigel	S	University of Bristol	United Kingdom
Iida, Kazumasa	S	Nagoya University	Germany
Imajo, Shusaku	S	University of Tokyo	Japan
Jakobsen, Hans	S	Aarhus University	Denmark
Jo, YounJung	S	Kyungpook National University	South Korea
Julve, Miguel	S	University of Valencia	Spain
Kambe, Shinsaku	S	Japan Atomic Energy Agency	Japan
Kikugawa, Naoki	S	National Institute for Materials Science	Japan
Krämer, Steffen	S	National Laboratory for Intense Magnetic Fields, Grenoble	France
Kyritsis, Panayotis	S	National and Kapodistrian University of Athens	Greece
Laurencin, Danielle	S	University of Montpellier	France
Lee, Daniel	S	University of Grenoble Alpes	France
Lewinski, Janusz	S	Warsaw University of Technology	Poland
Lloret, Francesc	S	University of Valencia	Spain
Machado, Fernando	S	Federal University of Pernambuco	Brazil
Miura, Masashi	S	Seikei University	Japan
Mukhamedshin, Irek	S	Kazan Federal University	Russia
Nakano, Motohiro	S	Osaka University	JAPAN
Ono, Shimpei	S	Central Research Institute of Electric Power Industry	Japan
Park, Je-Geun	S	Seoul National University	Korea
Peng, Luming	S	Nanjing University	China
Raychaudhuri, Pratap	S	Tata Institute of Fund. Research	India
Rydh, Andreas	S	Stockholm University	Sweden
Sakai, Hironori	S	Japan Atomic Energy Agency	Japan
Sebastian, Suchitra	S	University of Cambridge	United Kingdom
Smirnov, Ivan	S	Ioffe Physical-Technical Institute of the Russian Academy of Sciences	Russia
Stern, Raivo	S	National Institute of Chemical Physics and Biophysics	Estonia
Taillefer, Louis	S	University of Sherbrooke	Canada
Tanaka, Hidekazu	S	Tokyo Institute of Technology	Japan

Name	User Type	Organization Name	Country
Terashima, Taichi	S	National Institute for Materials Science	Japan
Tokunaga, Yo	S	Japan Atomic Energy Agency	Japan
Usoskin, Alexander	S	Bruker HTS GmbH	Germany
Vasiliev, Alexander	S	Lomonosov Moscow State University	Russia
Werfel, Frank	S	Adelwitz Technologiezentrum GmbH	Germany
Whittlesey, Michael	S	University of Bath	United Kingdom
Wolska-Pietkiewicz, Malgorzata	S	Warsaw University of Technology	Poland
Xiu, Faxian	S	Fudan University	China
Xu, Jun	S	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	China
Yan, Hugen	S	Fudan University	China
Yuan, Huiqiu	S	Zhejiang University	China
Zhang, Cheng	S	Fudan University	China
Zhang, Yuanbo	S	Fudan University	China
Zhao, Zhenchao	S	Dalian Institute of Chemical Physics	China
Zvyagin, Sergei	S	Helmholtz-Zentrum Dresden-Rossendorf	Germany
Ciomaga Hatnean, Monica	P	University of Warwick	United Kingdom
Coak, Matthew	P	University of Warwick	United Kingdom
Gilmutdinov, Ildar	P	Kazan Federal University	Russia
Gotze, Kathrin	P	University of Warwick	United Kingdom
Gourgout, Adrien	P	University of Sherbrooke	Canada
Hirose, Hishiro	P	National Institute for Materials Science	Japan
Hirschberger, Maximilian	P	RIKEN	Japan
Hsu, Yu-Te	P	High Field Magnet Laboratory, Radboud University	Netherlands
Krellner, Cornelius	P	Max Planck Institute for Chemical Physics of Solids, Dresden	Germany
Lai, Kwing To	P	Chinese University of Hong Kong	Hong Kong
Maximova, Olga	P	Lomonosov Moscow State University	Russia
Namburi, Devendra	P	University of Cambridge	United Kingdom
Nehrkorn, Joscha	P	Max Planck Institute for Chemical Energy Conversion, Muelheim	Germany
Puphal, Pascal	P	Paul Scherrer Institute	Switzerland
Smidman, Michael	P	Zhejiang University	China
Veber, Sergey	P	International Tomography Center of Russian Academy of Sciences	Russia
Viciano-Chumillas, Marta	P	University of Valencia	Spain
Willa, Roland	P	Karlsruhe Institute of Technology	Germany
Williams, Robert	P	University of Warwick	United Kingdom
Xiao, Dong	P	Dalian Institute of Chemical Physics	China
Zhang, Enze	P	Fudan University	China
Zhang, Zuocheng	P	Fudan University	China

Name	User Type	Organization Name	Country
Ataei, Amirreza	G	University of Sherbrooke	Canada
Basistha, Somak	G	Tata Institute of Fundamental Research	India
Berben, Maarten	G	High Field Magnet Laboratory, Radboud University	Netherlands
Chen, Hongyu	G	Dalian Institute of Chemical Physics	China
Curley, Sam	G	University of Warwick	United Kingdom
Davies, Alexander	G	University of Cambridge	United Kingdom
Du, Feng	G	Zhejiang University	China
Du, Jiahuan	G	Nanjing University	China
Dutta, Surajit	G	Tata Institute of Fund. Research	India
Eaton, Alex	G	University of Cambridge	United Kingdom
Ferentinos, Eleftherios	G	University of Athens	Greece
Girod, Clément	G	University of Sherbrooke	Canada
Grissonnanche, Gaël	G	University of Sherbrooke	Canada
Guo, Shuaifei	G	Fudan University	China
Hickey, Alex	G	University of Cambridge	United Kingdom
Hu, Yajian	G	Hong Kong University of Science and Technology	Hong Kong
Huang, Ce	G	Fudan University	China
Huang, Shenyang	G	Fudan University	China
Kaniewska, Kinga	G	Gdansk University of Technology	Poland
Laliberte, Francis	G	University of Sherbrooke	Canada
Legros, Anaëlle	G	University of Sherbrooke	Canada
Liu, Hsu	G	University of Cambridge	United Kingdom
Martins, Vinicius	G	University of Western Ontario	Canada
Meyer, Sven	G	Karlsruhe Institute of Technology	Germany
Olejnik-Fehér, Natalia	G	Institute of Physics, Polish Academy of Sciences	Poland
Paredes Aulestia, Esteban	G	Chinese University of Hong Kong	Hong Kong
Pearce, Matthew	G	University of Warwick	United Kingdom
Ratkovski, Danilo	G	Federal University of Pernambuco	Brazil
Rosa, Priscilla	G	University Estadual de Campinas	Brazil
Shen, Bin	G	Zhejiang University	China
Silber, Itai	G	Tel-Aviv University	Israel
Song, Chaoyu	G	Fudan University	China
Srpcic, Jan	G	University of Cambridge	United Kingdom
Vakaliuk, Oleksii	G	Ilmenau University of Technology	Germany
Vallejo, Julia	G	University of Valencia	Spain
Wang, An	G	Zhejiang University	China
Yang, Yunkun	G	Fudan University	China
Yuan, Xiang	G	Fudan University	China
Zhang, Wei	G	Chinese University of Hong Kong	Hong Kong

Name	User Type	Organization Name	Country
Zhao, Minhao	G	Fudan University	China
Huang, Liting	U	University of Cambridge	United Kingdom
Jin, Alice	U	University of Cambridge	United Kingdom
Link, Joosep	U	National Institute of Chemical Physics and Biophysics	Estonia
Luo, Mingyan	U	Fudan University	China
Salvati, Flavio	U	University of Cambridge	United Kingdom
Solomons-Tuke, Oscar	U	Cambridge University	United Kingdom
Jesudasan, John	T	Tata Institute of Fundamental Research	India
Wang, Qiang	T	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	China

3. EMR Facility

National Users

Name	User Type	Organization Name	Country
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Angerhofer, Alex	S	University of Florida	USA
Berry, John	S	University of Wisconsin, Madison	USA
Bowers, Clifford	S	University of Florida	USA
Campbell, Jason	S	National Institute of Standards and Technology	USA
Chen, Hailong	S	Georgia Institute of Technology	USA
Christou, George	S	University of Florida	USA
Columbus, Linda	S	University of Virginia	USA
Dalal, Naresh	S	National High Magnetic Field Laboratory	USA
del Barco, Enrique	S	University of Central Florida	USA
Deng, Wu-Min	S	Florida State University	USA
Doerrer, Linda	S	Boston University	USA
Drichko, Natalia	S	Johns Hopkins University	USA
Dubroca, Thierry	S	National High Magnetic Field Laboratory	USA
Fiedler, Adam	S	Marquette University	USA
Freedman, Danna	S	Northwestern University	USA
Frydman, Lucio	S	National High Magnetic Field Laboratory	USA
Haile, Sossina	S	Northwestern University	USA
Hammel, P.	S	Ohio State University	USA
Hill, Stephen	S	National High Magnetic Field Laboratory	USA
Holder, Alvin	S	Old Dominion University	USA
Hu, Yan-Yan	S	Florida State University	USA
Jiang, Zhigang	S	Georgia Institute of Technology	USA
Kanatzidis, Mercouri	S	Northwestern University	USA
kovalev, alexey	S	National High Magnetic Field Laboratory	USA
Kozimor , Stosh	S	Los Alamos National Laboratory	USA

Name	User Type	Organization Name	Country
Krzystek, Jurek	S	National High Magnetic Field Laboratory	USA
Lu, Yi	S	University of Illinois at Urbana-Champaign	USA
Lumata, Lloyd	S	University of Texas, Dallas	USA
Marks, Tobin	S	Northwestern University	USA
Meisel, Mark	S	University of Florida	USA
Mentink, Frederic	S	National High Magnetic Field Laboratory	USA
Mindiola, Daniel	S	Pennsylvania State University	USA
Nippe, Michael	S	Texas A&M University	USA
Ozarowski, Andrew	S	National High Magnetic Field Laboratory	USA
Ozerov, Mykhaylo	S	National High Magnetic Field Laboratory	USA
Pan, Jianjun	S	University of South Florida	USA
Pelekhov, Denis	S	Ohio State University	USA
Poeppelmeier, Kenneth	S	Northwestern University	USA
Que, Lawrence	S	University of Minnesota, Twin Cities	USA
Reinherz, Ellis	S	Dana-Farber Cancer Institute	USA
Rossini, Aaron	S	Iowa State University	USA
Schlueter, John	S	Argonne National Laboratory	USA
Shafaat, Hannah	S	Ohio State University	USA
Shimizu, Linda	S	University of South Carolina	USA
Siegrist, Theo	S	National High Magnetic Field Laboratory	USA
Singamaneni, Srinivasa Rao	S	University of Texas, El Paso	USA
Smirnov, Dmitry	S	National High Magnetic Field Laboratory	USA
Smith, Julia	S	National High Magnetic Field Laboratory	USA
Song, Likai	S	National High Magnetic Field Laboratory	USA
Stein, Benjamin	S	Los Alamos National Laboratory	USA
Stoian, Sebastian	S	University of Idaho	USA
Strouse, Geoffrey	S	National High Magnetic Field Laboratory	USA
Suslov, Alexey	S	National High Magnetic Field Laboratory	USA
Telser, Joshua	S	Roosevelt University	USA
Thirunavukkuarasu, Komalavalli	S	Florida Agricultural and Mechanical University	USA
Tondreau, Aaron	S	Los Alamos National Laboratory	USA
van Tol, Johan	S	National High Magnetic Field Laboratory	USA
Vejerano, Eric	S	University of South Carolina	USA
Wi, Sungsool	S	National High Magnetic Field Laboratory	USA
Xue, Ziling	S	University of Tennessee, Knoxville	USA
Yang, Fengyuan	S	Ohio State University	USA
Zadrozny, Joseph	S	Colorado State University	USA
Zhang, Jianyuan	S	Rutgers University	USA
Zvanut, Mary Ellen	S	University of Alabama, Birmingham	USA

Name	User Type	Organization Name	Country
Batista Lopes Escobar, Livia	P	Florida State University	USA
Ghosh, Tuhin	P	University of Florida	USA
Greer, Samuel	P	Los Alamos National Laboratory	USA
Jiang, Yuxuan	P	National High Magnetic Field Laboratory	USA
Kundu, Krishnendu	P	National High Magnetic Field Laboratory	USA
Lee, Inhee	P	Ohio State University	USA
Lin, Chun-yi	P	Colorado State University	USA
McKay, Johannes	P	Keysight Technologies	USA
Rebar, Drew	P	National High Magnetic Field Laboratory	USA
Reinholdt, Anders	P	University of Pennsylvania	USA
Srivastava, Amit	P	Florida State University	USA
Tang, Mingxue	P	Florida State University	USA
Wei, Kaya	P	National High Magnetic Field Laboratory	USA
Wojnar, Michael	P	Northwestern University	USA
Abhyankar, Nandita	G	Florida State University	USA
Akinfaderin, Adewale	G	Florida State University	USA
Amdur, Moses	G	Northwestern University	USA
Bai, Xiaojian	G	Georgia Institute of Technology	USA
Bhandari, Suman	G	University of Alabama, Birmingham	USA
Bindra, Jasleen	G	National Institute of Standards and Technology	USA
Bone, Alexandria	G	University of Tennessee, Knoxville	USA
Brantley, ChristiAnna	G	University of Florida	USA
Cain, John	G	University of North Florida	USA
Carnahan, Scott	G	Iowa State University	USA
Celestine, Michael	G	Old Dominion University	USA
Chakraborty, Sankalpa	G	Florida State University	USA
Cochran, Josiah	G	National High Magnetic Field Laboratory	USA
Collins, Kelsey	G	Northwestern University	USA
Coste, Scott	G	Northwestern University	USA
DeHaven, Baillie	G	University of South Carolina	USA
Elinburg, Jessica	G	Boston University	USA
Fataftah, Majed	G	Northwestern University	USA
Hand, Adam	G	University of Tennessee, Knoxville	USA
Hazel, Joseph	G	The Shafaat Group - Ohio State University	USA
Henderson, Alyssa	G	National High Magnetic Field Laboratory	USA
Jackson, Cassidy	G	Colorado State University	USA
Jafari, Mehrafshan	G	University of Pennsylvania	USA
Kettell, Brian	G	University of Tennessee Space Institute	USA
Komijani, Dorsa	G	National High Magnetic Field Laboratory	USA

Name	User Type	Organization Name	Country
Laorenza, Daniel	G	Northwestern University	USA
Latendresse, Trevor	G	Texas A&M University	USA
Marbey, Jonathan	G	National High Magnetic Field Laboratory	USA
Mardani, Masoud	G	Florida State University	USA
Miller, Effie	G	Ohio State University	USA
Mings, Clay	G	University of Tennessee, Knoxville	USA
Montoya, Alvaro	G	University of Florida	USA
Moseley, Duncan	G	University of Tennessee, Knoxville	USA
Niedbalski, Peter	G	University of Texas, Dallas	USA
Parish, Christopher	G	University of Texas, Dallas	USA
Patel, Sawankumar	G	Florida State University	USA
Peek, Nathan	G	Florida State University	USA
Rasheed, Waqas	G	University of Minnesota, Twin Cities	USA
Sindt, Ammon	G	University of South Carolina	USA
Tin, Pagnareach	G	University of Tennessee, Knoxville	USA
Tokarski, John	G	University of Florida	USA
Vaidya, Priyanka	G	University of Central Florida	USA
Widener, Chelsea	G	University of Tennessee, Knoxville	USA
Zhao, Tianhao	G	Georgia Institute of Technology	USA
DeMason, Kenneth	U	University of Florida	USA
Johnson, Spencer	U	Colorado State University	USA

International Users

Name	User Type	Organization Name	Country
Bienko, Alina	S	University of Wroclaw	Poland
Cano, Joan	S	University of Valencia	Spain
Cizmar, Erik	S	P.J.Safarik University	Slovakia
Cruickshank, Paul	S	University of St. Andrews	UK
Enders, Markus	S	Heidelberg University	Germany
Feher, Alexander	S	Pavol Jozef Safarik University in Kosice	Slovakia
Ghosh, Abhik	S	University of Tromso, the Arctic University of Norway	Norway
Han, Oc Hee	S	Korea Basic Science Institute	South Korea
Heutz, Sandrine	S	Imperial College London	UK
Janas, Zofia	S	University of Wroclaw	Poland
Jezierska, Julia	S	University of Wroclaw	Poland
Julve, Miguel	S	University of Valencia	Spain
Kyritsis, Panayotis	S	National and Kapodistrian University of Athens	Greece
Lloret, Francesc	S	University of Valencia	Spain
Megiel, Elzbieta	S	University of Warsaw	Poland

Name	User Type	Organization Name	Country
Mukhin, Alexander	S	General Physics Institute of the Russian Academy of Sciences	Russia
Obaleye, Joshua	S	University of Ilorin	Nigeria
Ouyang, Zhongwen	S	Huazhong University of Science and Technology	China
Piligkos, Stergios	S	University of Copenhagen	Denmark
Sigurdsson, Snorri	S	University of Iceland	Iceland
Skumryev, Vassil	S	Autonomous University of Barcelona	Spain
Vassilyeva, Olga	S	Taras Shevchenko National University of Kyiv	Ukraine
Vaz, Maria	S	Federal Fluminense University	Brazil
Wang, Zhenxing	S	Huazhong University of Science and Technology	China
Zorko, Andrej	S	Jozef Stefan Institute	Slovenia
Grubba, Rafal	P	Gdansk University of Technology	Poland
Nehrkorn, Joscha	P	Max Planck Institute for Chemical Energy Conversion, Muelheim	Germany
Nesterov, Dmytro	P	Technical University of Lisbon	Portugal
Viciano-Chumillas, Marta	P	University of Valencia	Spain
Ajibola, Abiodun	G	University of Ilorin	Nigeria
Kaniewska, Kinga	G	Gdansk University of Technology	Poland
Kasyanova, Katerina	G	Taras Shevchenko National University of Kyiv	Ukraine
Lei, Yin	G	Huazhong University of Science and Technology	China
Li, Jing	G	Nanjing University	China
Lubert-Perquel, Daphné	G	Imperial College London	UK
Xiao, Tongtong	G	Huazhong University of Science & Technology	China
Yu, Lu	G	University of Science and Technology of China	China

4. High B/T Facility

National Users

Name	User Type	Organization Name	Country
Candela, Donald	S	University of Massachusetts	USA
Gao, Xuan	S	Case Western Reserve University	USA
Lee, Yoonseok	S	University of Florida	USA
Pfeiffer, Loren	S	Princeton University	USA
Sullivan, Neil	S	University of Florida	USA
West, Ken	S	Princeton University	USA
Xia, Jian-sheng	S	University of Florida	USA
Huan, Chao	P	University of Florida	USA
Serafin, Alessandro	P	University of Florida	USA
Steinke, Lucia	P	University of Florida	USA
Woods, Andrew	P	University of Florida	USA
Yin, Liang	P	University of Florida	USA

Name	User Type	Organization Name	Country
Adams, Johnny	G	University of Florida	USA
Gunther, Keegan	G	University of Florida	USA
Lewkowitz, Marc	G	University of Florida	USA
Solomon, Jenny	U	University of Florida	USA

International Users

Name	User Type	Organization Name	Country
Nomura, Ryuji	S	Tokyo Institute of Technology	Japan

5. ICR Facility

National Users

Name	User Type	Organization Name	Country
Agarwal, Archana	S	University of Utah	USA
Anderson, Lissa	S	National High Magnetic Field Laboratory	USA
Biswal, Sibani	S	Rice University	USA
Blakney, Greg	S	National High Magnetic Field Laboratory	USA
Bleiholder, Christian	S	Florida State University	USA
Blotevogel, Jens	S	Colorado State University	USA
Boiteau, Rene	S	Oregon State University	USA
Borch, Thomas	S	Colorado State University	USA
Bota, Gheorghe	S	Ohio University	USA
Bothner, Brian	S	Montana State University	USA
Brewer, Catherine	S	New Mexico State University	USA
Brooks, Gregg	S	Eckerd College	USA
Buck, Kristen	S	University of South Florida	USA
Cao, Tran	S	NALCO	USA
Castelao, Renato	S	University of Georgia	USA
Cerrato, Jose	S	University of New Mexico	USA
Chang, Ni-Bin	S	University of Central Florida	USA
Chanton, Jeffrey	S	Florida State University	USA
Chappell, Dreux	S	Old Dominion University	USA
Chen, Huan	S	National High Magnetic Field Laboratory	USA
D,Andrilli, Juliana	S	Louisiana Universities Marine Consortium	USA
Dierks, Arne	S	University of Southern Mississippi	USA
DiPinto, Lisa	S	NOAA	USA
Dunk, Paul	S	National High Magnetic Field Laboratory	USA
Echegoyen, Luis	S	University of Texas, El Paso	USA
Eiler, John	S	California Institute of Technology	USA
Fellman, Jason	S	University of Alaska Southeast	USA
Fernandez-Lima, Francisco	S	Florida International Unversity	USA

Name	User Type	Organization Name	Country
Foreman, Christine	S	Montana State University	USA
French-McKay, Deborah	S	RPS ASA	USA
Galy, Valier	S	Woods Hole Oceanographic Institution	USA
Gosselin, Kelsey	S	Woods Hole Oceanographic Institution	USA
Griffith, David	S	Willamette University	USA
Heil, Cynthia	S	Mote Marine Laboratory	USA
Hendrickson, Chris	S	National High Magnetic Field Laboratory	USA
Hockaday, William	S	Baylor University	USA
Holguin, F. Omar	S	New Mexico State University	USA
Hou, Aixin	S	Louisiana State University	USA
Hughes, Sarah	S	Shell Canada	USA
Jarvis, Jackie	S	New Mexico State University	USA
Jena, Umakanta	S	New Mexico State University	USA
Junker, James	S	Louisiana Universities Marine Consortium	USA
Kaiser, Nathan	S	Biodesix, Inc.	USA
Kelleher, Neil	S	Northwestern University	USA
Knapp, Angela	S	Florida State University	USA
Kominoski, John	S	Florida International University	USA
Lamar, Richard	S	Bio Huma Netics, Inc.	USA
Lang, Susan	S	University of South Carolina	USA
Lau, Boris	S	University of Massachusetts	USA
Leach, Franklin	S	University of Georgia	USA
Lin, Qianxin	S	Louisiana State University	USA
Lisle, John	S	U.S. Geological Survey	USA
LLC, Omics	S	Omics, LLC	USA
Macedo, Marcia	S	Woods Hole Oceanographic Institution	USA
Marshall, Alan	S	National High Magnetic Field Laboratory	USA
Masserini, Robert	S	University of Tampa	USA
McKenna, Amy	S	National High Magnetic Field Laboratory	USA
Medeiros, Patricia	S	University of Georgia	USA
Mohapatra, Bijoyaa	S	New Mexico State University	USA
Monda, Hiarhi	S	Bio Huma Netics, Inc.	USA
Moore, Willard	S	University of South Carolina	USA
Nimlos, Mark	S	National Renewable Energy Laboratory	USA
Pinckney, James	S	University of South Carolina	USA
Podgorski, David	S	University of New Orleans	USA
Rappaport, Stephen	S	University of California, Berkeley	USA
Reddy, Chris	S	Woods Hole Oceanographic Institution	USA
Ren, Zhiyong	S	University of Colorado, Boulder	USA

Name	User Type	Organization Name	Country
Richardson, Susan	S	University of South Carolina	USA
Rockwood, Alan	S	University of Utah	USA
Rodgers, Ryan	S	National High Magnetic Field Laboratory	USA
Romero, Isabel	S	University of South Florida	USA
Rosario-Ortiz, Fernando	S	University of Colorado, Boulder	USA
Rowland, Steven	S	National Renewable Energy Laboratory	USA
Rubasinghege, Gayan	S	New Mexico Tech	USA
Sharpless, Charles	S	University of Mary Washington	USA
Sitther, Viji	S	Morgan State University	USA
Smith, Donald	S	National High Magnetic Field Laboratory	USA
Spencer, Robert	S	Florida State University	USA
Stubbins, Aron	S	Northeastern University	USA
Tang, Youneng	S	Florida State University	USA
Tarr, Matthew	S	University of New Orleans	USA
Tharayil, Nishanth	S	Clemson University	USA
Thomas, Paul	S	Northwestern University	USA
Vachet, Richard	S	University of Massachusetts Amherst	USA
Valentine, Dave	S	University of California, Santa Barbara	USA
Ward, Collin	S	Woods Hole Oceanographic Institution	USA
Weisbrod, Chad	S	National High Magnetic Field Laboratory	USA
White, Helen	S	Haverford College	USA
Wickland, Kimberly	S	U.S. Geological Survey	USA
Williams, Evan	S	University of California, Berkeley	USA
Wilson, Alicia	S	University of South Carolina	USA
Wilson, Nolan	S	National Renewable Energy Lab	USA
Wozniak, Andrew	S	University of Delaware	USA
Yates, Kimberly	S	U.S. Geological Survey	USA
Yen, Andrew	S	Shell Global Solutions US, Inc.	USA
Young, Robert	S	Colorado State University	USA
Zhang, Yuanhui	S	University of Illinois at Urbana-Champaign	USA
Zhu, Mengqiang	S	University of Wyoming	USA
Zito, Phoebe	S	University of New Orleans	USA
Zuo, Yi	S	Chevron, San Ramon	USA
Aeppli, Christoph	P	Woods Hole Oceanographic Institution	USA
Butcher, David	P	National High Magnetic Field Laboratory	USA
Cai, Wenting	P	University of Texas, El Paso	USA
Carlsson, Henrik	P	University of California, Berkeley	USA
Chacon, Martha	P	National High Magnetic Field Laboratory	USA
Couch, Melaine	P	High Magnetic Field Laboratory	USA

Name	User Type	Organization Name	Country
DeHart, Caroline	P	Northwestern University	USA
DesSoye, Benjamin	P	Northwestern University	USA
Dong, Huiyu	P	University of South Carolina	USA
Hawkings, Jon	P	Florida State University	USA
Jin, Peng	P	Ohio University	USA
Kellerman, Anne	P	Florida State University	USA
Lin, Yu-Jiun	P	University of Delaware	USA
Liu, Fanny	P	Florida State University	USA
Lu, Lu	P	University of Colorado, Boulder	USA
Mao, Hairuo	P	University of Wyoming	USA
Melani, Rafael	P	Northwestern university	USA
Nyadong, Leonard	P	National High Magnetic Field Laboratory	USA
Pica, Nasim	P	Colorado State University	USA
Si, Buchun	P	University of Illinois at Urbana-Champaign	USA
Srzentic, Kristina	P	Northwestern University	USA
Tose, Lilian	P	Florida International University	USA
Vialykh, Elena	P	University of Colorado, Boulder	USA
Wagner, Sasha	P	University of Georgia	USA
Wang, Huan	P	University of Colorado, Boulder	USA
Xia, Mengxue	P	Clemson University	USA
Zhang, Jianchao	P	University of Wyoming	USA
Allen, Joshua	G	University of South Carolina	USA
Arrington, Eleanor	G	University of California, Santa Barbara	USA
Audu, Meshack	G	New Mexico State University	USA
Bahureksa, William	G	Colorado State University	USA
Bayat, Hengameh	G	New Mexico State University	USA
Behnke, Megan	G	Florida State University	USA
Bojan, Olivia	G	Colorado State University	USA
Castro, Edison	G	University of Texas, El Paso	USA
Cerón, Maira	G	University of Texas, El Paso	USA
Coffey, Nicole	G	University of Delaware	USA
Cui, Zheng	G	New Mexico State University	USA
Cuthbertson, Amy	G	University of South Carolina	USA
Dam, Than	G	Univesity of Wyoming	USA
Dehghanizadeh, Mostafa	G	New Mexico State University	USA
Drake, Travis	G	Florida State University	USA
Fernandez, Olivia	G	University of Texas, El Paso	USA
Frye, Joseph	G	National High Magnetic Field Laboratory	USA
Glattke, Taylor	G	Florida State University	USA

Name	User Type	Organization Name	Country
Gomez Torres, Maria	G	University of Texas, El Paso	USA
He, Lidong	G	National High Magnetic Field Laboratory	USA
Hemingway, Jordon	G	MIT/WHOI Joint Program in Oceanography	USA
Hutchinson, Carolyn	G	Iowa State University	USA
Krajewski, Logan	G	National High Magnetic Field Laboratory	USA
Kurek, Martin	G	Florida State University	USA
Letourneau, Maria	G	University of Georgia	USA
Li, Runwei	G	FSU-FAMU College of Engineering	USA
Li, Wenbo	G	Florida State University	USA
Liberatore, Hannah	G	University of South Carolina	USA
Lin, Yuan	G	Florida State University	USA
Liu, Peilu	G	Florida State University	USA
Logan, Merritt	G	Colorado State University	USA
Lopes, Christian	G	Florida International University	USA
Lusk, Mary	G	University of Florida	USA
Martineac, Rachel	G	University of Georgia	USA
Niles, Sydney	G	National High Magnetic Field Laboratory	USA
Peach, Jesse	G	Montana State University	USA
Popovic, Zeljka	G	Florida State University	USA
Putman, Jonathan	G	National High Magnetic Field Laboratory	USA
Salas, Alma	G	New Mexico State University	USA
Smith, Heidi	G	Montana State University	USA
Tabatabai, Behnam	G	Morgan State University	USA
Thomas, Rachel	G	Florida State University	USA
Valencia, Andrea	G	University of Central Florida	USA
Velasco, Carmen	G	University of New Mexico	USA
Walsh, Anna	G	Woods Hole Oceanographic Institution	USA
Wang, Yinghui	G	Florida State University	USA
Ware, Rebecca	G	National High Magnetic Field Laboratory	USA
Watson, Jamison	G	University of Illinois at Urbana-Champaign	USA
Wen, Dan	G	University of Central Florida	USA
Yi, Xiong	G	FAMU-FSU College of Engineering	USA
Zhang, Zhiming	G	Florida State University	USA
Zhou, Yongqiang	G	Florida State University	USA
Conley, Miranda	U	University of Tampa	USA
Davis, Cameron	U	National High Magnetic Field Laboratory	USA
Deverteuil, Ashley	U	National High Magnetic Field Laboratory	USA
Dheressa, Ermias	U	National Renewable Energy Laboratory	USA
Johnson, Joshua	U	Gardner-Webb University	USA

Name	User Type	Organization Name	Country
Miranda, Carlos	U	Florida State University	USA
Ordonez, Diana	U	University of Central Florida	USA
Reid, Carley	U	University of Tampa	USA
Rogers, Jennifer	U	Florida State University	USA
Santoyo, Christy	U	University of Texas, El Paso	USA
Sutton, Alexys	U	National High Magnetic Field Laboratory	USA
Textor, Sadie	U	Florida State University	USA
Thomas, Taniya	U	National High Magnetic Field Laboratory	USA
Yen, Timothy	U	National High Magnetic Field Laboratory	USA
Arumanayagam, AnithaChristy	T	Methodist Hospital Research Institute	USA
Butman, David	T	University of Washington	USA
Chen, Chunmei	T	University of New Orleans	USA
Dornblaser, Mark	T	U.S. Geological Survey	USA
Fathabad, Somayeh	T	Morgan State University	USA
Fountain, Ryan	T	Bio Huma Netics, Inc.	USA
Jankowski, KathiJo	T	U.S. Geological Survey	USA
Lu, Jie	T	National High Magnetic Field Laboratory	USA
Quinn, John	T	National High Magnetic Field Laboratory	USA
Robbins, Winston	T	Win Consulting Services	USA
Striegl, Rob	T	U.S. Geological Survey	USA

International Users

Name	User Type	Organization Name	Country
Afonso, Carlos	S	Normandy University	France
Baker, Andy	S	University of New South Wales	Australia
Bernier-Latmani, Rizlan	S	Ecole Polytechnique Federale de Lausanne	Switzerland
Blanksby, Stephen	S	Queensland University of Technology	Australia
Bode, Samuel	S	Ghent University	Belgium
Boeckx, Pascal	S	Ghent University	Belgium
Bogard, Matthew	S	University of Lethbridge	Canada
Boreham, Chris	S	Geoscience Australia	Australia
Boyemba, Faustin	S	University of Kisangani	Democratic Republic of Congo
Brocks, Jochen	S	Australian National University	Australia
Brookes, Justin	S	University of Adelaide	Australia
Carrasco, Nathalie	S	Sorbonne University	France
Chen, Meilian	S	Guangdong Technion	China
Covert, Paul	S	Fisheries and Oceans Canada	Canada
Dinga, Bienvenu	S	Institut de Recherche en Sciences et Exactes et Naturelles	Congo - Brazzaville

Name	User Type	Organization Name	Country
Ferre, Benedicte	S	University of Tromso, the Arctic University of Norway	Norway
Finlay, Kerri	S	University of Regina	Canada
Gautier, Thomas	S	Sorbonne University	France
Grundger, Friederike	S	University of Tromso, the Arctic University of Norway	Norway
Guillemette, Francois	S	University of Quebec at Trois-Rivières	Canada
Haakensen, Monique	S	Contango Strategies	Canada
Harbottle, David	S	University of Leeds	United Kingdom
Headley, John	S	Environment and Climate Change Canada	Canada
Hervé-Fernández, Pedro	S	Ghent University	Belgium
jeppesen, erik	S	Sino-Danish Centre for Education and Research	Denmark
Johannessen, Sophia	S	Fisheries and Oceans Canada	Canada
Kappler, Andreas	S	Eberhard Karls University of Tübingen	Germany
Li, Yuan	S	Peking University	China
McMartin, Dena	S	University of Regina	Canada
Ntaboba, Landry	S	Université Catholique de Bukavu	Democratic Republic of Congo
Ohkouchi, Naohiko	S	Japan Agency for Marine Earth Science & Technology	Japan
Oliver, Allison	S	Skeena Fisheries Commission	Canada
Poblet, Josep	S	Rovira i Virgili University	Spain
Qin, Boqiang	S	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences	China
Rodriguez-Fortea, Antonio	S	Rovira i Virgili University	Spain
Rüger, Christopher	S	University of Rostock	Germany
Schmitz-Afonso, ISabelle	S	University of Rouen	France
Sen, Indra	S	Indian Institute of Technology, Kanpur	India
Silyakova, Anna	S	University of Tromso, the Arctic University of Norway	Norway
Six, Johan	S	Swiss Federal Institute of Technology in Zurich	Switzerland
Takemori, Nobuaki	S	Ehime University	Japan
Tang, Xiangming	S	Nanjing University	China
Van Oost, Kristof	S	University of Leuven	Belgium
Verbeeck, Hans	S	Ghent University	Belgium
Wadham, Jemma	S	University of Bristol	United Kingdom
Xiao, Wenjie	S	Shanghai Ocean University	China
Xu, Yunping	S	Shanghai Ocean University	China
Xu, Zhenghe	S	University of Alberta	Canada
Yang, Yuanhe	S	Institute of Botany, Chinese Academy of Sciences	China
Yarranton, Harvey	S	University of Calgary	Canada
Zhang, Yibo	S	University Chinese Academy of Sciences	China
Zhang, Yunlin	S	Nanjing University	China

Name	User Type	Organization Name	Country
Zimov, Nikita	S	Pacific Institute of Geography Russian Academy of Sciences	Russia
Zubarev, Roman	S	Karolinska Institute	Sweden
Asta, Maria	P	Institute of Earth Sciences	France
Bryce, Casey	P	University of Tuebingen	Germany
Johnston, Sarah	P	University of Lethbridge	Canada
Poad, Berwyck	P	Queensland University of Technology	Australia
Van Dam, Bryce	P	Helmholtz-Zentrum Geesthacht	Germany
Zeller, Mary	P	Florida International University	Germany
Zhang, Xuepei	P	Karolinska Institutet	Sweden
Ajaero, Chukwuemeka	G	University of Regina	Canada
Ballard, Dewi	G	University of Leeds	United Kingdom
Bauters, Marijn	G	Ghent University	Belgium
Chatain, Audrey	G	Versailles Saint-Quentin-en-Yvelines University	France
de Oliveira, Andre	G	Marine Science Institute, Federal University of Ceara	Brazil
del Campo, Ruben	G	University of Navarra	Spain
Lee, Xuhui	G	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences	China
Maillard, Julien	G	Versailles Saint-Quentin-en-Yvelines University	France
Makelele, Isaac	G	University of Kisangani	Democratic Republic of Congo
Marshall, Matthew	G	University of Bristol	United Kingdom
McDonough, Liza	G	University of New South Wales	Australia
Nyilitya, Benjamin	G	Ghent University	Belgium
Oudone, Phetdala	G	University of New South Wales	Australia
Patzner, Monique Sézanne	G	University Tuebingen	Germany
Qiao, Peiqi	G	University of Alberta	Canada
Rashid, Harunur	G	Shanghai Ocean University	China
Sert, Muhammed	G	University of Tromso, the Arctic University of Norway	Norway
Shi, Kun	G	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences	China
Wei, Dandan	G	Shangai Ocean University	China
Xiao, Qitao	G	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences	China
Yao, Xiaolong	G	University of Chinese Academy of Sciences	China
Zhang, Mi	G	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences	China
Andersen, Martin	T	University of New South Wales	Australia
Barthel, Matti	T	ETH Zurich	Switzerland
Brügger, Clément	T	UNSW Sydney	Australia
Ding, Wenhao	T	University of Chinese Academy of Sciences	China
Ducati, Caterina	T	University of Cambridge	United Kingdom

Name	User Type	Organization Name	Country
Graca, Didia Coelho	T	Hôpitaux Universitaires de Genève	Switzerland
Hanxue, Huang	T	UNSW Sydney	Australia
Hoyt, Alison	T	Ghent University	Germany
Kraft, Markus	T	University of Cambridge	United Kingdom
Lescuyer, Pierre	T	Universitaires de Gene`ve	Switzerland
Manley-Harris, Merilyn	T	University of Waikato	New Zealand
Marjo, Christopher	T	University of New South Wales	Australia
Martin, Jacob	T	University of Cambridge	United Kingdom
Meredith, Karina	T	Australia,s Nuclear Science and Technology Organisation	Australia
Morales-Martínez, Roser	T	Rovira i Virgili University	Spain
Nunes, Darlisson	T	Instituto de Pesquisa Ambiental da Amazônia	Brazil
O,Carroll, Denis	T	University of New South Wales	Australia
Peru, Kerry	T	Environment and Climate Change Canada	Canada
Rutlidge, Helen	T	University of New South Wales	Australia
Trumbore, Susan	T	Ghent University	Germany
Wu, Huawu	T	University of Chinese Academy of Sciences	China

6. NMR Facility

National Users

Name	User Type	Organization Name	Country
Aakeroy, Christer	S	Kansas State University	USA
Agyare, Edward	S	Florida Agricultural and Mechanical University	USA
Arora, Rajendra	S	Florida Agricultural and Mechanical University	USA
Badisa, Ramesh	S	Florida Agricultural and Mechanical University	USA
Blackband, Steve	S	University of Florida	USA
Borlongan, Cesario	S	University of South Florida	USA
Bowers, Clifford	S	University of Florida	USA
Brady, Jeanine	S	University of Florida	USA
Brey, William	S	National High Magnetic Field Laboratory	USA
Bunnell, Bruce	S	Tulane University	USA
Centeno, Silvia	S	The Metropolitan Museum of Art	USA
CHen, Banghao	S	Florida State University	USA
Chen, Bo	S	University of Central Florida	USA
Chen, Hailong	S	Georgia Institute of Technology	USA
Cotten, Myriam	S	College of William and Mary	USA
Cross, Tim	S	National High Magnetic Field Laboratory	USA
Dalal, Naresh	S	National High Magnetic Field Laboratory	USA
Davis, Mark	S	California Institute of Technology	USA
Dichtel, William	S	Northwestern University	USA

Name	User Type	Organization Name	Country
Dubroca, Thierry	S	National High Magnetic Field Laboratory	USA
Dybowski, Cecil	S	University of Delaware	USA
Edison, Art	S	University of Georgia	USA
Eisenmesser, Elan	S	University of Colorado, Denver	USA
Fadool, Debra	S	Florida State University	USA
Feng, Zhenxing	S	Oregon State University	USA
Fichter, Katye	S	Missouri State University	USA
Flint, Jeremy	S	University of Florida	USA
Forder, John	S	University of Florida	USA
Frederick, Kendra	S	University of Texas, Southwestern	USA
Frydman, Lucio	S	National High Magnetic Field Laboratory	USA
Fu, Riqiang	S	National High Magnetic Field Laboratory	USA
Gan, Zhehong	S	National High Magnetic Field Laboratory	USA
Goodman, Carl	S	Florida Agricultural and Mechanical University	USA
Gor,kov, Petr	S	National High Magnetic Field Laboratory	USA
Grant, Samuel	S	National High Magnetic Field Laboratory	USA
Griffin, Robert	S	Massachusetts Institute of Technology	USA
Guilfoyle, David	S	Nathan Kline Institute for Psychiatric Research	USA
Haile, Sossina	S	Northwestern University	USA
Harrington, Michael	S	Huntington Medical Research Institutes	USA
Hayes, Sophia	S	Washington University in St. Louis	USA
Hong, Mei	S	Massachusetts Institute of Technology	USA
Hornak, Lawrence	S	University of Georgia	USA
Hu, Yan-Yan	S	Florida State University	USA
Huang, Wei	S	Northwestern University	USA
Hung, Ivan	S	National High Magnetic Field Laboratory	USA
Hwang, Sonjong	S	California Institute of Technology	USA
Ippolito, Joseph	S	Washington University in St. Louis	USA
Kanatzidis, Mercouri	S	Northwestern University	USA
Kennemur, Justin	S	Florida State University	USA
Koeppe, Roger	S	University of Arkansas	USA
Krishnan, Sunil	S	University of Texas, MD Anderson Cancer Center	USA
Levenson, Cathy	S	Florida State University	USA
Lim, Kwang Hun	S	East Carolina University	USA
Litvak, Ilya	S	National High Magnetic Field Laboratory	USA
Long, Joanna	S	University of Florida	USA
Ma, Teng	S	Florida State University	USA
Maggard, Paul	S	North Carolina State University	USA
Maly, Thorsten	S	Bridge12, Technologies, Inc.	USA

Name	User Type	Organization Name	Country
Marassi, Francesca	S	Sanford Burnham Prebys Medical Discovery Institute	USA
Marinas, Benito	S	University of Illinois at Urbana-Champaign	USA
Marks, Tobin	S	Northwestern University	USA
Martin, Rachel	S	University of California, Irvine	USA
McMahon, Michael	S	Johns Hopkins University	USA
Meints, Gary	S	Missouri State University	USA
Mentink, Frederic	S	National High Magnetic Field Laboratory	USA
Mohammadigoushki, Hadi	S	Florida State University	USA
Mohanty, Smita	S	Oklahoma State University	USA
Mueller, Leonard	S	University of California, Riverside	USA
Murray, Dylan	S	University of California Davis	USA
Nevzorov, Alexander	S	North Carolina State University	USA
Nilsson, Bradley	S	University of Rochester	USA
Ostrovsky, Dmitry	S	University of Alaska, Anchorage	USA
Paravastu, Anant	S	Georgia Institute of Technology	USA
Petzold, Linda	S	University of California, Santa Barbara	USA
Poeppelmeier, Kenneth	S	Northwestern University	USA
Ramamoorthy, Ayyalusamy	S	University of Michigan	USA
Reams, Renee	S	Florida Agricultural and Mechanical University	USA
Rosenberg, Jens	S	National High Magnetic Field Laboratory	USA
Rosenberry, Terrone	S	Mayo Clinic, Jacksonville	USA
Rossini, Aaron	S	Iowa State University	USA
Schepkin, Victor	S	National High Magnetic Field Laboratory	USA
Schiano, Jeffrey	S	Pennsylvania State University	USA
Schlenoff, Joseph	S	Florida State University	USA
Schurko, Robert	S	Florida State University	USA
Sen, Sabyasachi	S	University of California, Davis	USA
Shimizu, Linda	S	University of South Carolina	USA
Siemer, Ansgar	S	University of Southern California	USA
Silvers, Robert	S	Florida State University	USA
Singh, Mandip	S	Florida Agricultural and Mechanical University	USA
Smirnov, Alex	S	North Carolina State University	USA
stringer, john	S	PhoenixNMR	USA
Strouse, Geoffrey	S	National High Magnetic Field Laboratory	USA
Swift, Jennifer	S	Georgetown University	USA
Tian, Fang	S	Pennsylvania State University	USA
van Tol, Johan	S	National High Magnetic Field Laboratory	USA
Vugmeyster, Liliya	S	University of Colorado, Denver	USA
Wang, Tuo	S	Louisiana State University	USA

Name	User Type	Organization Name	Country
White, Jeffery	S	Oklahoma State University	USA
Whitmer, Tanya	S	Ohio State University	USA
Wi, Sungsool	S	National High Magnetic Field Laboratory	USA
Wu, Qiong	S	University of Texas, Southwestern	USA
Zhou, Huan-Xiang	S	University of Illinois at Chicago	USA
Zumbulyadis, Nicholas	S	Independent Scholar and Consultant	USA
Barran-Berdon, Ana	P	University of Florida	USA
Chen, Kuizhi	P	National High Magnetic Field Laboratory	USA
Di Tullio, Valeria	P	The Metropolitan Museum of Art	USA
Escobar, Cristian	P	National High Magnetic Field Laboratory	USA
Feng, Xuyong	P	Florida State University	USA
Guo, Cong	P	National High Magnetic Field Laboratory	USA
Holmes, Sean	P	Florida State University	USA
Hooker, Jerris	P	Florida Agricultural and Mechanical University	USA
Kragelj, Jaka	P	University of Texas, Southwestern	USA
Li, Xiang	P	Argonne National Laboratory	USA
Mao, Wenping	P	National High Magnetic Field Laboratory	USA
Mazzio, Elizabeth	P	Florida Agricultural and Mechanical University	USA
Miao, Yimin	P	Florida State University	USA
O,Donnell, Lauren	P	Hunter College of CUNY	USA
Paulino, Joana	P	National High Magnetic Field Laboratory	USA
Pavuluri, Kowsalyadevi	P	Johns Hopkins University	USA
Ravula, Thirupathi	P	University of Michigan	USA
Riviere, Gwladys	P	University of Florida	USA
Scott, Faith	P	National High Magnetic Field Laboratory	USA
Wang, Xiaoling	P	National High Magnetic Field Laboratory	USA
Watzlawik, Jens	P	Mayo Clinic, Jacksonville	USA
Xiao, Yiling	P	University of Texas, Southwestern	USA
Yang, Lufeng	P	Georgia Institute of Technology	USA
Zhang, Rongfu	P	National High Magnetic Field Laboratory	USA
Abad, Nastaren	G	Florida State University	USA
Abdolrahmani, maryam	G	Oklahoma State University	USA
Affram, Kevin	G	Florida Agricultural and Mechanical University	USA
Afzaal, Waseem	G	Florida State University	USA
Altenhof, Adam	G	Florida State University	USA
Amouzandeh, Ghoncheh	G	Florida State University	USA
Au, Dan	G	University of Colorado, Denver	USA
Bagdasarian , Frederick	G	Florida State University	USA
Banks, Daniel	G	Massachusetts Institute of Technology	USA

Name	User Type	Organization Name	Country
Bierma, Jan	G	University of California, Irvine	USA
Bindra, Jasleen	G	National Institute of Standards and Technology	USA
Cai, Songting	G	Northwestern University	USA
Carnahan, Scott	G	Iowa State University	USA
Chakraborty, Arnab	G	Louisiana State University	USA
Chalek, Kevin	G	University of California, Riverside	USA
Chaudhary, Bharat	G	Oklahoma State University	USA
Chen, Chia-Hsin	G	Washington University in St. Louis	USA
Chien, Po-Hsiu	G	Florida State University	USA
Costello, Whitney	G	University of Texas, Southwestern	USA
Cui, Jinlei	G	Washington University in St. Louis	USA
Dahal, Salik	G	Oklahoma State University	USA
Deck, Michael	G	Florida State University	USA
DeHaven, Baillie	G	University of South Carolina	USA
Dickwella Widanage, Malitha	G	Louisiana State University	USA
Dorn, Rick	G	Iowa State University	USA
Foley, Emily	G	University of California, Santa Barbara	USA
Gao, Lina	G	Florida State University	USA
Gao, Yuan	G	Georgia Institute of Technology	USA
Ghosh, Rittik	G	University of California, Riverside	USA
Harada, Jaye	G	Northwestern University	USA
Helsper, Shannon	G	National High Magnetic Field Laboratory	USA
Hike, David	G	Florida State University	USA
Holder, Samuel	G	Florida State University	USA
Horstmeier, Sarah	G	Oklahoma State University	USA
Inkoom, Andriana	G	Florida A&M University	USA
Johnston, Taylor	G	Florida State University	USA
Kirui, Alex	G	Louisiana State University	USA
Liu, Haoyu	G	Florida State University	USA
Mandala, Venkata	G	Massachusetts Institute of Technology	USA
Marple, Maxwell	G	University of California, Davis	USA
McClain, Becca	G	Northwestern University	USA
McKay, Matthew	G	University of Arkansas	USA
Meng, Xinxing	G	Pennsylvania State University	USA
Mosiman, Daniel	G	University of Illinois at Urbana-Champaign	USA
N Vidyadharan, Lakshmi Bhai	G	Ohio State University	USA
Ndemazie, Nkafu Bechem	G	Florida A&M University	USA
Neary, William	G	Florida State University	USA
Pandey, Shobhit	G	Northwestern University	USA

Name	User Type	Organization Name	Country
Patel, Sawankumar	G	Florida State University	USA
Peach, Austin	G	Florida State University	USA
Peng, Qingqing (Emily)	G	University of Florida	USA
Quigley, Elena	G	University of Rochester	USA
Rama Krishna, Sanath Kumar	G	Florida State University	USA
Sanati, Omid	G	University of Georgia	USA
Sangvi, Sheel	G	Northwestern University	USA
Schwartz, Austin	G	Florida State University	USA
Shan, Xiong	G	Georgia Institute of Technology	USA
Shin, Yiseul	G	Florida State University	USA
Sil, Aritra	G	Northwestern University	USA
Sindt, Ammon	G	University of South Carolina	USA
Smith, Taylor	G	Florida Agricultural and Mechanical University	USA
sun, he	G	Washington University in St. Louis	USA
Tangbampensountorn, Waroch	G	Pennsylvania State University	USA
Tokarski, John	G	University of Florida	USA
Tran, Nhi	G	University of Florida	USA
Venkatesh, Amrit	G	Iowa State University	USA
Vojvodin, Cameron	G	Florida State University	USA
Wang, Louis	G	Northwestern University	USA
Wang, Pengbo	G	Florida State University	USA
Watts, Taylor	G	Georgetown University	USA
West, Michael	G	Washington University in St. Louis	USA
Wijesekara, Viraj	G	Iowa State University	USA
Yuan, Bing	G	University of California, Davis	USA
Yuan, Xuegang	G	Florida State University	USA
Zhang, Xiangwu	G	North Carolina State University	USA
Zheng, Jin	G	Florida State University	USA
Zhu, Weidi	G	University of California, Davis	USA
Alderson, Hannah	U	Florida State University	USA
Boebinger, Scott	U	Florida State University	USA
Brotgandel, Albert	U	University of Florida	USA
Grice, Dillon	U	Florida State University	USA
Olson, Erik	U	Florida State University	USA
Taylor, Joshua	U	Florida State University	USA
Wong, Victor	U	Florida State University	USA
Blue, Ashley	T	National High Magnetic Field Laboratory	USA
Ould Ismail, Abdol Aziz	T	University of Pennsylvania	USA
Qin, Huajun	T	Florida State University	USA

Name	User Type	Organization Name	Country
Ranner, Steven	T	National High Magnetic Field Laboratory	USA

International Users

Name	User Type	Organization Name	Country
Andreas, Loren	S	Max Planck Institute for Biophysical Chemistry, Goettingen	Germany
Bernin, Diana	S	Chalmers University of Technology	Sweden
Bildsoe, Henrik	S	Aarhus University	Denmark
Bonhomme, Christian	S	Pierre and Marie Curie University	France
Brorson, Michael	S	Haldor Topsoe	Denmark
Bryce, David	S	University of Ottawa	Canada
Cai, Shuhui	S	Xiamen University	China
Chen, Zhong	S	Xiamen University	China
De Paepe, Gael	S	The French Alternative Energies and Atomic Energy Commission	France
Delgado, Paula	S	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany
Fekl, Ulrich	S	University of Toronto (Mississauga)	Canada
Freytag, Nicolas	S	Bruker Biospin	Switzerland
Friscic, Tomislav	S	McGill University	Canada
Gervais, Christel	S	Sorbonne University	France
Han, Oc Hee	S	Korea Basic Science Institute	South Korea
Hansen, Brian	S	Aarhus University	Denmark
Hediger, Sabine	S	The French Alternative Energies and Atomic Energy Commission	France
Hou, Guangjin	S	Dalian Institute of Chemical Physics	China
Huang, Yining	S	University of Western Ontario	Canada
Huang, Yuqing	S	Xiamen University	China
Jakobsen, Hans	S	Aarhus University	Denmark
Kong, Xueqian	S	Zhejiang University	China
Kuehne, Andre	S	MRI.TOOLS GmbH	Germany
Laurencin, Danielle	S	University of Montpellier	France
Lee, Chang Hyun	S	Dankook University	South Korea
Lee, Daniel	S	University of Grenoble Alpes	France
Lewinski, Janusz	S	Warsaw University of Technology	Poland
Li, Conggang	S	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	China
Neeman, Michal	S	Weizmann Institute of Science	Israel
Niendorf, Thoralf	S	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany
Ouari, Olivier	S	Aix-Marseille University	France
Peng, Luming	S	Nanjing University	China
Pohlmann, Andreas	S	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany

Name	User Type	Organization Name	Country
Schad, Lothar	S	Heidelberg University	Germany
Sigurdsson, Snorri	S	University of Iceland	Iceland
Sinha, Neeraj	S	Centre of Bio-Medical Research (CBMR)	India
Topgaard, Daniel	S	University of Lund	Sweden
Waiczies, Helmar	S	MRI.TOOLS GmbH	Germany
Waiczies, Sonia	S	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany
Wolska-Pietkiewicz, Malgorzata	S	Warsaw University of Technology	Poland
Wu, Gang	S	Queen,s University at Kingston	Canada
Xu, Jun	S	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	China
Zhao, Zhenchao	S	Dalian Institute of Chemical Physics	China
Zhong, Guiming	S	Chinese Academy of Sciences	China
Huskic, Igor	P	McGill University	Canada
Leftin, Avigdor	P	Weizmann Institute of Science	Israel
Markovic , Stefan	P	Weizmann Institute of Science	Israel
Millward, Jason	P	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany
Xiao, Dong	P	Dalian Institute of Chemical Physics	China
Abdulla, Louae	G	University of Windsor	Canada
Ahn, Juhee	G	Dankook University	South Korea
Chen, Hongyu	G	Dalian Institute of Chemical Physics	China
Du, Jiahuan	G	Nanjing University	China
Guan, Hanxi	G	Zhejiang University	China
Hwang, Jin Pyo	G	Dankook University	South Korea
Kim, Woo Young	G	Dankook University	South Korea
Lim, Yoon Jae	G	Dankook University	South Korea
Liu, Xiaomei	G	University of Science and Technology of China	China
Martins, Vinicius	G	University of Western Ontario	Canada
Oh, Chang Hoon	G	Dankook University	South Korea
Olejnik-Fehér, Natalia	G	Institute of Physics, Polish Academy of Sciences	Poland
Park, In Kee	G	Dankook University	South Korea
Prack, Ernest	G	University of Toronto (Mississauga)	Canada
Prinz, Christian	G	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany
Pyo, Se Youn	G	Dankook University	South Korea
Starke, Ludger	G	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Germany
Tan, Chunhua	G	Xiamen University	China
Wang, Kaiyu	G	Xiamen University	China
Purdie, John	U	University of Windsor	Canada
Chen, Huixin	T	Chinese Academy of Sciences	China

Name	User Type	Organization Name	Country
Ramaswamy, Vijay	T	Bruker Biospin	Switzerland

7. Pulsed Field Facility

National Users

Name	User Type	Organization Name	Country
Analytis, James	S	University of California, Berkeley	USA
Balakirev, Fedor	S	National High Magnetic Field Laboratory	USA
Balicas, Luis	S	National High Magnetic Field Laboratory	USA
Bauer, Eric	S	Los Alamos National Laboratory	USA
Baumbach, Ryan	S	National High Magnetic Field Laboratory	USA
Betts, Jonathan	S	National High Magnetic Field Laboratory	USA
Boebinger, Greg	S	National High Magnetic Field Laboratory	USA
Bud'ko, Sergey	S	Ames Laboratory	USA
Butch, Nicholas	S	National Institute of Standards and Technology	USA
Canfield, Paul	S	Ames Laboratory	USA
Cao, Gang	S	University of Colorado, Boulder	USA
Cava, Bob	S	Princeton University	USA
Checkelsky, Joseph	S	Massachusetts Institute of Technology	USA
Cheong, Sang Wook	S	Rutgers University, New Brunswick	USA
Chikara, Shalinee	S	National High Magnetic Field Laboratory	USA
Corvalan Moya, Carolina	S	Los Alamos National Laboratory	USA
Crooker, Scott	S	National High Magnetic Field Laboratory	USA
DiTusa, John	S	Louisiana State University	USA
Fisk, Zachary	S	University of California, Irvine	USA
Ghimire, Nirmal	S	George Mason University	USA
Gofryk, Krzysztof	S	Idaho National Laboratory	USA
Graf, David	S	National High Magnetic Field Laboratory	USA
Greene, Laura	S	National High Magnetic Field Laboratory	USA
Harrison, Neil	S	National High Magnetic Field Laboratory	USA
Huang, Chien-Lung	S	Rice University	USA
Jaime, Marcelo	S	National High Magnetic Field Laboratory	USA
Jena, Debdeep	S	Cornell University	USA
Klimov, Victor	S	Los Alamos National Laboratory	USA
Krzystek, Jurek	S	National High Magnetic Field Laboratory	USA
Landee, Chris	S	Clark University	USA
Lee, Minhyea	S	University of Colorado, Boulder	USA
Li, Lu	S	University of Michigan	USA
Li, Qi	S	Pennsylvania State University	USA
Maiorov, Boris	S	Los Alamos National Laboratory	USA
Manson, Jamie	S	Eastern Washington University	USA

Name	User Type	Organization Name	Country
Mao, Zhiqiang	S	Pennsylvania State University	USA
Maple, Brian	S	University of California, San Diego	USA
McDonald, Ross	S	National High Magnetic Field Laboratory	USA
McEuen, Paul	S	Cornell University	USA
McQueeney, Robert	S	Ames Laboratory	USA
Mitchell, John	S	Argonne National Laboratory	USA
Morosan, Emilia	S	Rice University	USA
Musfeldt, Janice	S	University of Tennessee, Knoxville	USA
Ni, Ni	S	University of California, Los Angeles	USA
Nie, Wanyi	S	Los Alamos National Laboratory	USA
Ozarowski, Andrew	S	National High Magnetic Field Laboratory	USA
Paglione, Johnpierre	S	University of Maryland, College Park	USA
Ramshaw, Brad	S	Cornell University	USA
Rickel, Dwight	S	National High Magnetic Field Laboratory	USA
Rodriguez, George	S	Los Alamos National Laboratory	USA
Ronning, Filip	S	Los Alamos National Laboratory	USA
Safa-Sefat, Athena	S	Oak Ridge National Laboratory	USA
Salamon, Myron	S	University of Texas, Dallas	USA
Shehter, Arkady	S	National High Magnetic Field Laboratory	USA
Singleton, John	S	National High Magnetic Field Laboratory	USA
Stemmer, Susanne	S	University of California, Santa Barbara	USA
Tarantini, Chiara	S	National High Magnetic Field Laboratory	USA
Turnbull, Mark	S	Clark University	USA
van Tol, Johan	S	National High Magnetic Field Laboratory	USA
Weickert, Dagmar	S	National High Magnetic Field Laboratory	USA
Welp, Ulrich	S	Argonne National Laboratory	USA
Winter, Laurel	S	National High Magnetic Field Laboratory	USA
Xing, Huili	S	Cornell University	USA
Xu, Xiaodong	S	University of Washington	USA
Yarotski, Dmitry	S	Los Alamos National Laboratory	USA
Zapf, Vivien	S	National High Magnetic Field Laboratory	USA
Zhou, Haidong	S	University of Tennessee, Knoxville	USA
Asaba, Tomoya	P	Los Alamos National Laboratory	USA
Breznay, Nicholas	P	Lawrence Berkeley National Laboratory	USA
Chan, Mun	P	National High Magnetic Field Laboratory	USA
Chen, Kuan-Wen	P	University of Michigan	USA
Ding, Xiaxin	P	Idaho National Laboratory	USA
Fang, Yuankan	P	University of California, San Diego	USA
Ferrari Silveira Rosa, Priscila	P	Los Alamos National Laboratory	USA

Name	User Type	Organization Name	Country
Galletti, Luca	P	University of California, Santa Barbara	USA
Ghimire, Nirmal	P	Argonne National Laboratory	USA
Goryca, Mateusz	P	National High Magnetic Field Laboratory	USA
Inoue, Hisashi	P	Massachusetts Institute of Technology	USA
Jackson, Daniel	P	National High Magnetic Field Laboratory	USA
Karna, Sunil	P	Louisiana State University	USA
Khan, Mojammel Alam	P	Argonne National Laboratory	USA
Kim, Jae Wook	P	Rutgers University, New Brunswick	USA
Kong, Tai	P	Princeton University	USA
Kumari, Shalini	P	Pennsylvania State University	USA
Kurumaji, Takashi	P	Massachusetts Institute of Technology	USA
Kushwaha, Satya	P	Los Alamos National Laboratory	USA
Lachman, Ella	P	University of California, Berkeley	USA
Lee, Menyoung	P	Cornell University	USA
Leroux, Maxime	P	Los Alamos National Laboratory	USA
Li, Jing	P	Los Alamos National Laboratory	USA
maniv, eran	P	University of California, Berkeley	USA
Mozaffari, Shirin	P	National High Magnetic Field Laboratory	USA
Nekrashevich, Ivan	P	CMMS	USA
Ning, Wei	P	Pennsylvania State University	USA
Park, Joonbum	P	Los Alamos National Laboratory	USA
Poudel, Narayan	P	Idaho National Laboratory	USA
Ran, Sheng	P	University of California, San Diego	USA
Ran, Sheng	P	University of Maryland, College Park	USA
Schoenemann, Rico	P	Los Alamos National Laboratory	USA
Schreiber, Katherine	P	National High Magnetic Field Laboratory	USA
Schumann, Timo	P	University of California, Santa Barbara	USA
Smylie, Matthew	P	Argonne National Laboratory	USA
Stier, Andreas	P	National High Magnetic Field Laboratory	USA
Sun, Dan	P	Los Alamos National Laboratory	USA
Suzuki, Takehito	P	Massachusetts Institute of Technology	USA
Tobash, Paul	P	National High Magnetic Field Laboratory	USA
Tsai, Hsinhan	P	Los Alamos National Laboratory	USA
Wang, Kefeng	P	University of Maryland, College Park	USA
Wartenbe, Mark	P	Los Alamos National Laboratory	USA
Xiang, Ziji	P	University of Michigan	USA
Xing, Jie	P	Oak Ridge National Lab	USA
Asaba, Tomoya	G	University of Michigan	USA
Blockmon, Avery	G	University of Tennessee, Knoxville	USA

Name	User Type	Organization Name	Country
Breindel, Alexander	G	University of California, San Diego	USA
Campbell, Daniel	G	University of Maryland, College Park	USA
Chen, Lu	G	University of Michigan	USA
Clune, Amanda	G	University of Tennessee, Knoxville	USA
Devarakonda, Aravind	G	Massachusetts Institute of Technology	USA
Eo, Yun Suk	G	University of Michigan	USA
Fang, Yawen	G	Cornell University	USA
Green, Jazmine	G	University of California, Los Angeles	USA
Haley, Shannon	G	University of California, Berkeley	USA
Han, Minyong	G	Massachusetts Institute of Technology	USA
Hayes, Ian	G	University of California, Berkeley	USA
Hu, Chaowei	G	University of California, Los Angeles	USA
Hughey, Kendall	G	University of Tennessee, Knoxville	USA
Jo, Na Hyun	G	Ames Laboratory	USA
Kealhofer, David	G	University of California, Santa Barbara	USA
Kealhofer, Robert	G	University of California, Berkeley	USA
Kuthanazhi, Brinda	G	Ames Laboratory	USA
Lai, You	G	National High Magnetic Field Laboratory	USA
Leahy, Ian	G	University of Colorado, Boulder	USA
Liu, I-LIn	G	University of Maryland, College Park	USA
Liu, Jinyu	G	Tulane University	USA
Maksimovic, Nikola	G	University of California, Berkeley	USA
Min, Lujin	G	Pennsylvania State University	USA
Modic, Kimberly	G	National High Magnetic Field Laboratory	USA
Nagarajan, Vikram	G	University of California, Berkeley	USA
Nair, Nityan	G	University of California, Berkeley	USA
Park, Kiman	G	University of Tennessee, Knoxville	USA
Pocs, Christopher	G	University of Colorado, Boulder	USA
Sanjeewa, Duminda	G	Oakridge	USA
Siegfried, Peter	G	University of Colorado, Boulder	USA
Thapa Magar, Nishchal	G	George Mason University	USA
Tinsman, Colin	G	University of Michigan	USA
Topping, Craig	G	National High Magnetic Field Laboratory	USA
Wang, Ziqiao	G	Pennsylvania State University	USA
Wilfong, Brandon	G	University of Maryland, College Park	USA
Wilson, Nathan	G	University of Washington	USA
Wright, John	G	Cornell University	USA
Xiao, Fan	G	Clark University	USA
Xu, Xianghan	G	Rutgers University, New Brunswick	USA

Name	User Type	Organization Name	Country
Ye, Linda	G	Massachusetts Institute of Technology	USA
Yokosuk, Michael	G	University of Tennessee, Knoxville	USA
Zhu, Junbo	G	Massachusetts Institute of Technology	USA
Zhu, Yanglin	G	Tulane University	USA
Kyriazi, Eleni Pagona	U	University of California, Los Angeles	USA
Nagarajan, Vikram	U	University of Minnesota, Twin Cities	USA
Neves, Paul	U	University of Maryland, College Park	USA
Thomas, Sean	T	Los Alamos National Laboratory	USA

International Users

Name	User Type	Organization Name	Country
Dabkowska, Hanna	S	McMaster University	Canada
Ebihara, Takao	S	Shizuoka University	Japan
Eremets, Mijkhail	S	Max Planck Institute for Chemistry, Mainz	Germany
Gaulin, Bruce	S	McMaster University	Canada
Goddard, Paul	S	University of Warwick	United Kingdom
Goh, Swee	S	Chinese University of Hong Kong	Hong Kong
Haenisch, Jens	S	Karlsruhe Institute of Technology	Germany
Iida, Kazumasa	S	Nagoya University	Germany
Imajo, Shusaku	S	University of Tokyo	Japan
Kohama, Yoshimitsu	S	University of Tokyo	Japan
Lancaster, Tom	S	University of Oxford	United Kingdom
Mackenzie, Andrew	S	University of St. Andrews	United Kingdom
Marie, Xavier	S	National Institute for Applied Sciences, Toulouse	France
Matsuda, Yuji	S	Kyoto University	Japan
Miura, Masashi	S	Seikei University	Japan
Moll, Philip	S	Ecole Polytechnique Federale de Lausanne	Switzerland
Morgan, Grace	S	University College Dublin	Ireland
Sakai, Hideaki	S	Osaka University	Japan
Saul, Andres	S	Aix-Marseille University	France
Stern, Raivo	S	National Institute of Chemical Physics and Biophysics	Estonia
Sullow, Stefan	S	Technical University of Braunschweig	Germany
Tanaka, Hidekazu	S	Tokyo Institute of Technology	Japan
Tsirlin, Alexander	S	National Institute of Chemical Physics and Biophysics	Estonia
Urbaszek, Bernhard	S	National Institute for Applied Sciences, Toulouse	France
Yuan, Huiqiu	S	Zhejiang University	China
Cayado, Pablo	P	karlsruhe institute of technology	Germany
Helm, Toni	P	Max Planck Institute, Dresden	Germany
Kuehne, Irina	P	University College Dublin	Ireland

Name	User Type	Organization Name	Country
Lai, Kwing To	P	Chinese University of Hong Kong	Hong Kong
Lao, Mayraluna	P	Karlsruhe Institute of Technology	Germany
Shirer, Kent	P	Max Planck Institute for Chemical Physics of Solids, Dresden	Germany
Smidman, Michael	P	Zhejiang University	China
Williams, Robert	P	University of Warwick	United Kingdom
Won, Choongjae	P	Pohang University of Science and Technology	South Korea
Bachmann, Maja	G	Max Planck Institute for Chemical Physics of Solids, Dresden	Germany
Curley, Sam	G	University of Warwick	United Kingdom
Guo, Chunyu	G	Zhejiang University	China
Huang, Xiangwei	G	Ecole Polytechnique Federale de Lausanne	Switzerland
Jakobsen, Vibe	G	University College Dublin	Ireland
Kelly, Conor	G	University College Dublin	Ireland
Khim, Seunghyun	G	Seoul National University	South Korea
Rosa, Priscilla	G	University Estadual de Campinas	Brazil
Shen, Bin	G	Zhejiang University	China
Wang, An	G	Zhejiang University	China
Xie, Jianyu	G	Chinese University of Hong Kong	Hong Kong
Zhang, Wei	G	Chinese University of Hong Kong	Hong Kong
Putzke, Carsten	U	University of Bristol	United Kingdom

APPENDIX V – USER PROPOSALS

1. AMRIS Facility

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Hae-Kwon Jeong (S)	PI	Texas A&M University	Chemical Engineering, Materials Science and Engi	NSF	CMMI - Civil, Mechanical & Manufacturing Innovation	CMMI1561347	P14981	Transport properties of mesoporous metal-organic frameworks by high field diffusion NMR	Engineering	1	22.5
Samuel Berens (G)	C	University of Florida	Chemical Engineering	NSF	CMMI - Civil, Mechanical & Manufacturing Innovation	CMMI1561897					
Christian Chmelik (P)	C	Leipzig University	Physics								
Akshita Dutta (G)	C	University of Florida	Chemical Engineering								
Febrian Hillman (G)	C	Texas A&M University	Chemical Engineering								
Joerg Kaerger (S)	C	Leipzig University	Physics								
Sergey Vasenkov (S)	C	University of Florida	Chemical Engineering								
Lilit Vardanyan (P)	PI	University of Florida	Soil and Water Science	DOE	EERE - Energy Efficiency and Renewable Energy	DE-EE0000031	P16145	Identification and Quantification of Organic Phosphorus Forms in the Soils of the Everglades Stormwater Treatment Areas (STAs)	Biology, Biochemistry, Biophysics	1	13
Andrew Maurer (S)	PI	University of Florida	Neuroscience	NIH	NIA - National Institute on Aging	AG055544	P16198	Alterations in the Thalamic Reuniens projections in the Aged Rat	Biology, Biochemistry, Biophysics	1	9
Jen Bizon (S)	C	University of Florida	Neuro	MBI-UF							
Sara Burke (S)	C	University of Florida	Neuroscience								
Jeremy Flint (S)	C	University of Florida	Neuroscience								
Sarah Lovett (T)	C	University of Florida	Neuroscience								
Aaron Mattfeld (S)	C	Florida International University	Psychology								
Kannan Menon (G)	C	University of Florida	Neuroscience								
Jerelyn Nick (T)	C	University of Florida	Neuroscience								
Kimberly Robertson (T)	C	University of Florida	Neuroscience								
Sean Turner (G)	C	University of Florida	Neuroscience								
Catherine Kaczorowski (S)	PI	The Jackson Laboratory	Neuroscience	University of Florida	US College and University		P17323	Neurite orientation dispersion and density imaging of Alzheimer's disease mouse models that exhibit either genetic susceptibility or resilience to high-risk human mutations.	Biology, Biochemistry, Biophysics	1	9.5
Amy Dunn (P)	C	The Jackson Laboratory	Neuroscience								
Marcelo Febo (S)	C	University of Florida	Psychiatry								
Sarah Neuner (G)	C	The Jackson Laboratory	Neuroscience								
Marjory Pompilus (G)	C	University of Florida	Psychiatry								
Rodolfo Gatto (S)	PI	University of Illinois at Chicago	Bioengineering	Chicago Biomedical Consortium	US College and University		P17430	Structural Analysis of Early Axonal Degeneration in ALS by MRI Diffusion Methods.	Biology, Biochemistry, Biophysics	1	15
Manish Amin (G)	C	University of Florida	Physics								
Luis Colon-Perez (S)	C	University of California, Irvine	Neurobiology and Behavior								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Jin Gao (G)	C		University of Illinois at Chicago	Biomedical Engineering								
Weiguo Li (T)	C		University of Illinois at Chicago	Bioengineering								
Richard Magin (S)	C		University of Illinois at Chicago	Bioengineering								
Thomas Mareci (S)	C		University of Florida	Biochemistry and Molecular Biology								
Sourajit Mustafi (P)	C		Indiana University	Radiology and Imaging Sciences								
Yu-Chien Wu (S)	C		Indiana University	Radiology and Imaging Sciences								
Anastasios Angelopoulos (S)	PI	*	University of Cincinnati	Department of Chemical and Environmental Engineering	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1836551	P17443	Diffusion-mediated exchange of small organic molecules between different types of local environments in perfluorosulfonic acid (PSA) membranes by high field PFG NMR	Engineering	1	72
Samuel Berens (G)	C		University of Florida	Chemical Engineering	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1836556					
Taylor Col (G)	C		Vasenkov Lab	Chemical Engineering								
Sergey Vasenkov (S)	C		University of Florida	Chemical Engineering								
Ryan Lively (S)	PI		Georgia Institute of Technology	School of Chemical & Biomolecular Engineering,	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1510411	P17444	The role of the framework flexibility in gas transport inside zeolitic imidazolate frameworks by pulsed field gradient NMR	Engineering	1	95
Amineh Baniani (G)	C		University of Florida	Chemical Engineering	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1510442					
Christian Chmelik (P)	C		Leipzig University	Physics								
Lei Fan (G)	C		University of Florida	Chemical Engineering								
Evan Forman (G)	C		University of Florida	Chemical Engineering								
Sergey Vasenkov (S)	C		University of Florida	Chemical Engineering								
Fengli Zhang (S)	C		National High Magnetic Field Laboratory	CIMAR								
Erkang Zhou (G)	C		Georgia Institute of Technology	School of Chemical & Biomolecular Engineering,								
Joanna Long (S)	PI		University of Florida	Biochemistry & Molecular Biology	No other support			P17539	New equipment/upgrades/troubleshooting on verticals (formerly P09507)	Biology, Biochemistry, Biophysics	1	190.75
James H.P. Collins (P)	C		University of Florida	Biochemistry & Molecular Biology	NIH	NIGMS - National Institute of General Medical Sciences	GM122698					
Malathy Elumalai (T)	C		University of Florida	AMRIS, McKnight Brain Institute								
Anil Mehta (O)	C		University of Florida	AMRIS								
James Rocca (S)	C		University of Florida	AMRIS Affiliated Faculty & Staff								
Joshua Slade (T)	C		University of Florida	AMRIS								
Joanna Long (S)	PI		University of Florida	Biochemistry & Molecular Biology	No other support			P17540	New equipment/upgrades/troubleshooting on horizontals (formerly P09509)	Biology, Biochemistry, Biophysics	1	54.83
Malathy Elumalai (T)	C		University of Florida	AMRIS, McKnight Brain Institute								
Kelly Jenkins (T)	C		University of Florida	AMRIS Affiliated Faculty & Staff								
Joshua Slade (T)	C		University of Florida	AMRIS								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)		Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Huadong Zeng (S)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
Joanna Long (S)	PI	University of Florida	Biochemistry & Molecular Biology	No other support		P17541	Routine maintenance of existing equipment (formerly P09510)	Biology, Biochemistry, Biophysics	1	292.7
Shane Chatfield (T)	C	University of Florida	AMRIS, McKnight Brain Institute							
James H.P. Collins (P)	C	University of Florida	Biochemistry & Molecular Biology							
Malathy Elumalai (T)	C	University of Florida	AMRIS, McKnight Brain Institute							
Kelly Jenkins (T)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
Thomas Mareci (S)	C	University of Florida	Biochemistry and Molecular Biology							
Anil Mehta (O)	C	University of Florida	AMRIS							
Tammy Nicholson (T)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
James Rocca (S)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR							
Joshua Slade (T)	C	University of Florida	AMRIS							
Judith Steadman (T)	C	University of Florida	AMRIS							
Christi Swiers (T)	C	University of Florida	AMRIS							
Huadong Zeng (S)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
Joanna Long (S)	PI	University of Florida	Biochemistry & Molecular Biology	No other support		P17542	New user training (formerly P09511)	Biology, Biochemistry, Biophysics	1	71.67
Guita Banan (G)	C	University of Florida	Biology							
James H.P. Collins (P)	C	University of Florida	Biochemistry & Molecular Biology							
Malathy Elumalai (T)	C	University of Florida	AMRIS, McKnight Brain Institute							
Thomas Mareci (S)	C	University of Florida	Biochemistry and Molecular Biology							
Anil Mehta (O)	C	University of Florida	AMRIS							
James Rocca (S)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
Joshua Slade (T)	C	University of Florida	AMRIS							
Huadong Zeng (S)	C	University of Florida	AMRIS Affiliated Faculty & Staff							
Ahmad Mostafa (P)	PI	Al-Azhar University	Pharmacognosy	Egyptian government	Other	P17558	Study on Chemical Constituents, and anticancer activities of certain natural products isolated from plants or marine drugs	Biology, Biochemistry, Biophysics	1	48.7
Hendrik Luesch (S)	C	University of Florida	College of Pharmacy							
QiQi Zhou (S)	PI	Malcom Randall VA Medical Center	Research Service (151)	VA - Department of Veterans Affairs		P17580	Mechanisms of Gulf War Illness	Biology, Biochemistry, Biophysics	2	10.33
Robert Caudle (S)	C	University of Florida	Dentistry							
Luis Colon-Perez (S)	C	University of California, Irvine	Neurobiology and Behavior							
Marcelo Febo (S)	C	University of Florida	Psychiatry							

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Marjory Pompilus (G)	C		University of Florida	Psychiatry								
G. Verne (S)	C		Tulane University	Medicine								
Jian Zuo (S)	C		University of Florida	Dentistry								
Benjamin Philmus (S)	PI	*	Oregon State University	College of Pharmacy	No other support			P17583	Understanding the chemical diversity, and biosynthesis triazine-containing secondary metabolites	Chemistry, Geochemistry	1	22.83
Joanna Long (S)	PI		University of Florida	Biochemistry & Molecular Biology	University of Florida matching support	US College and University		P17621	Not listed	Biology, Biochemistry, Biophysics	1	64
James H.P. Collins (P)	C		University of Florida	Biochemistry & Molecular Biology								
Chongyang Huang (P)	C		University of Florida	Biochem/Molecular Biology								
Jeanine Brady (S)	PI		University of Florida	Oral Biology	No other support		DMR1644779	P17623	Structural studies of adhesion protein P1 of Streptococcus mutans, its quaternary structure, and its formation of amyloid fibrils	Biology, Biochemistry, Biophysics	2	26.5
Mavis Agbandje-McKenna (S)	C		University of Florida	Biochemistry and Molecular Biology	NIH	NIDCR - National Institute of Dental and Craniofacial Research	DE021789					
Ana Barran-Berdon (P)	C		University of Florida	Oral Biology								
Albert Brotgandel (U)	C		University of Florida	Biochemistry and Molecular Biology								
Matthew Burg (G)	C		University of Florida	Chemistry								
Joanna Long (S)	C		University of Florida	Biochemistry & Molecular Biology								
Leronne Perera (G)	C		University of Florida	Oral Biology								
Gwladys Riviere (P)	C		University of Florida	Biochemistry and molecular biology								
Mavis Agbandje-McKenna (S)	PI		University of Florida	Biochemistry and Molecular Biology	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI126583	P17624	Unveiling the structure and dynamics of the VP1u infectivity domain of AAV, a gene therapy vector	Biology, Biochemistry, Biophysics	1	16.33
Matthew Burg (G)	C		University of Florida	Chemistry								
Renuk Lakshmanan (T)	C		University of Florida	Biochemistry and Molecular Biology								
Joanna Long (S)	C		University of Florida	Biochemistry & Molecular Biology								
Gwladys Riviere (P)	C		University of Florida	Biochemistry and molecular biology								
Jordi Diaz-Manera (S)	PI		University of Barcelona	Neurology	NIH	NIAMS - National Institute of Arthritis and Musculoskeletal and Skin Diseases	AR066077	P17648	Muscle MRI as a tool to detect glycogen in skeletal muscles	Biology, Biochemistry, Biophysics	1	0.5
Celine Baligand (S)	C		Leiden University Medical Center	Radiology	Muscular Dystrophy Association	Other						
Abhinandan Batra (G)	C		University of Florida	Phyical therapy								
Darin Falk (P)	C		University of Florida	Pediatrics								
Lauren Vaught (T)	C		University of Florida	Pediatrics								
Glenn Walter (S)	C		University of Florida	Physiology and Functional Genomics								
Huadong Zeng (S)	C		University of Florida	AMRIS Affiliated Faculty & Staff								
Evren Özarslan (S)	PI	*	Linköping University	Institutionen för medicinsk teknik	No other support			P17744	Examining neurite geometry via diffusion MR at very high field strengths	Biology, Biochemistry, Biophysics	1	17.5
Manish Amin (G)	C		University of Florida	Physics								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Guita Banan (G)	C		University of Florida	Biology								
Thomas Mareci (S)	C		University of Florida	Biochemistry and Molecular Biology								
Iulian Tampu (G)	C		University of Florida	Biochemistry & Molecular Biology								
John Jones (S)	PI	*	Center for Neurosciences and Cell Biology	Metabolic Control Lab	No other support			P17827	High-sensitivity 13C NMR isotopomer analysis of triglyceride fatty acid enrichment from [U-13C]fructose	Biology, Biochemistry, Biophysics	1	14.92
Ram Khattri (P)	C		University of Florida	Biochemistry and molecular biology/medicine								
Rohit Mahar (P)	C		University of Florida	Biochemistry and molecular biology								
Marc McLeod (G)	C		University of Florida College of Medicine	Biochemistry and Molecular Biology								
Matthew Merritt (S)	C		University of Florida	Biochemistry and Molecular Biology								
Mukundan Ragavan (P)	C		University of Florida	Department of Biochemistry and Molecular Biology								
David Blackburn (S)	PI	*	University of Florida	NH-Herpatology	NSF	DBI - Division of Biological Infrastructure	DBI1701714	P17834	Integration of MRI into the NSFs oVert Program,	Biology, Biochemistry, Biophysics	1	3.17
Steve Blackband (S)	C		University of Florida	CIMAR								
Jeremy Flint (S)	C		University of Florida	Neuroscience								
John Forder (S)	C		University of Florida	Radiology								
Edward Stanley (S)	C		University of Florida	NH-Herpetology								
Linda Shimizu (S)	PI	*	University of South Carolina	Chemistry and Biochemistry	NSF	CHE - Chemistry	CHE1608874	P17929	Investigating the Process of Energy Transfer in UV-Irradiated Triphenylamine bis-Urea Macrocycle Nanotubes	Chemistry, Geochemistry	1	10.5
Clifford Bowers (S)	C		University of Florida	Chemistry								
Baillie DeHaven (G)	C		University of South Carolina	Chemistry								
Ammon Sindt (G)	C		University of South Carolina	Chemistry and Biochemistry								
John Tokarski (G)	C		University of Florida	Chemistry								
Jamie Near (S)	PI	*	McGill University	Psychiatry	No other support			P17950	Ketogenic diet induced rescue of cortical neurotransmitter and metabolic profiles in aged rodents: a proton MRS study at 11.1 Tesla	Biology, Biochemistry, Biophysics	1	6.83
Marcelo Febo (S)	C		University of Florida	Psychiatry								
Marjory Pompilus (G)	C		University of Florida	Psychiatry								
Eric Porges (S)	C		University of Florida	Clinical and Health Psychology								
Daniel R. Talham (S)	PI	*	University of Florida	Chemistry	No other support			P17951	Polymer coated lanthanide nanoparticles as PARACEST MRI contrast agents	Chemistry, Geochemistry	1	11
Pratik Roy (G)	C		University of Florida	Chemistry								
Luis Colon-Perez (S)	PI	*	University of California, Irvine	Neurobiology and Behavior	No other support			P18050	Characterization of brain structure at multiple scales in a rodent model early life stress	Biology, Biochemistry, Biophysics	1	12
Pascal Bernatchez (S)	PI	*	University of British Columbia	Anesthesiology, Pharmacology, & Therapeutics	No other support			P18061	Imaging tissue heterogeneity in a new model of chronic muscle damage with fibrofatty infiltration and wasting.	Biology, Biochemistry, Biophysics	1	33.9
Elisabeth Barton (S)	C		University of Florida	Applied Physiology and Kinesiology								
Abhinandan Batra (G)	C		University of Florida	Phyical therapy								
Glenn Walter (S)	C		University of Florida	Physiology and Functional Genomics								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Huadong Zeng (S)	C		University of Florida	AMRIS Affiliated Faculty & Staff								
Baldwyn Torto (S)	PI	*	International Centre of Insect Physiology and Ecology	Chemical Ecology	No other support			P18083	Isolation, synthesis and anti-plasmodium studies of parthenin derivatives	Biology, Biochemistry, Biophysics	1	1.2
Rhoel Dinglasan (S)	C		University of Florida	Emerging Pathogens Institute/Id&P								
Hae-Kwon Jeong (S)	PI		Texas A&M University	Chemical Engineering, Materials Science and Engi	NSF	CMMI - Civil, Mechanical & Manufacturing Innovation	CMMI1561347	P18084	Microscopic gas diffusion in hybrid zeolitic-imidazolate frameworks (ZIFs) by high field diffusion NMR	Engineering	1	30.5
Samuel Berens (G)	C		University of Florida	Chemical Engineering								
Febrian Hillman (G)	C		Texas A&M University	Chemical Engineering								
Sergey Vasenkov (S)	C		University of Florida	Chemical Engineering								
Kunjan Dave (S)	PI		University of Miami	Neurology	No other support			P18093	Accelerated brain aging in diabetes: The impact of recurrent hypoglycemia.	Biology, Biochemistry, Biophysics	1	2
Eduardo Candelario-Jalil (S)	C		University of Florida	Neuroscience								
Marcelo Febo (S)	C		University of Florida	Psychiatry								
Marjory Pompilus (G)	C		University of Florida	Psychiatry								
Matthew Eddy (S)	PI	*	University of Florida	Chemistry	University of Florida (start-up funds)	US College and University		P19106	ML-EDDY-001: Allosteric Regulation of Human Signaling Complexes	Biology, Biochemistry, Biophysics	1	25
Kara Anazia (G)	C		University of Florida	Chemistry department								
Niloofar Gopal Pour (G)	C		University of Florida	Chemistry								
Emma Mulry (G)	C		University of Florida	Chemistry								
Arka Prabha Ray (G)	C		University of Florida	Chemistry								
Naveen Thakur (G)	C		University of Florida	Chemistry								
Andrew Palmer (S)	PI	*	Florida Institute of Technology	Department of Biomedical and Chemical Engineering and Sciences	No other support			P19156	Regulating Bacterial Virulence through Quorum Sensing Modulation	Biology, Biochemistry, Biophysics	1	2.5
Anil Mehta (O)	C		University of Florida	AMRIS								
Eric Ziegler (G)	C		Florida Institute of Technology	Biological and Chemical Engineering and Sciences								
Benjamin Wylie (S)	PI	*	Texas Tech University Department of Chemistry and Biochemistry	Chemistry and Biochemistry	No other support		DMR1644779	P19164	Determining the dynamic structure of lipid-membrane protein complexes via solid-state NMR	Biology, Biochemistry, Biophysics	1	15.83
Anil Mehta (O)	C		University of Florida	AMRIS								
Adam Veige (S)	PI	*	University of Florida	Chemistry	NSF	CHE - Chemistry	CHE1808234	P19170	Quantification of End Groups in Cyclic vs. Linear Polyacetylenes by Carbon-13 Magic Angle Spinning Nuclear Magnetic Resonance Spectroscopy	Biology, Biochemistry, Biophysics	1	6
Clifford Bowers (S)	C		University of Florida	Chemistry								
Alec Esper (G)	C		University of Florida	Chemistry								
Zhihui Miao (G)	C		University of Florida	Department of Chemistry								
Brent Sumerlin (S)	C		University of Florida	Chemistry								
Kyle McCommis (S)	PI	*	Saint Louis University (SLU)	Biochemistry	NIH	NHLBI - National Heart and Blood Institute	HL136658	P19214	Hyperpolarized Pyruvate in MPC-/- Hearts to Assess Pyruvate Metabolism in Heart Failure	Biology, Biochemistry, Biophysics	1	14
Matthew Merritt (S)	C		University of Florida	Biochemistry and Molecular Biology								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Mukundan Ragavan (P)	C	University of Florida	Department of Biochemistry and Molecular Biology								
								Total Proposals: 34		Experiments: 36	Days: 1,242.00

2. DC Field Facility

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Dmitry Smirnov (S)	PI	National High Magnetic Field Laboratory	Instrumentation & Operations	No other support			P09593	Testing new probes and techniques for high-field optical magnetospectroscopy	Magnets, Materials	3	7.09
Yuxuan Jiang (P)	C	National High Magnetic Field Laboratory	CMS								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Seongphill Moon (G)	C	National High Magnetic Field Laboratory	Physics								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Dmitry Semenov (T)	C	National High Magnetic Field Laboratory	DC Field								
Dmytro Abraimov (S)	PI	National High Magnetic Field Laboratory	The Applied Superconductivity Center	No other support			P13640	Angular dependence of Jc for modern ReBCO Coated Conductors at high magnetic fields	Magnets, Materials	1	5
Griffin Bradford (O)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
Ashleigh Francis (T)	C	National High Magnetic Field Laboratory	ASC								
Jan Jaroszynski (S)	C	National High Magnetic Field Laboratory	CMS								
David Larbalestier (S)	C	National High Magnetic Field Laboratory	ASC								
Sufei Shi (S)	PI	Rensselaer Polytechnic Institute	Chemical and Biological Engineering	AFOSR	Other US Federal Agency	A12938.2230	P14775	Magneto-transport of van der Waals Heterostructure	Engineering	2	11.05
Zhipeng Li (P)	C	Rensselaer Polytechnic Institute	Chemical and Biological Engineering								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Tianmeng Wang (G)	C	Rensselaer Polytechnic Institute	Chemical and Biological Engineering								
Michael Zudov (S)	PI	University of Minnesota, Twin Cities	School of Physics and Astronomy	DOE	Office of Science - BES – Basic Energy Sciences	DE-46640-SC000256	P14855	Anisotropic and nonequlibrium transport in 2D systems	Condensed Matter Physics	2	14
XIaojun Fu (G)	C	University of Minnesota, Twin Cities	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0006671					
Michael Manfra (S)	C	Nokia Bell Labs	Semiconductor Physics Research								
Loren Pfeiffer (S)	C	Princeton University	Electrical Engineering								
Ken West (S)	C	Princeton University	Princeton Institute for the Science and Technology of Materials								
Hongwoo Baek (S)	PI	National High Magnetic Field Laboratory	DC field	NSF	DMR - Division of Materials Research	DMR1644779	P14877	Development of Probes in the DC field facility	Magnets, Materials	1	6.37
Alimamy Bangura (S)	C	National High Magnetic Field Laboratory	CMS								
Jonathan Billings (T)	C	National High Magnetic Field Laboratory	Instrumentation								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Glover Jones (T)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Scott Maier (T)	C		National High Magnetic Field Laboratory	Instrumentation and Operations								
Tim Murphy (S)	C		National High Magnetic Field Laboratory	Operations								
Ju-Hyun Park (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations, User Support								
Bobby Pullum (T)	C		National High Magnetic Field Laboratory	I&O								
Yasu Takano (S)	PI		University of Florida	Physics	UCGP		R02102	P14886	Magnetic and thermal properties of novel quantum magnets	Condensed Matter Physics	1	5.38
Eun Sang Choi (S)	C		National High Magnetic Field Laboratory	Physics Department								
Xinzhe Hu (G)	C		University of Florida	Physics								
Dakota Shields (U)	C		Northwest Missouri State University	Natural Sciences								
K A M Hasan Siddiquee (G)	C		University of Central Florida	Physics								
Wei Pan (S)	PI		Sandia National Laboratories	Semiconductor Devices and Science	DOE	LDRD - Laboratory Directed R&D	DE-NA00-03	P14899	Quantum transport properties in three-dimensional topological materials	Condensed Matter Physics	2	14
Sabyasachi Sen (S)	PI	*	University of California, Davis	Chemical Engineering and Materials Science	NSF	DMR - Division of Materials Research	DMR1505185	P14934	Elucidation Of Structure-Functionality Relationships In Amorphous And Crystalline Materials By High-Field Solid-State Nmr Spectroscopy	Chemistry, Geochemistry	1	5
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Maxwell Marple (G)	C		University of California, Davis	Chemical Engineering and Materials Science								
Hans Jakobsen (S)	PI		Aarhus University	Department of Chemistry	Aarhus University/Haldor Topsoe, Denmark	Non US College and University		P14957	Dynamic and Structure NMR Studies of Tetraoxoanions and Gas-Solid Materials Mimicking Environments on Planet Mars	Chemistry, Geochemistry	1	5
Henrik Bildsoe (S)	C		Aarhus University	Chemistry								
Michael Brorson (S)	C		Haldor Topsoe	Catalysis								
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Faxian Xiu (S)	PI		Fudan University	Physics	No other support			P14980	Magnetotransport study of unconventional Weyl orbits near quantum limit	Condensed Matter Physics	2	11.47
Ce Huang (G)	C		Fudan University	Department of Physics	Fudan University	Non US College and University						
Alexey Suslov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Yunkun Yang (G)	C		Fudan University	Dept. of Physics								
Xiang Yuan (G)	C		Fudan University	Physics								
Cheng Zhang (S)	C		Fudan University	Institute for Nanoelectronic Devices and Quantum Computing								
Enze Zhang (P)	C		Fudan University	Physics								
Minhao Zhao (G)	C		Fudan University	Physics								
Haidong Zhou (S)	PI		University of Tennessee, Knoxville	Physics and Astronomy	NSF	DMR - Division of Materials Research	DMR1350002	P14982	Studies on low temperature physical properties of new quantum spin liquid and spin-orbital liquid candidates	Condensed Matter Physics	2	15
Eun Sang Choi (S)	C		National High Magnetic Field Laboratory	Physics Department								
Qing Huang (G)	C		University of Tennessee, Knoxville	Physics								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Zhigang Jiang (S)	C	Georgia Institute of Technology	School of Physics								
Kyle Noordhoek (U)	C	University of Tennessee, Knoxville	Physics and Astronomy								
Chengkun Xing (G)	C	University of Tennessee, Knoxville	Physics								
Han Zhang (P)	C	University of Tennessee	Physics								
Jin Hu (S)	PI	University of Arkansas	Physics	DOE	EPSCoR - Established Program to Stimulate Competitive Research	DE-SC0019467	P14984	Exotic High Field Quantum Phenomena of Nodal-line Fermions	Condensed Matter Physics	2	10.52
Rabindra Basnet (G)	C	University of Arkansas	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0019467					
Hugh Churchill (S)	C	University of Arkansas	Physics								
Arash Fereidouni Ghaleh Minab (G)	C	University of Arkansas	Physics								
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Seng Huat Lee (S)	C	Pennsylvania State University	Physics								
Zhiqiang Mao (S)	C	Pennsylvania State University	Department of Physics								
Yu Wang (T)	C	Pennsylvania State University	Department of Physics								
Yanglin Zhu (G)	C	Tulane University	Department of Physics and Engineering Physics								
Luis Balicas (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Experiment	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0002613	P15986	Fermiology in geometrically frustrated heavy fermions	Condensed Matter Physics	1	7
Yu Che Chiu (G)	C	National High Magnetic Field Laboratory	Condensed Matter Sciences								
Emilia Morosan (S)	C	Rice University	Physics and Astronomy								
Shirin Mozaffari (P)	C	National High Magnetic Field Laboratory	Condensed Matter Sciences								
Daniel Rhodes (S)	C	University of Wisconsin, Madison	Materials Science and Engineering								
Rico Schoenemann (P)	C	Los Alamos National Laboratory	MPA-MAG								
WenKai Zheng (G)	C	National High Magnetic Field Laboratory	Condensed Matter Sciences								
Yuanbo Zhang (S)	PI	Fudan University	Physics	National Science Foundation of China	Non US Foundation	11425415	P15988	Quantum transport in black phosphorus and other novel two-dimensional materials	Condensed Matter Physics	2	8.67
Shuaifei Guo (G)	C	Fudan University	Physics Department	National Science Foundation of China	Other Non US Federal Agency	11425415					
Mingyan Luo (U)	C	Fudan University	physics								
Zuocheng Zhang (P)	C	Fudan University	Physics								
Sara Haravifard (S)	PI	Duke University	Department of Physics	Duke University	US College and University		P15993	Pressure-Induced Bosonic States in the Spin Dimer System SrCu2(BO3)2 at Low Fields	Condensed Matter Physics	2	21
Sachith Dissanayake (P)	C	Duke University	Physics	Duke University	US College and University	William M. Fairbank Chair in Physics					
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Brodie Popovic (G)	C	Duke University	Physics								
Zhenzhong Shi (P)	C	Duke University	Department of Physics								
William Steinhardt (G)	C	Duke University	Physics								
Stephen McGill (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Science	NSF	DMR - Division of Materials Research	DMR1229217	P15996		Condensed Matter Physics	2	14

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Luis Balicas (S)	C		National High Magnetic Field Laboratory	Condensed Matter Experiment					Optical Spectroscopy of Novel Two-Dimensional Materials			
Carlos Garcia (G)	C		Florida State University	Physics								
Jade Holleman (G)	C		Florida State University	Physics								
Efstratios Manousakis (S)	C		Florida State University	Physics								
William Coniglio (S)	PI		National High Magnetic Field Laboratory	A1	No other support			P16001	Macroscopic and microscopic investigations of quantum matter with field and pressure	Condensed Matter Physics	2	9.38
Nicolas Doiron-Leyraud (S)	C		University of Sherbrooke	Physics								
Takao Ebihara (S)	C		Shizuoka University	Physics								
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS								
Audrey Grockowiak (S)	C		National High Magnetic Field Laboratory	DC Field/CMS								
Tim Murphy (S)	C		National High Magnetic Field Laboratory	Operations								
Ju-Hyun Park (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations, User Support								
Louis Taillefer (S)	C		University of Sherbrooke	Physics								
Stan Tozer (S)	C		National High Magnetic Field Laboratory	Physics								
Kate Ross (S)	PI		Colorado State University	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC00-18	P16040	Out of equilibrium effects in a quantum magnet	Condensed Matter Physics	2	12.25
Colin Sarkis (G)	C		Colorado State University	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0018972					
Steffen Säubert (P)	C		Colorado State University	Department of Physics								
Jun Xu (S)	PI	*	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	Wuhan NMR center	National Natural Science Foundation of China	Other		P16062	Study of active site and reaction intermediates on heterogeneous catalysis by DNP-NMR	Biology, Biochemistry, Biophysics	1	5
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Qiang Wang (T)	C		Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	Wuhan NMR center								
N. Phuan Ong (S)	PI		Princeton University	Physics	NSF	DMR - Division of Materials Research	DMR1420541	P16070	High-field thermopower of the nu=1/2 state in ultra-thin GaAs devices	Condensed Matter Physics	1	7
Tong Gao (G)	C		Princeton University	Physics								
Sihang Liang (G)	C		Princeton University	Physics								
Jingjing Lin (G)	C		Princeton University	Physics								
Nicholas Quirk (G)	C		Princeton University	Physics								
Wudi Wang (G)	C		Princeton University	Physics								
Chun Ning (Jeanie) Lau (S)	PI		Ohio State University	Department of Physics and Astronomy	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC10-59	P16071	Symmetry-broken Quantum Hall States and Phase Diagrams in 2D Materials	Condensed Matter Physics	5	32
Shi Che (G)	C		University of California, Riverside	Physics	DOE	Office of Science - BES – Basic Energy Sciences	46940-DE-SC0010597					
Emilio Codecido (G)	C		Ohio State University	Physics	The Ohio State University	US College and University						

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Xueshi Gao (G)	C	Ohio State University	Physics								
Yulu Liu (G)	C	Ohio State University	Physics								
Dmitry Shcherbakov (G)	C	Ohio State University	Physics								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Petr Stepanov (G)	C	University of California, Riverside	Physics								
Haidong Tian (G)	C	Ohio State University	Physics								
Son Tran (G)	C	University of California, Riverside	Physics								
Jiawei Yang (G)	C	University of California, Riverside	Physics								
Zhigang Jiang (S)	PI	Georgia Institute of Technology	School of Physics	DOE	Other	DE-FG02-07ER46451	P16079	Magneto-infrared Spectroscopy Study of Emerging Topological Materials with Layered Structures	Condensed Matter Physics	4	29.25
Yuxuan Jiang (P)	C	National High Magnetic Field Laboratory	CMS	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-07ER46451					
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Jingyue Wang (G)	C	Georgia Institute of Technology	Physics								
Tianhao Zhao (G)	C	Georgia Institute of Technology	School of Physics								
Johnpierre Paglione (S)	PI	University of Maryland, College Park	Center for Nanophysics and Advanced Materials, Department of Physics	NSF	DMR - Division of Materials Research	DMR1610349	P16084	Fermi Surface Study by Quantum Oscillations in Transition Metal Phosphides	Condensed Matter Physics	2	10.93
Daniel Campbell (G)	C	University of Maryland, College Park	Physics	Gordon and Betty Moore Foundation	US Foundation	GBMF4419					
Yun Suk Eo (G)	C	University of Michigan	Physics Department	Gordon and Betty Moore Foundation	Other	GBMF4419					
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Wen-Chen Lin (G)	C	University of Maryland College Park	Physics								
Wen-Chen Lin (G)	C	University of Maryland College Park	physics								
Paul Neves (U)	C	University of Maryland, College Park	Center for Nanophysics and Advanced Materials								
Kefeng Wang (P)	C	University of Maryland, College Park	Department of Physics								
Brandon Wilfong (G)	C	University of Maryland, College Park	Center for Nanophysics and Advanced Materials								
Irina Drichko (S)	PI	Ioffe Physical-Technical Institute of the Russian Academy of Sciences	Physics of Semiconductors and Dielectrics	Presidium of Russian Academy of Sciences	Non US Council		P16087	High-frequency magnetotransport in high-mobility n-AlGaAs/GaAs/AlGaAs heterostructures with wide quantum well near the filling factor with even denominators, ½ and others: Acoustic studies	Condensed Matter Physics	1	7
Loren Pfeiffer (S)	C	Princeton University	Electrical Engineering								
Ivan Smirnov (S)	C	Ioffe Physical-Technical Institute of the Russian Academy of Sciences	Physics of Semiconductors and Dielectrics								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Ken West (S)	C	Princeton University	Princeton Institute for the Science and Technology of Materials								

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Vikram Deshpande (S)	PI	University of Utah	Physics & Astronomy	American Chemical Society: Petroleum Research Fund	Other		P16093	Search for Interaction Effects in Dual-Gated Topological Insulators in the Quantum Hall Regime	Condensed Matter Physics	2	14
Su Kong Chong (G)	C	University of Utah	Physics & Astronomy	University of Utah	US College and University						
Taylor Sparks (S)	C	University of Utah	Materials Science & Engineering								
Debdeep Jena (S)	PI	Cornell University	ECE	NSF	GRFP - Graduate Research Fellowship Program	GRFP1650441	P16094	Understanding Pairing in Nb2N: A new Epitaxial Superconductor	Condensed Matter Physics	2	10
Reet Chaudhuri (G)	C	Cornell University	Electrical and Computer Engineering	NSF	ECCS - Electrical, Communications, and Cyber Systems	ECCS1740136					
Phillip Dang (G)	C	Cornell University	Electrical Engineering	NSF	EFMA - Emerging Frontiers and Multidisciplinary Activities	EFMA1741694					
Scott Katzer (S)	C	U.S. Naval Research Laboratory		NSF	DGE - Division of Graduate Education	DGE1650441					
Guru Khalsa (P)	C	Cornell University	Applied Physics and Material Science	NSF	EECS - Electrical, Communications and Cyber Systems	EECS1740286					
David Meyer (S)	C	U.S. Naval Research Laboratory	Electronics Science and Technology Division								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Suresh Vishwanath (G)	C	Cornell University	ECE								
Huili Xing (S)	C	Cornell University	ECE								
Rusen Yan (P)	C	Cornell University	Electrical and Computer Engineering								
Abhay Pasupathy (S)	PI	Columbia University	Physics	NSF	DMR - Division of Materials Research	DMR1420634	P16099	Probing the interface of a Fractional Quantum Hall system and a Superconductor at high magnetic fields	Condensed Matter Physics	2	14
Avishai Benyamini (P)	C	Columbia University	Mechanical Engineering	DOE	Office of Science - BES – Basic Energy Sciences	Programmable Quantum Materials					
Augusto Ghiotto (G)	C	Columbia University	Physics								
Apoorv Jindal (G)	C	Columbia University	Physics								
Qianhui Shi (P)	C	Columbia University	Physics								
En-Min Shih (G)	C	Columbia University	Physics								
Evan Telford (G)	C	Columbia University	Physics								
Da Wang (G)	C	Columbia University	Physics								
Yihang Zeng (G)	C	Columbia University	Physics								
Vesna Mitrovic (S)	PI	Brown University	Physics	NSF	DMR - Division of Materials Research	DMR-1608760	P16102	Microscopic Investigation of Mott Insulators with Strong Spin-Orbit Coupling	Condensed Matter Physics	1	5
Rong Cong (G)	C	Brown University	Physics								
Erick Garcia (G)	C	Brown University	Department of Physics								
Arneil Reyes (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Cedomir Petrovic (S)	PI	Brookhaven National Laboratory	Condensed Matter Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0012704	P16104	Quantum oscillation study of type-2 Weyl semimetals	Condensed Matter Physics	2	12.53

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Zhixiang Hu (G)	C	Brookhaven National Laboratory	Condensed Matter Physics								
Yu Liu (P)	C	Brookhaven National Laboratory	Condensed Matter Physics								
Qi Wang (G)	C	Brookhaven National Laboratory	Condensed Matter Physics And Material Science								
David Graf (S)	PI	National High Magnetic Field Laboratory	DC Field CMS	No other support			P16107	Two-axis rotation for DC magnetic fields	Condensed Matter Physics	2	6.72
Itai Silber (G)	C	Tel-Aviv University	Physics								
Dmitry Smirnov (S)	PI	National High Magnetic Field Laboratory	Instrumentation & Operations	No other support			P16108	Out-of-equilibrium magneto-transport of the surface state in 3D topological insulators	Condensed Matter Physics	3	20.18
Yuxuan Jiang (P)	C	National High Magnetic Field Laboratory	CMS	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-07ER46451					
Seongphill Moon (G)	C	National High Magnetic Field Laboratory	Physics								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Lei Wang (G)	C	Columbia University	Mechanical Engineering								
Janice Musfeldt (S)	PI	University of Tennessee, Knoxville	Department of Chemistry	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0201458	P16137	High field spectroscopy of materials	Chemistry, Geochemistry	3	17.61
Avery Blockmon (G)	C	University of Tennessee, Knoxville	Chemistry	NSF	DMR - Division of Materials Research	DMR1707846					
Amanda Clune (G)	C	University of Tennessee, Knoxville	Chemistry	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-01ER45885					
Shiyu Fan (G)	C	University of Tennessee, Knoxville	Physics								
Kendall Hughey (G)	C	University of Tennessee, Knoxville	Chemistry								
Stephen McGill (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Sabine Neal (G)	C	University of Tennessee, Knoxville	Chemistry								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Kiman Park (G)	C	University of Tennessee, Knoxville	Chemistry								
Kevin Smith (G)	C	University of Tennessee, Knoxville	Chemistry								
Tony Heinz (S)	PI	Stanford University	Department of Physics	NSERC Canada	Other Non US Federal Agency	PGSD3-502559-2017	P16139	Magneto-Optical Study of Atomically Thin Transition Metal Dichalcogenide Crystals	Condensed Matter Physics	1	7
Elyse Barré (G)	C	Stanford University	Electrical Engineering								
Ouri Karni (P)	C	Stanford University	Applied Physics								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Aidan O'Beirne (G)	C	Stanford University	Physics								
Kateryna Pistunova (G)	C	Stanford University	Physics								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Dmitry Smirnov (S)	PI	National High Magnetic Field Laboratory	Instrumentation & Operations	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-07ER46451	P16234	Electrical and magnetic field control of optical processes	Condensed Matter Physics	6	37.81

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
James Hone (S)	C	Columbia University	Mechanical Engineering	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02- 07ER46451		in mono- and few-layer transition metal dichalcogenides			
Yuxuan Jiang (P)	C	National High Magnetic Field Laboratory	CMS								
Zhigang Jiang (S)	C	Georgia Institute of Technology	School of Physics								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Seongphill Moon (G)	C	National High Magnetic Field Laboratory	Physics								
Daniel Rhodes (S)	C	University of Wisconsin, Madison	Materials Science and Engineering								
Tianhao Zhao (G)	C	Georgia Institute of Technology	School of Physics								
Boris Aronzon (S)	PI	Lebedev Physical Institute of the Russian Academy of Sciences	Solid State Department	Russian Science Foundation	Non US Foundation		P16247	3D topologically nontrivial systems with magnetic impurities	Condensed Matter Physics	2	14
Alexandr Davydov (S)	C	Lebedev Physical Institute of the Russian Academy of Sciences	Division of Solid State Physics								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Philip Kim (S)	PI	Harvard University	Department of Physics	DOE	Office of Science - BES – Basic Energy Sciences	DOE DE-SC0012260	P16250	Unconventional quantum Hall effect in 2D material Heterostructures	Condensed Matter Physics	3	16.07
Laurel Anderson (G)	C	Harvard University	Physics								
Kristiaan De Greve (P)	C	Harvard University	Physics								
Rebecca Engelke (G)	C	Harvard University	Physics								
Ryan Gelly (G)	C	Harvard University	Physics								
Onder Gul (P)	C	Harvard University	Department of Physics								
Danial Haei Najafabadi (U)	C	Harvard University	Applied Physics								
Zeyu Hao (G)	C	Harvard University	Physics								
Katie Huang (G)	C	Harvard University	Physics								
Luis Jauregui (P)	C	Harvard University	College of Science								
Andrew Joe (G)	C	Harvard University	Physics								
Jia Li (S)	C	Brown University	Department of Physics								
Xiaomeng Liu (G)	C	Harvard University	Physics								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Joon Young Park (P)	C	Harvard University	Physics								
Kateryna Pistunova (G)	C	Stanford University	Physics								
Yuval Ronen (P)	C	Harvard University	Physics								
Giovanni Scuri (G)	C	Harvard University	Physics								
Jiho Sung (P)	C	Harvard University	Physics								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Andrey Sushko (G)	C	Harvard University	Physics								
Thomas Werkmeister (G)	C	Harvard University	Applied Physics								
Hyobin Yoo (P)	C	Harvard University	Physics								
Jonathan Zauberman (G)	C	Harvard University	Physics								
Xilin Zhou (U)	C	Harvard University	Physics								
You Zhou (P)	C	Harvard University	Department of Physics								
Joseph Checkelsky (S)	PI	Massachusetts Institute of Technology	Physics	NSF	DMR - Division of Materials Research	DMR1231319	P16258	High Field Studies of Magnetic Weyl Semimetals	Condensed Matter Physics	6	44.52
Aravind Devarakonda (G)	C	Massachusetts Institute of Technology	Physics	Massachusetts Institute of Technology	US College and University						
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS	MIT	US College and University						
Minyong Han (G)	C	Massachusetts Institute of Technology	Physics								
Hisashi Inoue (P)	C	Massachusetts Institute of Technology	Physics								
Takashi Kurumaji (P)	C	Massachusetts Institute of Technology	Physics								
Takehito Suzuki (P)	C	Massachusetts Institute of Technology	Department of Physics								
Joshua Wakefield (G)	C	Massachusetts Institute of Technology	Physics								
Linda Ye (G)	C	Massachusetts Institute of Technology	Physics								
Junbo Zhu (G)	C	Massachusetts Institute of Technology	Physics								
Fernando Machado (S)	PI	Federal University of Pernambuco	Physics	CAPES	Non US Foundation		P16271	Thermal Conductivity Of Yig At High-Applied Magnetic Fields And Low Temperatures	Condensed Matter Physics	1	1.19
Luis Balicas (S)	C	National High Magnetic Field Laboratory	Condensed Matter Experiment	FACEPE	Non US Foundation						
Alimamy Bangura (S)	C	National High Magnetic Field Laboratory	CMS	CNPq	Non US Foundation						
Danilo Ratkovski (G)	C	Federal University of Pernambuco	Departamento de Fisica								
Mike Sumption (S)	PI	Ohio State University	CSMM, MSE	DOE	Office of Science - HEP – High Energy Physics	DE-SC0013849	P16278	High Field Transport Properties in ternary and Binary APC type Nb3Sn Conductors	Magnets, Materials	1	5.44
Jacob Rochester (G)	C	Ohio State University	Materials Science	DOE	Office of Science - HEP – High Energy Physics	DE-SC0017755					
Xingchen Xu (S)	C	Fermi National Accelerator Laboratory	Magnet System	DOE	LDRD - Laboratory Directed R&D	DE-AC02-06CH11357					
Marcelo Jaime (S)	PI	National High Magnetic Field Laboratory	Physics	UCGP		Revealing hidden anisotropies in quantum matter via thermal properties under strain	P16279	Probing high field magnetoelastic coupling in CeRhIn5	Condensed Matter Physics	1	3.07
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF								
Eric Bauer (S)	C	Los Alamos National Laboratory	MST-10								
Priscila Ferrari Silveira Rosa (P)	C	Los Alamos National Laboratory	MPA-CMMS								
Shusaku Imajo (S)	C	University of Tokyo	International MegaGauss Science Laboratory								
Filip Ronning (S)	C	Los Alamos National Laboratory	MPA-CMMS								
Myron Salamon (S)	C	University of Texas, Dallas	Physics								

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Rico Schoenemann (P)	C	Los Alamos National Laboratory	MPA-MAG								
Sean Thomas (T)	C	Los Alamos National Laboratory	CMMS								
David Graf (S)	PI	National High Magnetic Field Laboratory	DC Field CMS	No other support			P16282	Study of the Electronic Structures of Doped Dirac Metals and Topological Insulators	Condensed Matter Physics	1	3.7
Ryan Baumbach (S)	C	National High Magnetic Field Laboratory	CMS								
Chris Mann (U)	C	National High Magnetic Field Laboratory	CMS								
Kaya Wei (P)	C	National High Magnetic Field Laboratory	CMS								
Louis Taillefer (S)	PI	University of Sherbrooke	Physics	NSERC, CIFAR, FRQNT, Canada Research Chair	Non US Foundation		P16283	Transport studies of the pseudogap critical point of cuprates	Condensed Matter Physics	2	5.84
Amirreza Ataei (G)	C	University of Sherbrooke	Physics	CIFAR, NSERC of Canada, FRQNT, Gordon and Betty Moore Foundation	Non US Foundation						
Nicolas Doiron-Leyraud (S)	C	University of Sherbrooke	Physics								
Clément Girod (G)	C	University of Sherbrooke	Physics								
Adrien Gourgout (P)	C	University of Sherbrooke	Physics								
Gaël Grissonnanche (G)	C	University of Sherbrooke	Physics								
Anaëlle Legros (G)	C	University of Sherbrooke	Physics								
Nathanael Fortune (S)	PI	Smith College	Department of Physics	No other support			P16284	Continuous Measurement of Specific Heat as a Function of Sample Orientation	Magnets, Materials	1	7
Charles Agosta (S)	C	Clark University	Department of Physics								
Alimamy Bangura (S)	C	National High Magnetic Field Laboratory	CMS								
Scott Hannahs (S)	C	National High Magnetic Field Laboratory	Instrumentation								
Andreas Rydh (S)	C	Stockholm University	Department of Physics								
John Schlueter (S)	C	Argonne National Laboratory	Materials Science								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
James Hone (S)	PI	Columbia University	Mechanical Engineering	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0016703	P16286	Studies of Quantum Transport in Two-Dimensional Transition Metal Dichalcogenide Heterostructures	Condensed Matter Physics	2	10.34
Abhinandan Antony (G)	C	Columbia University	Mechanical Engineering	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0016703					
Avishai Benyamini (P)	C	Columbia University	Mechanical Engineering								
Cory Dean (S)	C	City College of New York	Physics								
Augusto Ghiotto (G)	C	Columbia University	Physics								
Younghun Jung (P)	C	Columbia University	Mechanical Engineering								
Jia Li (S)	C	Brown University	Department of Physics								
Anna Okounkova (U)	C	Columbia University	Physics								
Daniel Rhodes (S)	C	University of Wisconsin, Madison	Materials Science and Engineering								

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Qianhui Shi (P)	C	Columbia University	Physics								
En-Min Shih (G)	C	Columbia University	Physics								
Josh Swann (G)	C	Columbia University	Physics								
Evan Telford (G)	C	Columbia University	Physics								
Matthew Yankowitz (S)	C	University of Washington	Physics								
Yihang Zeng (G)	C	Columbia University	Physics								
Mansour Shayegan (S)	PI	Princeton University	Department of Electrical Engineering	NSF	DMR - Division of Materials Research	DMR1157490	P16287	Probing Exotic Phases of Interacting Electrons in Low-dimensional Systems	Condensed Matter Physics	2	14
Hao Deng (G)	C	Princeton University	Electrical Engineering								
Md Shafayat Hossain (G)	C	Princeton University	EE								
Meng Ma (G)	C	Princeton University	Electrical Engineering								
Siddharth Kumar Singh (G)	C	Princeton University	Electrical Engineering								
Pranav Thekke Madathil (G)	C	Princeton University	Electrical Engineering								
Kevin Villegas Rosales (G)	C	Princeton University	Electrical Engineer								
Alexander Usoskin (S)	PI	Bruker HTS GmbH	R&D	No other support			P16288	High field homogeneity evaluation of new, high performance YBCO coated conductor with double disorder (DD)	Magnets, Materials	1	2.81
Dmytro Abraimov (S)	C	National High Magnetic Field Laboratory	The Applied Superconductivity Center								
Griffin Bradford (O)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
David Larbalestier (S)	C	National High Magnetic Field Laboratory	ASC								
Cory Dean (S)	PI	City College of New York	Physics	NSF	DMR - Division of Materials Research	DMR1644779	P16292	Novel phases and exotic states of two-dimensional materials in high magnetic field	Condensed Matter Physics	2	13.32
Shi Che (G)	C	University of California, Riverside	Physics	NSF	DMR - Division of Materials Research	DMR1507788					
Shaowen Chen (G)	C	Columbia University	Applied Physics and Applied Mathematics	David and Lucille Packard Foundation	US Foundation						
Olivia Ghosh (U)	C	Columbia University	Physics								
Jia Li (S)	C	Brown University	Department of Physics								
Dmitry Shcherbakov (G)	C	Ohio State University	Physics								
Qianhui Shi (P)	C	Columbia University	Physics								
Yihang Zeng (G)	C	Columbia University	Physics								
Sergey Suchalkin (S)	PI	State University of New York at Stony Brook	Electrical and Computer Engineering	NSF	DMR - Division of Materials Research	DMR1809708	P16294	Carrier dispersion and non-trivial topological phases in ultra-low bandgap metamorphic InAsSb/InAsSb superlattices	Condensed Matter Physics	2	14
Gregory Belenky (S)	C	State University of New York at Stony Brook	Electrical and Computer Engineering								
Maksim Ermolaev (G)	C	State University of New York at Stony Brook	ECE								
Seongphill Moon (G)	C	National High Magnetic Field Laboratory	Physics								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Anand Bhattacharya (S)	PI	Argonne National Laboratory	Materials Science Division & Center for Nanoscale Materials	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-06CH11357	P16295	Determining the superfluid density in the non-adiabatic limit of superconducting SrTiO3-d	Condensed Matter Physics	1	7
Terence Bretz-Sullivan (P)	C	Argonne National Laboratory	Materials Science Division								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS								
Changjiang Liu (P)	C		Argonne National Laboratory	Material science division								
Alexey Suslov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Shanti Deemyad (S)	PI		University of Utah	Physics and Astronomy	NSF	DMR - Division of Materials Research	DMR1351986	P17344	Fermi Surface of Lithium Isotopes	Condensed Matter Physics	2	10.86
Neil Ashcroft (S)	C		Cornell University	Physics								
Tushar Bhowmick (G)	C		University of Utah	Physics and Astronomy								
Stanimir Bonev (S)	C		Lawrence Livermore National Laboratory	Physics Division								
William Coniglio (S)	C		National High Magnetic Field Laboratory	A1								
Sabri Elatresh (P)	C		Cornell University	chemistry								
Audrey Grockowiak (S)	C		National High Magnetic Field Laboratory	DC Field/CMS								
Roald Hoffmann (S)	C		Cornell University	Dept. of Chemistry and Chemical Biology								
Mohammad Tomal Hossain (G)	C		University of Utah	Physics and Astronomy								
Stan Tozer (S)	C		National High Magnetic Field Laboratory	Physics								
Sergei Zvyagin (S)	PI		Helmholtz-Zentrum Dresden-Rossendorf	EPR	Deutsche Forschungsgemeinschaft	Other		P17345	Spin dynamics and magnetic properties of spin systems with competing magnetic interactions	Condensed Matter Physics	2	13
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS	DFG	Other						
Hidekazu Tanaka (S)	C		Tokyo Institute of Technology	Physics								
Bernd Halbedel (S)	PI		Ilmenau University of Technology	Group for Inorganic-Nonmetallic Materials, Institute for Material Engineering and Institute for Micro- and Nanotechnologies	Adelwitz Technologiezentrum GmbH			P17347	Trapped field bulk magnet system for Lorentz Force Velocimetry	Engineering	1	7
Dmytro Abraimov (S)	C		National High Magnetic Field Laboratory	The Applied Superconductivity Center								
Jan Jaroszynski (S)	C		National High Magnetic Field Laboratory	CMS								
Oleksii Vakaliuk (G)	C		Ilmenau University of Technology	Group for Inorganic-Nonmetallic Materials Institute for Material Engineering and Institute for Micro- and Nanotechnologies								
Frank Werfel (S)	C		Adelwitz Technologiezentrum GmbH	Adelwitz Technologiezentrum GmbH (ATZ)								
Tuo Wang (S)	PI	*	Louisiana State University	Chemistry	NSF	Other	1833040	P17348	Structure and Packing of Complex Carbohydrates in Native Plant and Fungal Cell Walls from Solid-State DNP-NMR	Biology, Biochemistry, Biophysics	2	9
Arnab Chakraborty (G)	C		Louisiana State University	Chemistry	NSF	OIA - Office of Integrative Activities	1833040					
Tim Cross (S)	C		National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry								
Malitha Dickwella Widanage (G)	C		Louisiana State University	chemistry								
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Alex Kirui (G)	C		Louisiana State University	Chemistry								

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Frederic Mentink (S)	C	National High Magnetic Field Laboratory	NMR Division								
Cecil Dybowski (S)	PI	University of Delaware	Chemistry and Biochemistry	NSF	DMR - Division of Materials Research	DMR1608594	P17354	Assessing the potential of high-field, natural abundance 67Zn solid-state NMR for understanding the reactivity of ZnO-based pigments in paint films	Chemistry, Geochemistry	1	5
Silvia Centeno (S)	C	The Metropolitan Museum of Art	Scientifi Research								
Valeria Di Tullio (P)	C	The Metropolitan Museum of Art	Scientific Research								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Nicholas Zumbulyadis (S)	C	Independent Scholar and Consultant	Consultancy								
Brad Ramshaw (S)	PI	Cornell University	Laboratory of Atomic and Solid State Physics	No other support			P17359	Determining of the onset of Fermi surface reconstruction in Nd-LSCO via angle-dependent magnetoresistance	Condensed Matter Physics	2	9.76
Nicolas Doiron-Leyraud (S)	C	University of Sherbrooke	Physics	Cornell University	US College and University						
Yawen Fang (G)	C	Cornell University	Laboratory of Atomic and Solid State Physics								
Paul Goddard (S)	C	University of Warwick	Department of Physics								
Gaël Grissonnanche (G)	C	University of Sherbrooke	Physics								
Francis Laliberte (G)	C	University of Sherbrooke	Physics								
Anaëlle Legros (G)	C	University of Sherbrooke	Physics								
Louis Taillefer (S)	C	University of Sherbrooke	Physics								
Theo Siegrist (S)	PI	National High Magnetic Field Laboratory	Chemical and Biomedical Engineering	NSF	DMR - Division of Materials Research	DMR1625780	P17361	Xray Diffraction in High Magnetic Fields	Magnets, Materials	3	9.6
Josiah Cochran (G)	C	National High Magnetic Field Laboratory	CMS								
alexey kovalev (S)	C	National High Magnetic Field Laboratory	CMS								
Masoud Mardani (G)	C	Florida State University	CMS								
Drew Rebar (P)	C	National High Magnetic Field Laboratory	CMS								
Julia Smith (S)	C	National High Magnetic Field Laboratory	DC Field								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Kaya Wei (P)	C	National High Magnetic Field Laboratory	CMS								
Christianne Beekman (S)	PI	National High Magnetic Field Laboratory	Physics	No other support			P17363	Frustrated magnetism in vanadium oxides	Condensed Matter Physics	3	27.39
Kevin Barry (G)	C	Florida State University	Physics	NSF	CAREER - Faculty Early Career Development Program	1847887					
Sangsoo Kim (G)	C	Florida State University	Physics								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Christie Thompson (G)	C	Florida State University	Materials Science and Engineering								

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Biwen Zhang (G)	C		Florida State University	Physics								
Denis Karaiskaj (S)	PI		University of South Florida	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0012635	P17364	Electronic dynamics of layered two dimensional materials in the Quantum Hall regime at very high magnetic fields	Condensed Matter Physics	2	7.28
Arup Barua (G)	C		University of South Florida	Physics	NSF	DMR - Division of Materials Research	DMR1409473					
David Hilton (S)	C		University of Alabama, Birmingham	Physics								
Varun Mapara (G)	C		University of South Florida	Physics								
Christopher Stevens (G)	C		University of South Florida	Physics								
Alejandro Villalobos Meza (U)	C		University of South Florida	Physics								
James Gleeson (S)	PI		Kent State University	Physics	NSF	DMR - Division of Materials Research	DMR1307674	P17368	High magnetic field optical studies of complex fluids	Condensed Matter Physics	1	4.49
Prabesh Gyawali (G)	C		Kent State University	Physics								
Antal Jakli (S)	C		Kent State University	Liquid Crystal Institute								
Rony Saha (G)	C		Kent State University	Physics								
Sam Sprunt (S)	C		Kent State University	Physics								
Mykhaylo Ozerov (S)	PI		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS	No other support			P17373	FTIR magneto-spectroscopy in the NHMFL DC facility: new developments, tests and optimization of experimental protocols	Magnets, Materials	2	13.06
Dmitry Semenov (T)	C		National High Magnetic Field Laboratory	DC Field								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Joan Cano (S)	PI	*	University of Valencia	Instituto de Ciencia Molecular	No other support			P17379	Building quantum gates and quantum computer by assembling mononuclear single-molecule magnets based on Co(II) and other 3d transition metal ions. In pursuit of new physics in spintronics	Chemistry, Geochemistry	1	7
Miguel Julve (S)	C		University of Valencia	Inorganic Chemistry								
Kinga Kaniewska (G)	C		Gdansk University of Technology	Department of Inorganic Chemistry								
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Francesc Lloret (S)	C		University of Valencia	Institut de Ciència Molecular (ICMOL).								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Julia Vallejo (G)	C		University of Valencia	Chemistry								
Marta Viciano-Chumillas (P)	C		University of Valencia	Instituto de Ciencia Molecular								
Leonard Mueller (S)	PI		University of California, Riverside	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM097569	P17435	Chemically-Rich Structure and Dynamics in the Active Site of Tryptophan Synthase from 17O Quadrupole Central Transition NMR at 36 T	Biology, Biochemistry, Biophysics	1	4
Rittik Ghosh (G)	C		University of California, Riverside	Chemistry								
Ilya Litvak (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C		National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C		National High Magnetic Field Laboratory	NMR								
Peide Ye (S)	PI		Purdue University	School of Electrical and Computer Engineering	NSF	EFMA - Emerging Frontiers and Multidisciplinary Activities	EFMA1433459	P17462	Magneto-transport in one-dimensional van der Waals chiral material tellurene	Condensed Matter Physics	2	10.03
Chang Niu (G)	C		Purdue University	Electrical and Computer Engineering								

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Gang Qiu (P)	C	University of California, Los Angeles	Electrical and Computer Engineering								
Zhuocheng Zhang (G)	C	Purdue University	Electrical and Computer Engineering								
Danielle Laurencin (S)	PI	University of Montpellier	Institut Charles Gerhardt de Montpellier	CNRS			P17464	High resolution solid state NMR studies of biomaterials at 36 T:analysis of calcium and oxygen local environments	Chemistry, Geochemistry	2	7
Christian Bonhomme (S)	C	Pierre and Marie Curie University	Laboratoire de Chimie de la Matière Condensée	ERC	Non US Council						
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	CNRS	Other						
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Lu Li (S)	PI	University of Michigan	Physics	NSF	DMR - Division of Materials Research	DMR1707620	P17469	Spin-orbit-coupled Correlated Metals	Condensed Matter Physics	3	21
Lu Chen (G)	C	University of Michigan	Physics								
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics								
David Mandrus (S)	C	University of Tennessee, Knoxville	Materials Science and Engineering								
Dmitri Mihaliov (G)	C	University of Michigan	Applied Physics								
Colin Tinsman (G)	C	University of Michigan	Physics								
Ziji Xiang (P)	C	University of Michigan	Physics								
Francesca Marassi (S)	PI	Sanford Burnham Prebys Medical Discovery Institute	Cancer Center	NIH	NIGMS - National Institute of General Medical Sciences	GM118186	P17471	Structure of Y. pestis Ail in lipid bilayers	Biology, Biochemistry, Biophysics	1	5
Tim Cross (S)	C	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Rongfu Zhang (P)	C	National High Magnetic Field Laboratory	NHMFL								
Jun Zhu (S)	PI	Pennsylvania State University	Physics	NSF	DMR - Division of Materials Research	DMR1708972	P17473	Probing quasi-particle charge and statistics in the quantum Hall and fractional quantum Hall regimes of bilayer graphene	Condensed Matter Physics	4	30.56
Hailong Fu (P)	C	Pennsylvania State University	Physics	NSF	DMR - Division of Materials Research	DMR1506212					
Ke Huang (G)	C	Pennsylvania State University	Physics								
Dragana Popovic (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Science / Experimental	NSF	DMR - Division of Materials Research	DMR1707785	P17479	Transport Studies of Magnetic-Field-Tuned Phase Transitions in Cuprates	Condensed Matter Physics	5	32.64
Shimpei Ono (S)	C	Central Research Institute of Electric Power Industry	Materials Science Research Laboratory								
Bal Pokharel (G)	C	National High Magnetic Field Laboratory	Physics								
Lily Stanley (G)	C	National High Magnetic Field Laboratory	Physics and CMS, NHMFL								
Jasminka Terzic (P)	C	National High Magnetic Field Laboratory	CMS								
Yuxin Wang (G)	C	Florida State University	CMS								
Oleksiy Svitelskiy (S)	PI	Gordon College	Physics	Gordon College	US College and University		P17487	Ultrasound pulse-echo studies of low-temperature electronic and magnetic properties of bulk multicomponent metallic glasses.	Condensed Matter Physics	1	7
Joseph Cartelli (G)	C	Towson University	Department of Physics, Astronomy & Geosciences								

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David Lee (S)	C	Gordon College	Physics								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Rachel Martin (S)	PI	University of California, Irvine	Chemistry	NSF	DMS - Division of Mathematical Sciences	DMS1361425	P17490	High-field NMR study of the interaction of the Droserasin 1 PSI with microbial lipids	Biology, Biochemistry, Biophysics	2	5
Kuizhi Chen (P)	C	National High Magnetic Field Laboratory	NMR	University of California, Irvine	US College and University						
Po-Hsiu Chien (G)	C	Florida State University	Chemistry and Biochemistry								
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Rongfu Zhang (P)	C	National High Magnetic Field Laboratory	NHMFL								
Ni Ni (S)	PI	University of California, Los Angeles	Physics and Astronomy	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0011978	P17495	Quantum transport studies of the topological semimetal candidates	Condensed Matter Physics	1	7
Chaowei Hu (G)	C	University of California, Los Angeles	Department of Physics and Astronomy								
Jinyu Liu (P)	C	University of California, Los Angeles	Physics and Astronomy Physics								
Richard Greene (S)	PI	University of Maryland, College Park	Physics	NSF	DMR - Division of Materials Research	DMR1708334	P17498	High Field Studies Of Electron-Doped Cuprate Thin Films	Condensed Matter Physics	1	5.09
Joshua Higgins (P)	C	University of Maryland, College Park	Physics								
Tarapada Sarkar (P)	C	University of Maryland, College Park	Physics								
Yining Huang (S)	PI	University of Western Ontario	Chemistry	Natural Sciences and Engineering Research Council of Canada	Other Non US Federal Agency		P17504	O-17 solid-state NMR of metal-organic frameworks	Chemistry, Geochemistry	2	8
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	NSERC	Other Non US Federal Agency						
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Vinicius Martins (G)	C	University of Western Ontario	Chemistry								
Henri Alloul (S)	PI	French National Center for Scientific Research	Physics	No other support			P17513	Magnetic , transport and Fermi surface properties of Na ordered cobaltates Nax CoO2	Condensed Matter Physics	3	15
Luis Balicas (S)	C	National High Magnetic Field Laboratory	Condensed Matter Experiment	VSP		#330					
William Coniglio (S)	C	National High Magnetic Field Laboratory	A1	Gordon and Betty Moore and ICAM	Other	QuantEmX award					
Ildar Gilmutdinov (P)	C	Kazan Federal University	Institute of Physics								
Audrey Grockowiak (S)	C	National High Magnetic Field Laboratory	DC Field/CMS								
Irek Mukhamedshin (S)	C	Kazan Federal University	Institute of Physics, General Physics Department								
Rico Schoenemann (P)	C	Los Alamos National Laboratory	MPA-MAG								

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Stan Tozer (S)	C	National High Magnetic Field Laboratory	Physics								
Krzysztof Gofryk (S)	PI	Idaho National Laboratory	Fuel Performance & Design	DOE	Office of Science - ECRP - Early Career Research Program	KG's Early career award	P17516	Strong magneto-elastic coupling in uranium dioxide probed by high magnetic fields.	Condensed Matter Physics	1	7
Daniel Antonio (P)	C	Idaho National Laboratory	Fuel Design and Development	DOE	LDRD - Laboratory Directed R&D	DE-AC07-05ID14517					
Ryan Baumbach (S)	C	National High Magnetic Field Laboratory	CMS								
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics								
Narayan Poudel (P)	C	Idaho National Laboratory	Nuclear Materials								
Jens Haenisch (S)	PI	Karlsruhe Institute of Technology	Institute for Technicla Physics	Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (B)	Other	16H04646	P17518	Anisotropic electrical transport in pinning-enhanced Fe-based and HTS superconducting thin films	Condensed Matter Physics	1	4.69
Kazumasa Iida (S)	C	Nagoya University	Dep. of Crystalline Materials Science, Graduate School of Engineering								
Jan Jaroszynski (S)	C	National High Magnetic Field Laboratory	CMS								
Sven Meyer (G)	C	Karlsruhe Institute of Technology	Institute for Technical Physics								
Chiara Tarantini (S)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
Nikoleta Theodoropoulou (S)	PI	Texas State University	Physics	NSF	CAREER - Faculty Early Career Development Program	1255629	P17528	Electronic Properties of epitaxial SrTiO3 films on Si	Condensed Matter Physics	2	14
Barry Koehne (G)	C	Texas State University	Physics	NSF	CAREER - Faculty Early Career Development Program	DMR-1255629					
John Miracle (G)	C	Texas State University	Physics								
Nikoleta Theodoropoulou (S)	C	Texas State University	Physics								
Komalavalli Thirunavukkuarasu (S)	PI	Florida Agricultural and Mechanical University	Physics	No other support			P17534	Magneto-optical spectroscopy on functional materials: Multiferroics and beyond	Condensed Matter Physics	3	21
Gary Knight (G)	C	Florida Agricultural and Mechanical University	Physics	DOD	US Navy						
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
David Mandrus (S)	C	University of Tennessee, Knoxville	Materials Science and Engineering								
Rachael Richardson (G)	C	Florida Agricultural and Mechanical University	Physics								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Julia Smith (S)	PI	National High Magnetic Field Laboratory	DC Field	No other support			P17594	Enhancement of the Infrastructure & Instrumentation of the DC Field Facility	Magnets, Materials	7	22.96
Alimamy Bangura (S)	C	National High Magnetic Field Laboratory	CMS	NSF	DMR - Division of Materials Research	DMR1644779					
William Brey (S)	C	National High Magnetic Field Laboratory	NMR								
William Coniglio (S)	C	National High Magnetic Field Laboratory	A1								

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Kevin Gamble (O)	C	National High Magnetic Field Laboratory	Facilities								
Scott Hannahs (S)	C	National High Magnetic Field Laboratory	Instrumentation								
Michael Hicks (T)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Tra Hunter (O)	C	National High Magnetic Field Laboratory	Facilities								
John Kynoch (S)	C	National High Magnetic Field Laboratory	Facilities								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Tim Murphy (S)	C	National High Magnetic Field Laboratory	Operations								
Andy Powell (S)	C	National High Magnetic Field Laboratory	Operations								
Eric Stiers (O)	C	National High Magnetic Field Laboratory	DC Field								
Sujana Sri Venkat Uppalapati (O)	C	National High Magnetic Field Laboratory	DC Field Facility								
Marshall Wood (S)	C	National High Magnetic Field Laboratory	Facilities								
Zhehong Gan (S)	PI	National High Magnetic Field Laboratory	NHMFL	No other support			P17597	Development of 1.5 GHz NMR using 36T Series-Connected-Hybrid (SCH) Magnet	Magnets, Materials	2	8
William Brey (S)	C	National High Magnetic Field Laboratory	NMR								
Kuizhi Chen (P)	C	National High Magnetic Field Laboratory	NMR								
Po-Hsiu Chien (G)	C	Florida State University	Chemistry and Biochemistry								
Tim Cross (S)	C	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Jeffrey Schiano (S)	C	Pennsylvania State University	Electrical Engineering								
Daniel Lee (S)	PI	University of Grenoble Alpes	INAC/MEM	ERC	Non US Council	ERC-CoG- 2015, no. 682895	P17632	Ultra-high field NMR for assessing the stability of the organic-inorganic interfaces of metal oxide nanocrystals	Chemistry, Geochemistry	1	5
Gael De Paepe (S)	C	The French Alternative Energies and Atomic Energy Commission	Institute for Nanoscience and Cryogenics	European commission	Other	3549/H2020/COFUND/2016/2, COFUN22					
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Janusz Lewinski (S)	C	Warsaw University of Technology	Chemistry and Institute of Physical Chemistry								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Natalia Olejnik-Fehér (G)	C	Institute of Physics, Polish Academy of Sciences	Institute of Physical Chemistry								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Malgorzata Wolska-Pietkiewicz (S)	C	Warsaw University of Technology	Chemistry								

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Alina Bienko (S)	PI	*	University of Wroclaw	Faculty of Chemistry	Wroclaw University, Poland	Non US College and University		P17642	Search for New Single-Molecule Magnets: High-Field EPR Studies on High-Spin Complexes of d-Electron Metals – Co(II), Ni(II), Re(IV)	Chemistry, Geochemistry	2	14
Andrew Ozarowski (S)	C		National High Magnetic Field Laboratory	EMR								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Chiara Tarantini (S)	PI		National High Magnetic Field Laboratory	Applied Superconductivity Center	DOE	Office of Science - HEP – High Energy Physics	DE-SC0012083	P17643	Characterization of state-of-the-art and experimental Nb3Sn wires	Condensed Matter Physics	1	5
Shreyas Balachandran (P)	C		Florida State University	Applied Superconductivity Center								
Eun Sang Choi (S)	C		National High Magnetic Field Laboratory	Physics Department								
Nawaraj Paudel (G)	C		Florida State University	Physics								
Mijkhail Eremets (S)	PI		Max Planck Institute for Chemistry, Mainz	Chemistry and Physics at High Pressures Group	European Research Council	Non US Foundation	ERC- 267777	P17644	High field superconducting phase-diagram of sulphur hydride/deuteride	Condensed Matter Physics	2	10
Fedor Balakirev (S)	C		National High Magnetic Field Laboratory	PFF	Max Planck Society	Non US Foundation						
Luis Balicas (S)	C		National High Magnetic Field Laboratory	Condensed Matter Experiment								
Laura Greene (S)	C		National High Magnetic Field Laboratory	Management and Administration								
Shirin Mozaffari (P)	C		National High Magnetic Field Laboratory	Condensed Matter Sciences								
Dan Sun (P)	C		Los Alamos National Laboratory	MPA-MAG								
Kresimir Rupnik (S)	PI		Louisiana State University	Chemistry Department	No other support			P17645	Variable Magnetic Field (VMF) Ultrafast Polarization Phase Selective (PPS) Attomechanics Studies in the Areas of Fundamental Significance to Biochemistry/Biophysics: New Methods and Tools for Monitoring Electronic Processes in Biosystems	Biology, Biochemistry, Biophysics	1	2.85
Swee Goh (S)	PI	*	Chinese University of Hong Kong	Department of Physics	NSF	DMR - Division of Materials Research	DMR1644779	P17646	Pressure-driven quantum magneto-transport phenomena in topological semimetals	Condensed Matter Physics	1	3.94
Fedor Balakirev (S)	C		National High Magnetic Field Laboratory	PFF								
Yajian Hu (G)	C		Hong Kong University of Science and Technology	Physics								
Kwing To Lai (P)	C		Chinese University of Hong Kong	Physics								
Esteban Paredes Aulestia (G)	C		Chinese University of Hong Kong	Department of Physics								
Dan Sun (P)	C		Los Alamos National Laboratory	MPA-MAG								
Wei Zhang (G)	C		Chinese University of Hong Kong	Physics								
Yasuyuki Nakajima (S)	PI		University of Central Florida	Physics	University of Central Florida	US College and University		P17651	Magnetic and thermal properties in topological phases of matter	Condensed Matter Physics	2	14
Yanbo Guo (G)	C		University of Florida	Physics								
Xinzhe Hu (G)	C		University of Florida	Physics								
K A M Hasan Siddiquee (G)	C		University of Central Florida	Physics								
Yasu Takano (S)	C		University of Florida	Physics								
Andrea Young (S)	PI		University of California, Santa Barbara	Physics	NSF	DMR - Division of Materials Research	DMR1636607	P17652	Probing correlated electron states in graphene	Condensed Matter Physics	3	16

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Ruiheng Bai (T)	C	University of California, Santa Barbara	Physics								
Xiaomeng Cui (U)	C	University of California, Santa Barbara	Physics								
Joshua Island (P)	C	University of California, Santa Barbara	Physics								
Hryhoriy Polshyn (P)	C	University of California, Santa Barbara	Physics								
Yu Saito (P)	C	University of California, Santa Barbara	Physics								
Eric Spanton (P)	C	University of California, Santa Barbara	Physics								
Fangyuan Yang (P)	C	University of California, Santa Barbara	Physics								
Haoxin Zhou (G)	C	University of California, Santa Barbara	Physics								
Alexander Zibrov (G)	C	University of California, Santa Barbara	Physics								
Joscha Nehrkorn (P)	PI	Max Planck Institute for Chemical Energy Conversion, Muelheim	EPR Research Group	Max-Planck Society	Non US Government Lab		P17653	Direct Detection of Zero-Field Splitting in Lanthanide Single-Ion Magnets	Condensed Matter Physics	1	7
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Sergey Veber (P)	C	International Tomography Center of Russian Academy of Sciences	Laboratory of Magnetic Resonance								
Raivo Stern (S)	PI	National Institute of Chemical Physics and Biophysics	Chemical Physics	Estonian Research Council	Non US Foundation	PRG4 (ENIQMA)	P17658	Investigation of the (H,T) phase diagram and characteristics of BEC in unmodulated Han Purple, Ba0:9Sr0:1CuSi2O6	Condensed Matter Physics	1	3.89
Mladen Horvatic (S)	C	National Laboratory for Intense Magnetic Fields, Grenoble	Magnetic Resonance								
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics								
Steffen Krämer (S)	C	National Laboratory for Intense Magnetic Fields, Grenoble	CNRS								
Cornelius Krellner (P)	C	Max Planck Institute for Chemical Physics of Solids, Dresden	Chemical Physics								
Joosep Link (U)	C	National Institute of Chemical Physics and Biophysics	Physics								
Pascal Puphal (P)	C	Paul Scherrer Institute	WLGA/019								
Dagmar Weickert (S)	C	National High Magnetic Field Laboratory	MPA-Mag								
Luis Balicas (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Experiment	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC26-13	P17659	Exploring the interplay between the superconducting gap, Fermi energy, Landau quantization and Zeeman-effect in FeSe	Condensed Matter Physics	1	5.58
Anna Boehmer (S)	C	Karlsruhe Institute of Technology	Institute for Solid State Physics								
Pengcheng Dai (S)	C	University of Tennessee, Knoxville	Physics								
Alexei Koshelev (S)	C	Argonne National Laboratory	Materials Science Division								
Shirin Mozaffari (P)	C	National High Magnetic Field Laboratory	Condensed Matter Sciences								
Rico Schoenemann (P)	C	Los Alamos National Laboratory	MPA-MAG								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
WenKai Zheng (G)	C	National High Magnetic Field Laboratory	Condensed Matter Sciences								
Rongying Jin (S)	PI	Louisiana State University	Department of Physics and Astronomy	DOE	EPSCoR - Established Program to Stimulate Competitive Research	DE-SC0012432	P17661	Search for possible quantum oscillations under high magnetic field in non-symmorphic PdSb2 and symmorphic PtBi2	Condensed Matter Physics	1	5.59
Ramakanta Chapai (G)	C	Louisiana State University	Physics and Astronomy	DOE	EPSCoR - Established Program to Stimulate Competitive Research	DE-SC0016315					
Lingyi Xing (P)	C	Louisiana State University	Physics and Astronomy								
Chun Hung Lui (S)	PI	University of California, Riverside	Physics	UC Riverside Startup Fund	US College and University		P17665	Probing the high-order few-body states in two-dimensional materials by magneto-optical spectroscopy	Condensed Matter Physics	2	14
Mashael Altaiary (G)	C	University of California, Riverside	Physics and Astronomy	University of California, Riverside	US College and University						
Erfu Liu (P)	C	University of California, Riverside	Astronomy & Physics								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Jeremiah van Baren (G)	C	University of California, Riverside	Physics								
Matthew Wilson (G)	C	University of California, Riverside	Physics and Astronomy								
Wan Kyu Park (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Science	NSF	DMR - Division of Materials Research	DMR1704712	P17666	Investigation of the Superconducting Order Parameter in Heavy Fermion Superconductor CeCoIn5 Using Planner Tunneling Spectroscopy	Condensed Matter Physics	2	11
Eric Bauer (S)	C	Los Alamos National Laboratory	MST-10								
Ryan Baumbach (S)	C	National High Magnetic Field Laboratory	CMS								
Laura Greene (S)	C	National High Magnetic Field Laboratory	Management and Administration								
You Lai (G)	C	National High Magnetic Field Laboratory	Physics								
Keshav Shrestha (P)	C	National High Magnetic Field Laboratory	Condensed Matter Physics								
Joe Thompson (S)	C	Los Alamos National Laboratory	MPA-10								
Shengzhi Zhang (G)	C	FSU	Physics, CMS								
Kin Fai Mak (S)	PI	Pennsylvania State University	Physics	DOD	US Navy	N00014-18-1-2368	P17668	Investigating van der Waals superconducting heterostructures in the high-field, paramagnetic limit	Condensed Matter Physics	1	7
Kaifei Kang (G)	C	Cornell University	Applied and engineering physics								
Tingxin Li (P)	C	Cornell University	AEP								
Jie Shan (S)	C	Pennsylvania State University	Physics								
Egon Sohn (G)	C	Cornell University	Applied Engineering and Physics								
Z. Valy Vardeny (S)	PI	University of Utah	Department of Physics & Astronomy	NSF	DMR - Division of Materials Research	DMR1701427	P17671	High magnetic field of electro absorption in two dimensional hybrid perovskite thin films	Condensed Matter Physics	3	16.77
Xiaomei Jiang (S)	C	University of South Florida	Physics	DOE	MSE - Materials Science and Engineering	DE-SC0014579					
Dipak Khanal (G)	C	University of Utah	Department of Physics and Astronomy								
Haoliang Liu (P)	C	University of Utah	Department of Physics & Astronomy								
Xiaojie Liu (G)	C	University of Utah	Department of Physics & Astronomy								

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Ian Fisher (S)	PI	Stanford University	Applied Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-76SF00515	P17673	Probing Nematic Fluctuations of Quantum Critical Systems through Elastoresistance in High Magnetic Fields	Condensed Matter Physics	1	5
Alexander Hristov (G)	C	Stanford University	Physics								
Johanna Palmstrom (G)	C	Stanford University	Applied Physics								
Matthew Sorensen (G)	C	Stanford University	Applied Physics								
Joshua Straquadine (G)	C	Stanford University	Applied Physics								
Philip Walmsley (P)	C	Stanford University	Applied physics - GLAM								
Arkady Shehter (S)	PI	National High Magnetic Field Laboratory	NHMFL, DC Field Facility	NSF	DMR - Division of Materials Research	DMR1644779	P17674	High-field resonant probe of thermodynamic and transport properties in correlated metals and frustrated magnets.	Condensed Matter Physics	2	9
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF	NSF	DMR - Division of Materials Research	DMR1157490					
Alimamy Bangura (S)	C	National High Magnetic Field Laboratory	CMS								
Jonathan Betts (S)	C	National High Magnetic Field Laboratory	NHMFL-PFF								
Greg Boebinger (S)	C	National High Magnetic Field Laboratory	Directors Office								
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
Kimberly Modic (G)	C	National High Magnetic Field Laboratory	PFF								
Brad Ramshaw (S)	C	Cornell University	Laboratory of Atomic and Solid State Physics								
Suchitra Sebastian (S)	PI	University of Cambridge	Physics	European Research Council	Non US Council		P17677	Superconductivity in the underdoped cuprates	Condensed Matter Physics	1	5
Alexander Davies (G)	C	University of Cambridge	Physics								
Alex Eaton (G)	C	University of Cambridge	Physics								
Alex Hickey (G)	C	University of Cambridge	Department of Physics								
Hsu Liu (G)	C	University of Cambridge	Physics								
Geetha Balakrishnan (S)	PI	University of Warwick	Physics	European Research Council	Other		P17678	Quantum oscillations in Kondo insulators	Condensed Matter Physics	2	10
Monica Ciomaga Hatnean (P)	C	University of Warwick	Physics	European Research Council	Non US Council						
Alexander Davies (G)	C	University of Cambridge	Physics								
Alex Eaton (G)	C	University of Cambridge	Physics								
Alex Hickey (G)	C	University of Cambridge	Department of Physics								
Liting Huang (U)	C	University of Cambridge	Physics								
Alice Jin (U)	C	University of Cambridge	QM								
Hsu Liu (G)	C	University of Cambridge	Physics								
Flavio Salvati (U)	C	University of Cambridge	Quantum Mechanics								
Suchitra Sebastian (S)	C	University of Cambridge	Physics								
Oscar Solomons-Tuke (U)	C	Cambridge University	Quantum Matter								
Javad Shabani (S)	PI	New York University	Physics	NSF	DMR - Division of Materials Research	DMR1836687	P17680	Andreev Reflection in Strong Magnetic Fields	Condensed Matter Physics	1	7

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Noah Goss (T)	C		New York University	726 Broadway								
Mehdi Hatefipour (G)	C		New York University	Physics								
Tzu-Ming Lu (S)	C		Sandia National Laboratories	1117								
William Schiela (G)	C		New York University	Physics								
William Strickland (G)	C		New York University	physics								
Kaushini Wickramasinghe (G)	C		University of Oklahoma	Physics and Astronomy								
Joseph Yuan (G)	C		New York University	Physics								
Ziling Xue (S)	PI		University of Tennessee, Knoxville	Chemistry	NSF	CHE - Chemistry	CHE1633870	P17697	Investigating Molecular Magnetism by Magneto-Raman Spectroscopy	Chemistry, Geochemistry	1	7
Alexandria Bone (G)	C		University of Tennessee, Knoxville	Chemistry								
Brian Kettell (G)	C		University of Tennessee Space Institute	Chemistry								
Duncan Moseley (G)	C		University of Tennessee, Knoxville	Chemistry								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Komalavalli Thirunavukkuarasu (S)	C		Florida Agricultural and Mechanical University	Physics								
Pagnareach Tin (G)	C		University of Tennessee, Knoxville	Chemistry								
Chelsea Widener (G)	C		University of Tennessee, Knoxville	Chemistry								
Alexander Vasiliev (S)	PI	*	Lomonosov Moscow State University	Low Temperature Physics and Superconductivity	Russian foundation for basic research	Non US Foundation	18-32-00153	P17703	Bose-Einstein Condensation of Triplons in BaVSi2O7	Condensed Matter Physics	1	4.55
Sang Wook Cheong (S)	C		Rutgers University, New Brunswick	Physics and Astronomy								
Marcelo Jaime (S)	C		National High Magnetic Field Laboratory	Physics								
Olga Maximova (P)	C		Lomonosov Moscow State University	Physics								
Vivien Zapf (S)	C		National High Magnetic Field Laboratory	Physics								
Panayotis Kyritsis (S)	PI		National and Kapodistrian University of Athens	Chemistry	National and Kapodistrian University of Athens	Non US College and University		P17741	Zero-field splitting in S = 1 Ni(II) and S = 3/2 Co(II) complexes probed by HFEPR and Far-InfraRed Magnetic Spectroscopy	Chemistry, Geochemistry	1	7
Eleftherios Ferentinos (G)	C		University of Athens	Chemistry								
Kinga Kaniewska (G)	C		Gdansk University of Technology	Department of Inorganic Chemistry								
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Theo Siegrist (S)	PI		National High Magnetic Field Laboratory	Chemical and Biomedical Engineering	NSF	DMR - Division of Materials Research	DMR1606952	P17742	Anisotropic Multiband Superconductivity in Single Crystal Nb2PdxSe5 (x=0.69, 0.7, 0.72, 0.85, and 0.91)	Condensed Matter Physics	1	2.45
Ryan Baumbach (S)	C		National High Magnetic Field Laboratory	CMS								
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS								
You Lai (G)	C		National High Magnetic Field Laboratory	Physics								
Jennifer Neu (G)	C		National High Magnetic Field Laboratory	CMS								

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David Singh (S)	C	Oak Ridge National Laboratory									
James Analytis (S)	PI	University of California, Berkeley	Physics	Berkeley	US College and University		P17755	Superconductor to Insulator Transition in a Non-Centrosymmetric Rare-Earth Compound	Condensed Matter Physics	1	8
Nikola Maksimovic (G)	C	University of California, Berkeley	Physics								
eran maniv (P)	C	University of California, Berkeley	Physics								
Vikram Nagarajan (U)	C	University of Minnesota, Twin Cities	Physics								
Vikram Nagarajan (G)	C	University of California, Berkeley	Physics								
Hironori Sakai (S)	PI	Japan Atomic Energy Agency	Advanced Science Research Center	JSPS Grants-in-Aid for Scientific Research	Other	16KK0106	P17758	Microscopic investigation of field sensitive electronic state in beta-US2: 33S-NMR Study	Condensed Matter Physics	1	4
Eric Bauer (S)	C	Los Alamos National Laboratory	MST-10	JSPS Grants-in-Aid for Scientific Research	Other	17K05522					
Priscila Ferrari Silveira Rosa (P)	C	Los Alamos National Laboratory	MPA-CMMS								
Shinsaku Kambe (S)	C	Japan Atomic Energy Agency	Japan Atomic Energy Agency								
Arneil Reyes (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Filip Ronning (S)	C	Los Alamos National Laboratory	MPA-CMMS								
Joe Thompson (S)	C	Los Alamos National Laboratory	MPA-10								
Yo Tokunaga (S)	C	Japan Atomic Energy Agency	Japan Atomic Energy Agency								
Young Lee (S)	PI	Stanford University	Applied Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-76SF00515	P17761	Quantum oscillations in La2CuO4+y	Condensed Matter Physics	1	8.77
Wei He (G)	C	Stanford University	Materials Science & Engineering								
Mingde Jiang (G)	C	Stanford University	Applied Physics								
Rebecca Smaha (G)	C	Stanford University	Department of Applied Physics								
Jiajia Wen (S)	C	Stanford University	Applied Physics								
Huiqiu Yuan (S)	PI	Zhejiang University	Physics Department	National Natural Science Foundation of China (NSFC)	Non US Foundation	No. U1632275	P17765	Evolution of the electronic structure in novel quantum critical systems	Condensed Matter Physics	1	4
Feng Du (G)	C	Zhejiang University	Physics								
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Bin Shen (G)	C	Zhejiang University	Physics								
Michael Smidman (P)	C	Zhejiang University	Center for Correlated Matter and Department of Physics								
An Wang (G)	C	Zhejiang University	Physics								
Ziling Xue (S)	PI	University of Tennessee, Knoxville	Chemistry	NSF	CHE - Chemistry	CHE1633870	P17767	Investigating Molecular Magnetism by Magneto-Far-IR Spectroscopy	Chemistry, Geochemistry	3	21
Alexandria Bone (G)	C	University of Tennessee, Knoxville	Chemistry								
Brian Kettell (G)	C	University of Tennessee Space Institute	Chemistry								
Clay Mings (G)	C	University of Tennessee, Knoxville	Chemistry								
Duncan Moseley (G)	C	University of Tennessee, Knoxville	Chemistry								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								

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Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Pagnareach Tin (G)	C		University of Tennessee, Knoxville	Chemistry								
Chelsea Widener (G)	C		University of Tennessee, Knoxville	Chemistry								
Minhyea Lee (S)	PI		University of Colorado, Boulder	Physics	Colorado energy research collaboratory	Other		P17772	Probing novel magnetism in spin-orbit coupled systems	Condensed Matter Physics	6	42
Gang Cao (S)	C		University of Colorado, Boulder	Department of Physics.	University of Colorado Boulder	US College and University						
Kwang Yong Choi (S)	C		Chung Ang University	Department of Physics								
Ian Leahy (G)	C		University of Colorado, Boulder	Physics								
Tyrel McQueen (S)	C		Johns Hopkins University	Chemistry and Physics and Astronomy								
Christopher Pocs (G)	C		University of Colorado, Boulder	Physics								
Peter Siegfried (G)	C		University of Colorado, Boulder	Physics								
Arthur Ramirez (S)	PI		University of California, Santa Cruz	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0017862	P17775	Probing the Putative Neutral Fermi Surface of SmB6 Using Specific Heat	Condensed Matter Physics	2	9
Zachary Fisk (S)	C		University of California, Irvine	Physics and Astronomy								
Nathanael Fortune (S)	C		Smith College	Department of Physics								
Scott Hannahs (S)	C		National High Magnetic Field Laboratory	Instrumentation								
Patrick LaBarre (G)	C		University of California, Santa Cruz	Physics								
Priscilla Rosa (G)	C		University Estadual de Campinas	Instituto Gleb Wataghin								
Ho Nyung Lee (S)	PI		Oak Ridge National Laboratory	Materials Science and Technology Division	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC05-00OR22725	P17777	Revealing Skyrmionics transport at high magnetic field in inversion-symmetry-broken iridate-manganite superlattices	Condensed Matter Physics	1	5.07
matthew brahlek (P)	C		Oak Ridge National Laboratory	physics								
Jong Mok Ok (G)	C		Oak Ridge National Laboratory	Physics								
Elizabeth Skoropata (P)	C		Oak Ridge National Laboratory	Materials Science and Technology								
Charles Agosta (S)	PI		Clark University	Department of Physics	No other support			P17778	Search for FFLO superconductivity in new materials	Condensed Matter Physics	2	13
Camille Bales (U)	C		Clark University	Physics								
Raju Ghimire (G)	C		Clark University	Physics								
Brett Laramee (G)	C		Clark University	Physics								
John Schlueter (S)	C		Argonne National Laboratory	Materials Science								
Makariy Tanatar (S)	C		Ames Laboratory	Division of material science and engineering								
Michael Whittlesey (S)	PI	*	University of Bath	Department of Chemistry	DOD	US Air Force	FA2386-17-1-4040	P17779	Two-Coordinate Ni(I) Single Molecule Magnets	Chemistry, Geochemistry	1	7
Samuel Greer (P)	C		Los Alamos National Laboratory	C-PCS: PHYSICAL CHEM & APPLIED SPECTROSCOPY								
Stephen Hill (S)	C		National High Magnetic Field Laboratory	EMR								
Jonathan Marbey (G)	C		National High Magnetic Field Laboratory	EMR								

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Eun Sang Choi (S)	PI		National High Magnetic Field Laboratory	Physics Department	No other support			P17780	Magnetothermal conductivity studies on breathing pyrochlore magnets	Condensed Matter Physics	5	30
Hongwoo Baek (S)	C		National High Magnetic Field Laboratory	DC field								
Rabindranath Bag (P)	C		Duke University	Physics								
Sachith Dissanayake (P)	C		Duke University	Physics								
Matthew Ennis (G)	C		Duke University	Physics								
Sara Haravifard (S)	C		Duke University	Department of Physics								
Hongcheng Lu (P)	C		Duke University	Physics								
Zhenzhong Shi (P)	C		Duke University	Department of Physics								
Wenda Si (U)	C		Duke University	Department of Physics								
William Steinhardt (G)	C		Duke University	Physics								
Lalit Yadav (G)	C		Duke University	Physics								
Arneil Reyes (S)	PI		National High Magnetic Field Laboratory	Condensed Matter Science	NSF	DMR - Division of Materials Research	DMR1644779	P17784	Exploratory investigation of Orbiting-Ion Paramagnetism (OIP) due to Li+ Ions Encapsulated in C60	Condensed Matter Physics	1	4
Motohiro Nakano (S)	C		Osaka University	Research Center for Structural Thermodynamics, School of Science								
Sanath Kumar Rama Krishna (G)	C		Florida State University	Condensed Matter Physics								
Roberto Myers (S)	PI	*	Ohio State University	Materials Science and Engineering	NSF	DMR - Division of Materials Research	DMR1420451	P17814	Inverted band gap semiconductor superlattices for topological materials exploration	Condensed Matter Physics	1	7
Elline Hettiaratchy (G)	C		The Ohio State University	Materials Science and Engineering								
Jeffrey Schiano (S)	PI	*	Pennsylvania State University	Electrical Engineering	NIH	NIGMS - National Institute of General Medical Sciences	GM122698	P17819	Flux Regulation for Powered Magnets	Engineering	2	9
William Brey (S)	C		National High Magnetic Field Laboratory	NMR								
Ilya Litvak (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Wenping Mao (P)	C		National High Magnetic Field Laboratory	NMR								
Xinxing Meng (G)	C		Pennsylvania State University	Electrical Engineering								
Waroch Tangbampensountorn (G)	C		Pennsylvania State University	Electrical Engineering								
Alexander Nevzorov (S)	PI	*	North Carolina State University	Chemistry	NSF	CHE - Chemistry	CHE1508400	P17825	NMR spectroscopic assignment of magnetically aligned samples at high fields	Biology, Biochemistry, Biophysics	1	3
Alex Smirnov (S)	C		North Carolina State University	Chemistry								
Serena Eley (S)	PI	*	Colorado School of Mines	Physics	Colorado School of Mines	US College and University		P17835	Search for Magnetic Signatures of Multiple Vortex Occupancy of Nanoparticles in Superconductors	Magnets, Materials	1	3.84
Sarah Jones (U)	C		Colorado School of Mines	Physics								
Jonathan Kim (U)	C		Colorado School of Mines	Physics								
Masashi Miura (S)	C		Seikei University	Graduate School of Science and Technology								
Roland Willa (P)	C		Karlsruhe Institute of Technology	Physics								
Wei-Tsung Lee (S)	PI	*	Loyola University Chicago	Chemistry and Biochemistry	No other support			P17840		Chemistry, Geochemistry	1	7

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science					Electronic structure of late transition metal ion complexes of a novel pincer ligand platform			
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Joshua Telser (S)	C		Roosevelt University	Biological, Physical and Health Sciences								
Patrick Holland (S)	PI	*	Yale University	Chemistry	No other support			P17841	Investigation of electronic structure of low-coordinate late transition metal ion complexes of beta-diketiminate ligands	Chemistry, Geochemistry	1	7
Daniel DeRosha (G)	C		Yale University	Chemistry								
Kinga Kaniewska (G)	C		Gdansk University of Technology	Department of Inorganic Chemistry								
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Alexandra Nagelski (G)	C		Yale University	Department of Chemistry								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Joshua Telser (S)	C		Roosevelt University	Biological, Physical and Health Sciences								
Qi Li (S)	PI		Pennsylvania State University	Physics	DOE	Office of Science - BES – Basic Energy Sciences	FG02-08ER46531	P17849	Shubnikov de Haas oscillation of two dimensional electron gases with strong spin-orbit coupling at transition metal oxide interfaces	Condensed Matter Physics	2	12.25
Autumn Heltman (U)	C		Penn State University	Physics	NSF	DMR - Division of Materials Research	DMR1905833					
Shalini Kumari (P)	C		Pennsylvania State University	Physics								
Ziqiao Wang (G)	C		Pennsylvania State University	Physics								
Xiaodong Xu (S)	PI		University of Washington	Physics	NSF	DMR - Division of Materials Research	DMR1708419	P17854	pressure tuning magnetic properties of van der Waals magnets	Condensed Matter Physics	4	27
Cory Dean (S)	C		City College of New York	Physics	DOE	MSE - Materials Science and Engineering	DE-SC0018171					
Zaiyao Fei (P)	C		University of Washington	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0019443					
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS	DOE	Office of Science - EFRC - Energy Frontier Research Centers	DE-SC0019443					
Tiancheng Song (G)	C		University of Washington	Physics								
Matthew Yankowitz (S)	C		University of Washington	Physics								
Vittorio Bellani (S)	PI	*	University of Pavia	Department of Physics	University of Pavia, Italy	Non US College and University		P17862	High magnetic field photoluminescence study of InAs quantum wells and InP crystal-phase quantum disks in core-multishell InP-InAs-InP nanowires	Condensed Matter Physics	1	7
Zhengguang Lu (G)	C		National High Magnetic Field Laboratory	Physics								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Sanfeng Wu (S)	PI	*	Princeton University	Department of Physics	NSF	DMR - Division of Materials Research	DMR1420541	P17871	Exploring Topological Quantum Phases and Devices Based on 2D Materials	Condensed Matter Physics	2	14
Yanyu Jia (G)	C		Princeton University	Physics								
Michael Onyszczak (G)	C		Princeton University	Physics								
Leslie Schoop (S)	C		Princeton University	Chemistry								
Pengjie Wang (P)	C		Princeton University	Department of Physics								
Susanne Stemmer (S)	PI		University of California, Santa Barbara	Materials	DOD	US Navy	N00014-16-1-2814	P17876	3D Dirac Semimetal Thin Films	Condensed Matter Physics	3	13

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Biswajit Datta (P)	C		University of California, Santa Barbara	Materials Department	DOE	Office of Science - BES – Basic Energy Sciences	DE-AA99-99AA99999					
Luca Galletti (P)	C		University of California, Santa Barbara	Materials Department								
David Kealhofer (G)	C		University of California, Santa Barbara	Physics								
Alexander Lygo (G)	C		University of California, Santa Barbara	Materials								
Ross McDonald (S)	C		National High Magnetic Field Laboratory	Physics								
Timo Schumann (P)	C		University of California, Santa Barbara	Materials Department								
Hugen Yan (S)	PI		Fudan University	Physics	Fudan University	Non US College and University		P17878	Magneto-optical Spectroscopy of topological semimetals in the quantum limit	Condensed Matter Physics	2	13.21
Shenyang Huang (G)	C		Fudan University	Dept. of Physics								
Chaoyu Song (G)	C		Fudan University	Physics								
Faxian Xiu (S)	C		Fudan University	Physics								
Yunkun Yang (G)	C		Fudan University	Dept. of Physics								
Xiang Yuan (G)	C		Fudan University	Physics								
Cheng Zhang (S)	C		Fudan University	Institute for Nanoelectronic Devices and Quantum Computing								
Minhao Zhao (G)	C		Fudan University	Physics								
Christianne Beekman (S)	PI		National High Magnetic Field Laboratory	Physics	No other support			P17889	The effect of strain and confinement on spin ice physics in pyrochlore titanate thin films.	Condensed Matter Physics	4	28
Kevin Barry (G)	C		Florida State University	Physics	NSF	CAREER - Faculty Early Career Development Program	1847887					
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS	NSF	CAREER - Faculty Early Career Development Program	1847887					
Sangsoo Kim (G)	C		Florida State University	Physics								
Zhenzhong Shi (P)	C		Duke University	Department of Physics								
Christie Thompson (G)	C		Florida State University	Materials Science and Engineering								
Lalit Yadav (G)	C		Duke University	Physics								
Susan Kauzlarich (S)	PI	*	University of California, Davis	Chemistry	NSF	DMR - Division of Materials Research	DMR1709382	P17890	High Field Measurements on Eu11Zn4Sn2As12	Chemistry, Geochemistry	1	7
Jackson Badger (G)	C		University of California, Davis	Chemistry								
Eun Sang Choi (S)	C		National High Magnetic Field Laboratory	Physics Department								
Kasey Devlin (G)	C		University of California, Davis	Department of Chemistry								
Valentin Taufour (S)	C		University of California, Davis	Physics Department								
Pashupati Dhakal (S)	PI	*	Jefferson Lab	SRF Institute	DOE	Other	DE-SC 0009960	P17893	Measurement of RF penetration depth of superconducting radio frequency niobium for linear accelerators using tunnel diode oscillator	Magnets, Materials	2	14
Shreyas Balachandran (P)	C		Florida State University	Applied Superconductivity Center	DOE	Office of Science - HEP – High Energy Physics	DE-SC0009960					
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Ryan Baumbach (S)	PI	National High Magnetic Field Laboratory	CMS	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0016568	P17894	Investigation of dual nature f-electron intermetallics using high magnetic fields	Condensed Matter Physics	3	18.86
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS	NSF	OIA - Office of Integrative Activities	NSF-OIA-1832967					
Xin Gui (G)	C	Louisiana State University	Chemistry	DOE	Office of Science - BES – Basic Energy Sciences	DESC0016568					
You Lai (G)	C	National High Magnetic Field Laboratory	Physics	Beckman Young Investigator Award	Other						
Chris Mann (U)	C	National High Magnetic Field Laboratory	CMS								
Rico Schoenemann (P)	C	Los Alamos National Laboratory	MPA-MAG								
Benny Schundelmier (U)	C	University of West Florida	Physics								
Kaya Wei (P)	C	National High Magnetic Field Laboratory	CMS								
Weiwei Xie (S)	C	Louisiana State University	Chemistry								
John Durrell (S)	PI	University of Cambridge	Engineering Department	The Boeing Company			P17896	High Field Trapping in Reinforced Bulk Superconductors	Magnets, Materials	1	6
David Cardwell (S)	C	University of Cambridge	Engineering Department								
Eric Hellstrom (S)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
Jan Jaroszynski (S)	C	National High Magnetic Field Laboratory	CMS								
Devendra Namburi (P)	C	University of Cambridge	Engineering								
Jan Srpcic (G)	C	University of Cambridge	Engineering								
Byron Freelon (S)	PI *	University of Louisville	Physics	UCGP			P17898	High field Studies of a Novel Weyl Semimetal	Condensed Matter Physics	1	7
Alaa Alfailakawi (G)	C	University of Louisville-Physics and Astronomy	Physics and Astronomy	University of Louisville							
Bhupendra Karki (G)	C	University of Louisville-Physics and Astronomy	Physics and Astronomy								
Iain Dixon (S)	PI *	National High Magnetic Field Laboratory	MS&T	NSF	DMR - Division of Materials Research	DMR1644779	P17899	No-Insulation Coil Tests for 40 T Magnet	Magnets, Materials	1	3.13
Hongyu Bai (S)	C	National High Magnetic Field Laboratory	MS&T								
Mark Bird (S)	C	National High Magnetic Field Laboratory	MS&T								
Kwanglok Kim (O)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
Kwangmin Kim (P)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
David Larbalestier (S)	C	National High Magnetic Field Laboratory	ASC								
Seungyong Hahn (S)	PI	National High Magnetic Field Laboratory	Applied Superconductivity Center, Mechanical Engineering	NSF	DMR - Division of Materials Research	DMR1644779	P17900	No-Insulation Type High Temperature Superconductor Winding Techniques for All-Superconducting >30-T DC User Magnets	Magnets, Materials	2	7.83
Dmytro Abraimov (S)	C	National High Magnetic Field Laboratory	The Applied Superconductivity Center								
Griffin Bradford (O)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
Iain Dixon (S)	C	National High Magnetic Field Laboratory	MS&T								
Xinbo Hu (G)	C	National High Magnetic Field Laboratory	ASC								
Jan Jaroszynski (S)	C	National High Magnetic Field Laboratory	CMS								

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Kwanglok Kim (O)	C		National High Magnetic Field Laboratory	Applied Superconductivity Center								
Kwangmin Kim (P)	C		National High Magnetic Field Laboratory	Applied Superconductivity Center								
Kyle Radcliff (G)	C		National High Magnetic Field Laboratory	Applied Superconductivity Center								
Xi Ling (S)	PI	*	Boston University	Department of Chemistry	No other support		BU start up fund	P17901	Magneto-optics of 2D Antiferromagnetic Semiconductors	Condensed Matter Physics	2	10.49
Jun Cao (G)	C		Boston University	Department of Chemistry	Boston University							
Zhengguang Lu (G)	C		National High Magnetic Field Laboratory	Physics								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Xingzhi Wang (P)	C		Boston University	Department of Chemistry								
Naoki Kikugawa (S)	PI		National Institute for Materials Science	Superconducting Properties Unit	MEXT KAKENHI, Japan	Other	JP17H06136	P17904	High-field study of correlated oxides under DC current in the vicinity of metal-insulator transition	Condensed Matter Physics	1	5.65
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS								
Hishiro Hirose (P)	C		National Institute for Materials Science	Nano-quantum Transport Group								
Taichi Terashima (S)	C		National Institute for Materials Science	Quantum Transport Properties Group								
Krzysztof Gofryk (S)	PI		Idaho National Laboratory	Fuel Performance & Design	No other support			P17910	High Field Static & Dynamic Crystal Lattice Studies of Piezomagnetic UO2 and related compounds	Condensed Matter Physics	2	12.53
Carolina Corvalan Moya (S)	C		Los Alamos National Laboratory	MPA-MAG	DOE	Office of Science - ECRP - Early Career Research Program	KG's early career award					
Xiaxin Ding (P)	C		Idaho National Laboratory	NST								
Marcelo Jaime (S)	C		National High Magnetic Field Laboratory	Physics								
alexey kovalev (S)	C		National High Magnetic Field Laboratory	CMS								
Drew Rebar (P)	C		National High Magnetic Field Laboratory	CMS								
Theo Siegrist (S)	C		National High Magnetic Field Laboratory	Chemical and Biomedical Engineering								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Julia Smith (S)	C		National High Magnetic Field Laboratory	DC Field								
Alexey Suslov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Komalavalli Thirunavukkuarasu (S)	C		Florida Agricultural and Mechanical University	Physics								
Nigel Hussey (S)	PI		University of Bristol	H.H. Wills Physics Laboratory	The Netherlands Organization for Scientific Research	Other	16METL01	P17912	Establishing the low-temperature vortex-solid boundary in underdoped cuprates	Condensed Matter Physics	1	5
Maarten Berben (G)	C		High Field Magnet Laboratory, Radboud University	HFML								
Yu-Te Hsu (P)	C		High Field Magnet Laboratory, Radboud University	Faculty of Science								
Nigel Hussey (S)	C		University of Bristol	H.H. Wills Physics Laboratory								
Jairo Velasco (S)	PI	*	University of California, Santa Cruz	Physics	University of California Santa Cruz	US College and University		P17915	Tunneling Spectroscopy of Graphene in the Fractional Quantum Hall Regime	Condensed Matter Physics	1	7
John Davenport (G)	C		UC Santa Cruz	Physics								

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Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Venkat Selvamanickam (S)	PI		University of Houston	Mechanical Engineering	DOE	Office of Science - HEP – High Energy Physics	DE-SC0015983	P17917	Critical current characterization of Symmetric Tape Round (STAR) REBa2Cu3Ox wires at 4 K and very high magnetic fields	Magnets, Materials	1	3.59
Eduard Galstyan (S)	C		University of Houston	Texas Center for Superconductivity								
Soumen Kar (S)	C		University of Houston	Mechanical Engineering								
Mehdi Kochat (G)	C		University of Houston	Mechanical engineering								
Wenbo Luo (G)	C		University of Houston	Mechanical Engineering								
Liang Wu (S)	PI	*	University of Pennsylvania	Physics and Astronomy	Start-up at U. Penn	Other		P17918	Identify a possible quantum spin liquid phase in RuCl3 above 7 Tesla	Condensed Matter Physics	1	7
Xingyue Han (G)	C		University of Pennsylvania	Physics and Astronomy								
Yuxuan Jiang (P)	C		National High Magnetic Field Laboratory	CMS								
Zhigang Jiang (S)	C		Georgia Institute of Technology	School of Physics								
David Mandrus (S)	C		University of Tennessee, Knoxville	Materials Science and Engineering								
Stephen McGill (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Stephen Nagler (S)	C		Oak Ridge National Laboratory									
Zhuoliang Ni (G)	C		University of Pennsylvania	Physics and Astronomy								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Jonathan Stensberg (G)	C		University of Pennsylvania	Physics and Astronomy								
Lloyd Engel (S)	PI		National High Magnetic Field Laboratory	CMS	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-05-ER46212	P17920	Microwave spectroscopy of electron solids in anisotropic semiconductor systems	Condensed Matter Physics	1	7
Matthew Freeman (G)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Loren Pfeiffer (S)	C		Princeton University	Electrical Engineering								
Mansour Shayegan (S)	C		Princeton University	Department of Electrical Engineering								
Luming Peng (S)	PI	*	Nanjing University	School of Chemistry and Chemical Engineering	National Natural Science Foundation of China	Non US Foundation	21573103	P17924	Multinuclear NMR studies of oxide nanostructures	Chemistry, Geochemistry	1	4
Kuizhi Chen (P)	C		National High Magnetic Field Laboratory	NMR								
Po-Hsiu Chien (G)	C		Florida State University	Chemistry and Biochemistry								
Jiahuan Du (G)	C		Nanjing University	School of Chemistry and Chemical Engineering								
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Nicholas Butch (S)	PI	*	National Institute of Standards and Technology	NIST Center for Neutron Research	National institute of standard and technology	US Government Lab		P17928	Physical properties of spin triplet superconductor UTe2 in high magnetic field	Condensed Matter Physics	2	7.39
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS	NIST	US Government Lab						
Sheng Ran (P)	C		University of Maryland, College Park	Physics								

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Shanta Saha (P)	C	University of Maryland, College Park	Physics								
Jun Lu (S)	PI	National High Magnetic Field Laboratory	MS&T	NSF	DMR - Division of Materials Research	DMR1644779	P17967	Magnetization of SuperPower REBCO coated conductor as a function of applied field angle	Magnets, Materials	1	7
Sufei Shi (S)	PI	Rensselaer Polytechnic Institute	Chemical and Biological Engineering	DOD	US Air Force		P17976	Probing Excitonic Fine Structures in Van der Waals Heterostructures	Condensed Matter Physics	3	17.34
Zhipeng Li (P)	C	Rensselaer Polytechnic Institute	Chemical and Biological Engineering	DOD	US Air Force	FA9550-18-1-0312					
Zhen Lian (G)	C	Rensselaer Polytechnic Institute	chemical engineering								
Zhengguang Lu (G)	C	National High Magnetic Field Laboratory	Physics								
Shengnan Miao (G)	C	Rensselear Polytechnic Institute	Chemical Engineering								
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Tianmeng Wang (G)	C	Rensselaer Polytechnic Institute	Chemical and Biological Engineering								
Prasenjit Guptasarma (S)	PI	University of Wisconsin, Milwaukee	Department of Physics	University of Wisconsin Milwaukee	US College and University		P17986	Magnetoresistance Studies in Superconducting Topological Crystalline Insulators (TCI)	Condensed Matter Physics	1	7
Uma Garg (G)	C	University of Wisconsin, Milwaukee	Physics								
William Rexhausen (G)	C	University of Wisconsin, Milwaukee	Physics								
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Fazel Tafti (S)	PI	Boston College	Physics	NSF	DMR - Division of Materials Research	DMR1708929	P17991	Revealing the Weyl-Kondo physics in a new semimetal	Condensed Matter Physics	1	4.59
Hung-Yu Yang (G)	C	Boston College	Physics								
Paul Goddard (S)	PI	University of Warwick	Department of Physics	European Research Council	Non US Council	Grant Agreement No. 681260	P17992	Molecule-based quantum magnets in applied pressures	Condensed Matter Physics	1	7
Matthew Coak (P)	C	University of Warwick	Department of Physics								
Sam Curley (G)	C	University of Warwick	Physics and Astronomy								
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Jamie Manson (S)	C	Eastern Washington University	Chemistry and Biochemistry								
Robert Williams (P)	C	University of Warwick	Dept of Physics								
Matthew Grayson (S)	PI	Northwestern University	Electrical Engineering & Computer Science	NSF	DMR - Division of Materials Research	DMR1729016	P17998	Weak localization as tunneling signature in In2O3/MoO3 polymorphic superlattice	Condensed Matter Physics	1	7
Can Aygen (G)	C	Northwestern University	Electrical and Computer Engineering								
Robert Chang (S)	C	Northwestern University	Materials Science and Engineering								
Qing Shao (G)	C	Northwestern University	Electrical Engineering and Computer Science								
Faxian Xiu (S)	PI	Fudan University	Physics	National Key Research and Development Program of China	Other	2017YFA0303302	P18001	Quantum phase transition and unconventional phases in 2D superconductors under in-plane magnetic fields	Condensed Matter Physics	1	5.88
Ce Huang (G)	C	Fudan University	Department of Physics								
Enze Zhang (P)	C	Fudan University	Physics								
Minhao Zhao (G)	C	Fudan University	Physics								
Chetan Dhital (S)	PI *	Kennesaw State University	Physics	No other support			P18004	de Haas-Van Alphen Oscillations in possible magnetic Weyl fermion system NdAlGe	Condensed Matter Physics	1	7
Ramakanta Chapai (G)	C	Louisiana State University	Physics and Astronomy								
John DiTusa (S)	C	Louisiana State University	Department of Physics and Astronomy								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Rongying Jin (S)	C		Louisiana State University	Department of Physics and Astronomy								
Sunil Karna (P)	C		Louisiana State University	Physics and Astronomy Department								
David Young (S)	C		Louisiana State University	College of Science								
TIm Mewes (S)	PI	*	University of Alabama	Physics & Astronomy	DOD	DARPA - Defense Advanced Research Projects Agency	D18AP0001	P18005	Investigation of higher-order anisotropy in materials with interfacial perpendicular anisotropy.	Condensed Matter Physics	1	7
Kevin Barry (G)	C		Florida State University	Physics								
Christianne Beekman (S)	C		National High Magnetic Field Laboratory	Physics								
Claudia Mewes (S)	C		The University of Alabama	Physics & Astronomy								
Anish Rai (G)	C		The University of Alabama	Department of Physics and Astronomy								
Christie Thompson (G)	C		Florida State University	Materials Science and Engineering								
Jak Chakhalian (S)	PI	*	Rutgers University, New Brunswick	physics	Gordon and Betty Moore Foundation	Other	EPiQS GBMF4534	P18007	Topological and Magnetic Phases of Pyrochlore Eu2Ir2O7 Thin Films in High Magnetic Field	Condensed Matter Physics	1	7
Eun Sang Choi (S)	C		National High Magnetic Field Laboratory	Physics Department								
Xiaoran Liu (P)	C		Rutgers University, New Brunswick	Physics and Astronomy								
Fangdi Wen (G)	C		Rutgers University, New Brunswick	Department of Physics and Astronomy								
Sasa Dordevic (S)	PI		University of Akron	Department of Physics	The University of Akron	US College and University		P18010	Magneto-optical study of 3D Topological Insulators Bi2Se3, Sb2Te3 and Bi2Te3 in Voigt geometry	Condensed Matter Physics	1	7
Emilia Morosan (S)	PI	*	Rice University	Physics and Astronomy	Gordon and Betty Moore Foundation	US Foundation	GBMF4417	P18011	Anomalous transport and metamagnetism in Yb-based Kondo compounds	Condensed Matter Physics	1	5.76
Luis Balicas (S)	C		National High Magnetic Field Laboratory	Condensed Matter Experiment								
Chien-Lung Huang (S)	C		Rice University	Physics and Astronomy								
Juan Macy (G)	C		National High Magnetic Field Lab	Condensed Matter Sciences								
Tyrel McQueen (S)	C		Johns Hopkins University	Chemistry and Physics and Astronomy								
Shirin Mozaffari (P)	C		National High Magnetic Field Laboratory	Condensed Matter Sciences								
Macy Stavinoha (G)	C		Rice University	Physics and Astronomy								
Vivien Zapf (S)	C		National High Magnetic Field Laboratory	Physics								
Chris Palmstrom (S)	PI		University of California, Santa Barbara	ECE-Material Science	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0014388	P18013	Revealing topological properties of Heusler compounds via magneto-transport under high magnetic field.	Condensed Matter Physics	1	5.21
Shouvik Chatterjee (P)	C		University of California Santa Barbara	Electrical & Computer Engineering								
Connor Dempsey (G)	C		University of California, Santa Barbara	ECE								
Hadass Inbar (G)	C		University of California, Santa Barbara	Materials								
Tony McFadden (G)	C		University of California, Santa Barbara	ECE								
Dan Read (S)	C		University of California, Santa Barbara	Materials								
Jagadeesh Moodera (S)	PI	*	MIT Plasma Science & Fusion Center	Physics	NSF	DMR - Division of Materials Research	DMR1700137	P18014		Condensed Matter Physics	1	6.17

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Scott Hannahs (S)	C		National High Magnetic Field Laboratory	Instrumentation	NSF	DMR - Division of Materials Research	DMR1231319		Exploring New States in Quantum Anomalous Hall Effect with High Magnetic Fields			
Yunbo Ou (P)	C		Massachusetts Institute of Technology	Plasma Science and Fusion Center	ONR	Other US Federal Agency	N00014-16-1-2657					
Jagadeesh Moodera (S)	PI	*	MIT Plasma Science & Fusion Center	Physics	NSF	DMR - Division of Materials Research	DMR1231319	P18015	Quantum transport at low temperatures and high fields in 2D materials subjected to induced ferromagnetic proximity coupling	Condensed Matter Physics	1	7
Scott Hannahs (S)	C		National High Magnetic Field Laboratory	Instrumentation								
Dhavala Suri (P)	C		Massachusetts Institute of Technology	Francis Bitter Magnet Laboratory								
Jia Li (S)	PI	*	Brown University	Department of Physics	University start up funding	Other US Federal Agency		P18016	Studying correlated electron states in two-dimensional material in high magnetic field with microwave techniques	Condensed Matter Physics	2	14
Xiaoxue Liu (P)	C		Brown University	Physics department	Brown University startup fund	Other						
Seng Huat Lee (S)	PI	*	Pennsylvania State University	Physics	NSF	Other	DMR-1539916	P18018	Seeking for Weyl State in Intrinsic Antiferromagnetic Topological Insulator MnBi2Te4 under High Magnetic Fields	Condensed Matter Physics	1	5.19
David Graf (S)	C		National High Magnetic Field Laboratory	DC Field CMS								
Zhiqiang Mao (S)	C		Pennsylvania State University	Department of Physics								
Lujin Min (G)	C		Pennsylvania State University	Department of Physics								
Wei Ning (P)	C		Pennsylvania State University	Department of Physics								
Paul Goddard (S)	PI		University of Warwick	Department of Physics	European Research Council Consolidator Grant	Other	681260	P18021	Phase diagram and quantum criticality of MOs4Sb12 skutterudites under pressure	Condensed Matter Physics	1	4.69
Kathrin Gotze (P)	C		University of Warwick	Department of Physics, Superconductivity and Magnetism group								
Pei-Chun Ho (S)	C		California State University, Fresno	Physics								
Brian Maple (S)	C		University of California, San Diego	Inst for Pure & Applied Physical Sciences								
Matthew Pearce (G)	C		University of Warwick	Physics								
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
Stan Tozer (S)	C		National High Magnetic Field Laboratory	Physics								
Jian Liu (S)	PI	*	University of Tennessee	Physics	University of Tennessee	US College and University		P18024	Low-temperature high-field magnetotransport study of geometrically frustrated spin ice heterostructures	Condensed Matter Physics	1	7
Qing Huang (G)	C		University of Tennessee, Knoxville	Physics								
Kyle Noordhoek (U)	C		University of Tennessee, Knoxville	Physics and Astronomy								
Chengkun Xing (G)	C		University of Tennessee, Knoxville	Physics								
Han Zhang (P)	C		University of Tennessee	Physics								
Adam Fiedler (S)	PI	*	Marquette University	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM126522	P18030	Probing the Magnetic Anisotropy of Co(II) Complexes Featuring Radical Ligands	Chemistry, Geochemistry	1	7
John Berry (S)	C		University of Wisconsin, Madison	Department of Chemistry								
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Joshua Telser (S)	C		Roosevelt University	Biological, Physical and Health Sciences								
Jiun-Haw Chu (S)	PI		University of Washington	Physics	DOD	US Air Force	FA9550-17-1-0217	P18033	Hc2 of a strained iron-based superconductor	Condensed Matter Physics	2	9

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Qianni Jiang (G)	C		University of Washington	Physics	DOD	US Air Force						
Zhaoyu Liu (P)	C		University of Washington	Department of Physics	Gordon and Betty Moore Foundation	US Foundation	GBMF6759					
Paul Malinowski (G)	C		University of Washington	Physics	The David and Lucile Packard Foundation	US Foundation						
Joshua Mutch (G)	C		University of Washington	Physics	Gordon and Betty Moore Foundation	US Foundation						
Arkady Shehter (S)	C		National High Magnetic Field Laboratory	NHMFL, DC Field Facility								
James Analytis (S)	PI		University of California, Berkeley	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-05CH11231	P18034	A search for a record-breaking exchange bias in intercalated transition metal dichalcogenides	Condensed Matter Physics	1	6.5
Shannon Haley (G)	C		University of California, Berkeley	Physics								
eran maniv (P)	C		University of California, Berkeley	Physics								
Vikram Nagarajan (G)	C		University of California, Berkeley	Physics								
Maximilian Hirschberger (P)	PI	*	RIKEN	Center for Emergent Matter Science	Japan Society for the Promotion of Science	Non US Foundation		P18037	Thermal Hall effect in canted ferromagnet pyrochlore metal Nd2Mo2O7	Condensed Matter Physics	1	1.82
					Japan Science and Technology Agency (JST)	Other Non US Federal Agency	JP- MJCR1874					
Zhi-Xun Shen (S)	PI	*	Stanford University	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-76SF00515	P18038	Fermi Surfaces in Correlated Insulators	Condensed Matter Physics	1	2.99
Alexander Davies (G)	C		University of Cambridge	Physics	European Research Council	Other						
Alex Eaton (G)	C		University of Cambridge	Physics								
Alex Hickey (G)	C		University of Cambridge	Department of Physics								
Liting Huang (U)	C		University of Cambridge	Physics								
Alice Jin (U)	C		University of Cambridge	QM								
Hsu Liu (G)	C		University of Cambridge	Physics								
Flavio Salvati (U)	C		University of Cambridge	Quantum Mechanics								
Suchitra Sebastian (S)	C		University of Cambridge	Physics								
Oscar Solomons-Tuke (U)	C		Cambridge University	Quantum Matter								
Kejun Xu (G)	C		Stanford University	Applied Physics								
Prasenjit Guptasarma (S)	PI		University of Wisconsin, Milwaukee	Department of Physics	University of Wisconsin Milwaukee	US College and University		P18040	Phase transition studies on intercalated Bi2Se3 single crystals	Condensed Matter Physics	1	14
Anand Dwivedi (G)	C		University of Wisconsin, Milwaukee	Department of Physics								
Yanan Li (G)	C		University of Wisconsin, Milwaukee	Physics								
Christian Parsons (G)	C		University of Wisconsin - Milwaukee	Physics								
Arneil Reyes (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
miha Zakotnik (S)	PI	*	Urban Mining Company	research	Urban Mining Company			P18071	Recycled NdFeB permanent magnets and their role in circular economy	Magnets, Materials	1	7
Petru Andrei (S)	C		College of Engineering	Electrical and Computer Engineering								
Davide Prosperi (O)	C		UMC	research								

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Luis Balicas (S)	PI		National High Magnetic Field Laboratory	Condensed Matter Experiment	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0002613	P18073	Low field characterization of CoSi single crystals grown via a Te flux method	Condensed Matter Physics	1	7
Shirin Mozaffari (P)	C		National High Magnetic Field Laboratory	Condensed Matter Sciences								
Chetan Dhital (S)	PI	*	Kennesaw State University	Physics	Kennesaw State University			P18075	Investigation of magnetic properties of RMWO6 (R=Rare earth, M=Fe, Cr) type polar compounds	Condensed Matter Physics	1	7
Pratap Raychaudhuri (S)	PI	*	Tata Institute of Fund. Research	Condensed Matter Physics and Materials Science	NSF	DMR - Division of Materials Research	DMR1707785	P19110	Exploring quantum vortex liquid phases in very weakly pinned superconducting a-MoGe thin films at low temperatures and high magnetic fields	Condensed Matter Physics	1	7
Somak Basistha (G)	C		Tata Institute of Fundamental Research	Department of Condensed Matter Physics and Materials Science								
Surajit Dutta (G)	C		Tata Institute of Fund. Research	Condensed Matter Physics and Materials Science								
John Jesudasan (T)	C		Tata Institute of Fundamental Research	Dept. Of Condensed Matter Physics and Material Science								
Bal Pokharel (G)	C		National High Magnetic Field Laboratory	Physics								
Dragana Popovic (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science / Experimental								
Jasminka Terzic (P)	C		National High Magnetic Field Laboratory	CMS								
Yuxin Wang (G)	C		Florida State University	CMS								
Geoffrey Strouse (S)	PI		National High Magnetic Field Laboratory	Chemistry	NSF	CHE - Chemistry	CHE1608364	P19121	Near-IR Magneto-Circular Dichroism to Probe Plasmonic Semiconductor Properties	Magnets, Materials	1	7
John Akintola (G)	C		Florida State University	Biochemistry and Chemistry								
Isabella Bertini (G)	C		Florida State University	Chemistry								
Carl Conti (G)	C		Florida State University	Chemistry & Biochemistry								
David Hardy (G)	C		Florida State University	Chemistry and Biochemistry								
Jason Kuszynski (G)	C		Florida State University	Chemistry								
Stephen McGill (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Edward Nguyen (G)	C		Florida State University	Chemistry								
Raul Ortega (G)	C		Florida State University	Chemistry & Biochemistry								
Joanna Schwarck (U)	C		Florida State University	Chemistry								
Luis Balicas (S)	PI		National High Magnetic Field Laboratory	Condensed Matter Experiment	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0002613	P19122	Understanding the anomalous Hall-effect in the magnetic topological semi-metallic candidates Fe3GeTe2 and Fe5GeTe2	Condensed Matter Physics	1	6.12
Juan Macy (G)	C		National High Magnetic Field Lab	Condensed Matter Sciences								
Shirin Mozaffari (P)	C		National High Magnetic Field Laboratory	Condensed Matter Sciences								
Pengcheng Dai (S)	PI		University of Tennessee, Knoxville	Physics	NSF	DMR - Division of Materials Research	DMR1700081	P19125	Broadband THz and Far Infrared Magnetospectroscopy in 2D Ferromagnets	Condensed Matter Physics	1	7
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Ryan Hadt (S)	PI	*	Caltech	Chemistry and Chemical Engineering	California Institute of Technology	US College and University		P19129	Ultrafast Molecular Magnetism and Spin-Phonon Coupling in Transition Metal Complexes	Chemistry, Geochemistry	1	2.5
Alexandra Barth (G)	C		California Institute of Technology	Chemistry								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Alec Follmer (P)	C		California Institute of Technology	Chemistry and Chemical Engineering								
Stephen McGill (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Danika Nimlos (G)	C		California Institute of Technology	Division of Chemistry and Chemical Engineering								
Haidong Zhou (S)	PI		University of Tennessee, Knoxville	Physics and Astronomy	NSF	DMR - Division of Materials Research	DMR1350002	P19130	Manipulating the strong quantum spin fluctuations in new triangular lattice antiferromagnets with spin-1/2	Condensed Matter Physics	2	14
Eun Sang Choi (S)	C		National High Magnetic Field Laboratory	Physics Department								
Qing Huang (G)	C		University of Tennessee, Knoxville	Physics								
Kyle Noordhoek (U)	C		University of Tennessee, Knoxville	Physics and Astronomy								
Chengkun Xing (G)	C		University of Tennessee, Knoxville	Physics								
Han Zhang (P)	C		University of Tennessee	Physics								
Rajeswari Kolagani (S)	PI	*	Towson University	Physics, Astronomy & Geosciences	NSF	DMR - Division of Materials Research	DMR1709781	P19134	Effect of Anion Stoichiometry Modulation on the Magneto-transport properties of Perovskite Metal Oxide Thin Films	Condensed Matter Physics	1	7
Joseph Cartelli (G)	C		Towson University	Department of Physics, Astronomy & Geosciences								
Alexey Suslov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
oleksiy svitelskiy (S)	C		Gordon College	Physics								
Guangjin Hou (S)	PI	*	Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis	National Natural Science Foundation of China	Non US Foundation		P19138	High field NMR and DNP enhanced NMR study of metal oxide catalysts	Chemistry, Geochemistry	1	4
Hongyu Chen (G)	C		Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis								
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								
Dong Xiao (P)	C		Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis								
Zhenchao Zhao (S)	C		Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis								
Ian Fisher (S)	PI		Stanford University	Applied Physics	Moore Foundation	US Foundation	GBMF4414	P19149	Field-Tuned Ferroquadrupole Quantum Critical Point in the Presence of Quenched Disorder	Condensed Matter Physics	2	12.8
Matthias Ikeda (P)	C		Stanford University	Department of Applied Physics								
Elliott Rosenberg (G)	C		Stanford University	Applied Physics								
Matthew Sorensen (G)	C		Stanford University	Applied Physics								
Stephen McGill (S)	PI		National High Magnetic Field Laboratory	Condensed Matter Science	No other support			P19166	Optical Spectroscopy of Semiconducting Mott Insulators	Condensed Matter Physics	1	7
Eun Sang Choi (S)	PI		National High Magnetic Field Laboratory	Physics Department	No other support			P19217	Magnetometry instrumentation: calibration and background measurements	Condensed Matter Physics	1	7
YounJung Jo (S)	PI		Kyungpook National University	Physics	National Research Foundation of Korea	Non US Foundation		P19278	Magnetic anisotropy in van der Waals antiferromagnets	Condensed Matter Physics	1	7
Je-Geun Park (S)	C		Seoul National University	Department of Physics & Astronomy								
									Total Proposals: 187		Experiments: 319	Days: 1,867.69

3. EMR Facility

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Likai Song (S)	PI	National High Magnetic Field Laboratory	EMR	No other support			P14730	Development of high-field and pulsed EPR methods in biological applications	Biology, Biochemistry, Biophysics	2	14
Sankalpa Chakraborty (G)	C	Florida State University	Department of Biological Sciences								
Johannes McKay (P)	C	Keysight Technologies	MMIC Microwave								
Nathan Peek (G)	C	Florida State University	Chemistry and Biochemistry								
Johan van Tol (S)	PI	National High Magnetic Field Laboratory	EMR	No other support			P14847	Instrumentation Testing	Magnets, Materials	1	3
Stephen Hill (S)	PI	National High Magnetic Field Laboratory	EMR	No other support			P14910	Instrument development and maintenance of the w-band pulsed EPR spectrometer HiPER	Magnets, Materials	1	4
Nandita Abhyankar (G)	C	Florida State University	Chemistry								
Paul Cruickshank (S)	C	University of St. Andrews	School of Physics & Astronomy								
Johannes McKay (P)	C	Keysight Technologies	MMIC Microwave								
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR								
Jianjun Pan (S)	PI	University of South Florida	Physics	No other support			P14941	Interactions of Protein Aggregates with Lipid Membranes Defined by Multi-Frequency EPR EMR Facility	Biology, Biochemistry, Biophysics	5	48
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR								
Hailong Chen (S)	PI	Georgia Institute of Technology	School of Mechanical Engineering	No other support			P14967	In situ and/or Operando NMR and EPR imaging of energy materials	Chemistry, Geochemistry	1	2
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR								
Mingxue Tang (P)	C	Florida State University	Chemistry & Biochemistry								
Danna Freedman (S)	PI	Northwestern University	Chemistry	NSF	CHE - Chemistry	CHE1455017	P14969	Enhancement of magnetic anisotropy in main group-transition metal hetero- bimetallic and trimetallic complexes	Chemistry, Geochemistry	1	12
Kelsey Collins (G)	C	Northwestern University	Chemistry								
Scott Coste (G)	C	Northwestern University	Chemistry								
Majed Fataftah (G)	C	Northwestern University	Chemistry								
Stephen Hill (S)	C	National High Magnetic Field Laboratory	EMR								
Daniel Laorenza (G)	C	Northwestern University	Chemistry								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Frederic Mentink (S)	PI	National High Magnetic Field Laboratory	NMR Division	No other support			P16032	Towards more efficient Magic Angle Spinning – Dynamic Nuclear Polarization at 14 T	Chemistry, Geochemistry	1	2
Snorri Sigurdsson (S)	C	University of Iceland	Chemistry								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Joshua Telser (S)	PI	Roosevelt University	Biological, Physical and Health Sciences	No other support			P16069	High- Frequency and- Field EPR Studies of Complexes of Complexes of Groups 5 – 9 Ions with Unusual Ligands	Chemistry, Geochemistry	2	10
Abhik Ghosh (S)	C	University of Tromso, the Arctic University of Norway	Department of Chemistry								
Mehrafshan Jafari (G)	C	University of Pennsylvania	Chemistry								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Daniel Mindiola (S)	C	Pennsylvania State University	Chemistry								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Anders Reinholdt (P)	C	University of Pennsylvania	Chemistry								
Sebastian Stoian (S)	C	University of Idaho	Chemistry								
Fengyuan Yang (S)	PI	Ohio State University	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-03ER46054	P16081	High Frequency Ferromagnetic/Antiferromagnetic Resonance of thin films	Magnets, Materials	1	9
P. Hammel (S)	C	Ohio State University	Physics								
Inhee Lee (P)	C	Ohio State University	Physics								
Denis Pelekhov (S)	C	Ohio State University	Physics								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Olga Vassilyeva (S)	PI	Taras Shevchenko National University of Kyiv	Chemistry	Taras Shevchenko University, Kiev, Ukraine	Non US College and University		P16086	New Schiff base heterometallics towards magnetic materials and catalysts	Chemistry, Geochemistry	1	5
Katerina Kasyanova (G)	C	Taras Shevchenko National University of Kyiv	Chemistry								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Natalia Drichko (S)	PI	Johns Hopkins University	Physics and Astronomy	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0019331	P16105	Magneto-electric effect in quasi-2D organic conductors	Condensed Matter Physics	1	5
Dmitry Smirnov (S)	C	National High Magnetic Field Laboratory	Instrumentation & Operations								
Komalavalli Thirunavukkuarasu (S)	C	Florida Agricultural and Mechanical University	Physics								
Stergios Piligkos (S)	PI	University of Copenhagen	Department of Chemistry	No other support			P16138	Pulsed HF-EPR of Yb(trensal)	Condensed Matter Physics	2	10
Stephen Hill (S)	C	National High Magnetic Field Laboratory	EMR								
Dorsa Komijani (G)	C	National High Magnetic Field Laboratory	Physics								
Jonathan Marbey (G)	C	National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Ellis Reinherz (S)	PI	Dana-Farber Cancer Institute	Medicine	No other support			P16241	EPR analysis of HIV-1 MPER segment for optimized vaccine design	Biology, Biochemistry, Biophysics	7	77
Enrique del Barco (S)	PI	University of Central Florida	Physics	No other support			P16298	Spintronics with Antiferromagnetic Insulators	Condensed Matter Physics	3	35
Priyanka Vaidya (G)	C	University of Central Florida	Physics Department	Univ. of Central Florida	US College and University						
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	PI	National High Magnetic Field Laboratory	EMR	No other support			P16303	Field dependence of Electron Spin Relaxation	Condensed Matter Physics	1	3
Thierry Dubroca (S)	C	National High Magnetic Field Laboratory	EMR								
Theo Siegrist (S)	PI	National High Magnetic Field Laboratory	Chemical and Biomedical Engineering	NSF	DMR - Division of Materials Research	DMR1625780	P17361	Xray Diffraction in High Magnetic Fields	Magnets, Materials	1	1

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)		Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Josiah Cochran (G)	C	National High Magnetic Field Laboratory	CMS							
alexey kovalev (S)	C	National High Magnetic Field Laboratory	CMS							
Masoud Mardani (G)	C	Florida State University	CMS							
Drew Rebar (P)	C	National High Magnetic Field Laboratory	CMS							
Julia Smith (S)	C	National High Magnetic Field Laboratory	DC Field							
Alexey Suslov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science							
Kaya Wei (P)	C	National High Magnetic Field Laboratory	CMS							
Joan Cano (S)	PI	University of Valencia	Instituto de Ciencia Molecular	No other support		P17379	Building quantum gates and quantum computer by assembling mononuclear single-molecule magnets based on Co(II) and other 3d transition metal ions. In pursuit of new physics in spintronics	Chemistry, Geochemistry	2	6
Miguel Julve (S)	C	University of Valencia	Inorganic Chemistry							
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science							
Francesc Lloret (S)	C	University of Valencia	Institut de Ciència Molecular (ICMOL).							
Marta Viciano-Chumillas (P)	C	University of Valencia	Instituto de Ciencia Molecular							
Markus Enders (S)	PI	Heidelberg University	Chemistry	No other support		P17384	Unpaired electron spin properties of light d-block metal compounds	Chemistry, Geochemistry	1	4.5
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science							
Joshua Telser (S)	C	Roosevelt University	Biological, Physical and Health Sciences							
Lloyd Lumata (S)	PI	University of Texas, Dallas	Physics	No other support		P17389	EPR studies of free radical mixtures used in dynamic nuclear polarization	Biology, Biochemistry, Biophysics	1	6
Peter Niedbalski (G)	C	University of Texas, Dallas	Department of Physics							
Christopher Parish (G)	C	University of Texas, Dallas	Physics							
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR							
Elzbieta Megiel (S)	PI	University of Warsaw	Faculty of Chemistry	No other support		P17442	High-spin nanostructures as novel DNP agents for NMR spectroscopy	Chemistry, Geochemistry	1	2
Thierry Dubroca (S)	C	National High Magnetic Field Laboratory	EMR							
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR							
Likai Song (S)	PI	National High Magnetic Field Laboratory	EMR	No other support		P17449	Developing Multifrequencey EPR Methods for Biological Applications	Biology, Biochemistry, Biophysics	13	161.5
Hannah Shafaat (S)	PI	Ohio State University	Chemistry and Biochemistry	No other support		P17478	Advanced EPR investigations of spin-coupled Mn/Fe intermediates formed during oxygen activation in a heterobimetallic oxidase	Biology, Biochemistry, Biophysics	2	21
Samuel Greer (P)	C	Los Alamos National Laboratory	C-PCS: PHYSICAL CHEM & APPLIED SPECTROSCOPY	The Ohio State University	US College and University					
Joseph Hazel (G)	C	The Shafaat Group - Ohio State University	Department of Chemistry and Biochemistry							
Stephen Hill (S)	C	National High Magnetic Field Laboratory	EMR							
Jonathan Marbey (G)	C	National High Magnetic Field Laboratory	EMR							
Effie Miller (G)	C	Ohio State University	Chemistry and Biochemistry							
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR							
Mykhaylo Ozerov (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS	No other support		P17494		Condensed Matter Physics	1	2

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Alexander Mukhin (S)	C	General Physics Institute of the Russian Academy of Sciences	Submillimeter Spectroscopy Department					Low-energy magnetic excitations in many sublattice antiferromagnets with large Neel temperature.			
Vassil Skumryev (S)	C	Autonomous University of Barcelona	Physics								
Jurek Krzystek (S)	PI	National High Magnetic Field Laboratory	Condensed Matter Science	No other support			P17505	Terahertz Electron Paramagnetic Resonance on Single-Molecule Magnets	Chemistry, Geochemistry	1	6
Linda Doerrer (S)	C	Boston University	Chemistry Department								
Jessica Elinburg (G)	C	Boston University	Chemistry								
Rafal Grubba (P)	C	Gdansk University of Technology	Department of Inorganic Chemistry								
Kinga Kaniewska (G)	C	Gdansk University of Technology	Department of Inorganic Chemistry								
Joscha Nehrkorn (P)	C	Max Planck Institute for Chemical Energy Conversion, Muelheim	EPR Research Group								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Sebastian Stoian (S)	C	University of Idaho	Chemistry								
Joshua Telser (S)	C	Roosevelt University	Biological, Physical and Health Sciences								
Naresh Dalal (S)	PI	National High Magnetic Field Laboratory	Chemistry	No other support			P17596	High Frequency and High Field EPR Characterization on Dilute Magnetic Semiconductor-Quantum Dots	Magnets, Materials	4	14.5
Jasleen Bindra (G)	C	National Institute of Standards and Technology	PML	NSF	CHE - Chemistry	CHE1464955					
Amit Srivastava (P)	C	Florida State University	Biochemistry and Chemistry	NSF	CHE - Chemistry	CHE1608364					
Geoffrey Strouse (S)	C	National High Magnetic Field Laboratory	Chemistry								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Joshua Obaleye (S)	PI	University of Ilorin	Department of Chemistry	Ilorin University, Kwara State, Nigeria	Non US College and University		P17620	High-Field EPR Characterization of New Biologically Relevant Metal-Carboxylate Complexes	Chemistry, Geochemistry	1	6
Abiodun Ajibola (G)	C	University of Ilorin	Department of Chemistry								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Zofia Janas (S)	PI	University of Wroclaw	Faculty of Chemistry	No other support			P17629	High-Field EPR Studies on V(IV) and V(III) Complexes of Schiff Bases and Diaminebis(aryloxides)	Chemistry, Geochemistry	1	6
Julia Jezierska (S)	C	University of Wroclaw	Chemistry								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Alina Bienko (S)	PI	University of Wroclaw	Faculty of Chemistry	Wroclaw University, Poland	Non US College and University		P17642	Search for New Single-Molecule Magnets: High-Field EPR Studies on High-Spin Complexes of d-Electron Metals – Co(II), Ni(II), Re(IV)	Chemistry, Geochemistry	1	3
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Sebastian Stoian (S)	C	University of Idaho	Chemistry								
Ziling Xue (S)	PI	University of Tennessee, Knoxville	Chemistry	No other support			P17697	Investigating Molecular Magnetism by Magneto-Raman Spectroscopy	Chemistry, Geochemistry	3	11.5
Alexandria Bone (G)	C	University of Tennessee, Knoxville	Chemistry	NSF	CHE - Chemistry	CHE1633870					
Adam Hand (G)	C	University of Tennessee, Knoxville	Chemistry								
Brian Kettell (G)	C	University of Tennessee Space Institute	Chemistry								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Clay Mings (G)	C		University of Tennessee, Knoxville	Chemistry								
Duncan Moseley (G)	C		University of Tennessee, Knoxville	Chemistry								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Likai Song (S)	C		National High Magnetic Field Laboratory	EMR								
Komalavalli Thirunavukkuarasu (S)	C		Florida Agricultural and Mechanical University	Physics								
Pagnareach Tin (G)	C		University of Tennessee, Knoxville	Chemistry								
Chelsea Widener (G)	C		University of Tennessee, Knoxville	Chemistry								
Srinivasa Rao Singamaneni (S)	PI		University of Texas, El Paso	Physics	No other support			P17698	Controlling Spin States in Honeycomb Two-Dimensional Layered Solids using Coherent Ligh	Condensed Matter Physics	3	14
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Wu-Min Deng (S)	PI	*	Florida State University	Biological Sciences	NIH	NIGMS - National Institute of General Medical Sciences	GM072562	P17712	Membrane Interaction of Drosophila NompC Studied Using Multifrequency EPR	Biology, Biochemistry, Biophysics	1	2
Zhigang Jiang (S)	PI		Georgia Institute of Technology	School of Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-07ER46451	P17713	Probing enhanced g-factors in topological materials via electron spin resonance	Condensed Matter Physics	2	6
Xiaojian Bai (G)	C		Georgia Institute of Technology	physics								
Yuxuan Jiang (P)	C		National High Magnetic Field Laboratory	CMS								
Andrew Ozarowski (S)	C		National High Magnetic Field Laboratory	EMR								
Dmitry Smirnov (S)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Tianhao Zhao (G)	C		Georgia Institute of Technology	School of Physics								
Eric Vejerano (S)	PI	*	University of South Carolina	Environmental Health Sciences	NSF	OIA - Office of Integrative Activities	1738337	P17716	The Molecular Nature of Environmentally Persistent Free Radicals	Chemistry, Geochemistry	1	5
Alex Angerhofer (S)	PI		University of Florida	Department of Chemistry	University of Florida	US College and University		P17729	High Field EPR and ENDOR on Oxalate Decarboxylase	Biology, Biochemistry, Biophysics	1	7
Kenneth DeMason (U)	C		University of Florida	Department of Chemistry								
Alvaro Montoya (G)	C		University of Florida	Department of Chemistry								
Andrew Ozarowski (S)	C		National High Magnetic Field Laboratory	EMR								
Joseph Zadrozny (S)	PI		Colorado State University	Chemistry	NSF	CHE - Chemistry	CHE1836537	P17730	Molecular Control of Spin Relaxation and EPR Linewidth in Transition Metal Complexes	Chemistry, Geochemistry	3	15
Cassidy Jackson (G)	C		Colorado State University	Chemistry								
Spencer Johnson (U)	C		Colorado State University	Chemistry								
Chun-yi Lin (P)	C		Colorado State University	Chemistry								
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Alvin Holder (S)	PI	*	Old Dominion University	Chemistry and Biochemistry	NSF	CAREER - Faculty Early Career Development Program	CHE-1431172	P17737	High Field Magnetic Studies of Cobalt(I)-, Cobalt(II)-, and Vanadium(III)-containing Species	Chemistry, Geochemistry	1	4

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Michael Celestine (G)	C	Old Dominion University	Chemistry and Biochemistry								
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Panayotis Kyritsis (S)	PI	National and Kapodistrian University of Athens	Chemistry	No other support			P17741	Zero-field splitting in S = 1 Ni(II) and S = 3/2 Co(II) complexes probed by HFEPR and Far-InfraRed Magnetic Spectroscopy	Chemistry, Geochemistry	4	15
Kinga Kaniewska (G)	C	Gdansk University of Technology	Department of Inorganic Chemistry								
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Mykhaylo Ozerov (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Lucio Frydman (S)	PI	National High Magnetic Field Laboratory	NMR	No other support			P17754	Three-Spins Solution State DNP	Biology, Biochemistry, Biophysics	2	13
Adewale Akinfaderin (G)	C	Florida State University	Physics								
Stephen Hill (S)	C	National High Magnetic Field Laboratory	EMR								
Krishnendu Kundu (P)	C	National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Zhenxing Wang (S)	PI	Huazhong University of Science and Technology	Wuhan National High Magnetic Field Center, China	National Natural Science Foundation of China	Non US Foundation	21701046	P17785	Pulsed EPR Studies of the H/D Isotope Effects to Intramolecular Vibrations in Spin Dynamics	Chemistry, Geochemistry	2	18
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Yin Lei (G)	C	Huazhong University of Science and Technology	Wuhan National High Magnetic Field Center								
Jing Li (G)	C	Nanjing University	School of Chemistry and Chemical Engineering								
Zhongwen Ouyang (S)	C	Huazhong University of Science and Technology	Wuhan National High Magnetic Field Center								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Tongtong Xiao (G)	C	Huazhong University of Science & Technology	School of Physics								
Yi Lu (S)	PI	University of Illinois at Urbana-Champaign	Chemistry	No other support			P17805	Pulsed EPR-based Approach for Mapping Global Structures of DNAzymes	Biology, Biochemistry, Biophysics	1	4
Likai Song (S)	C	National High Magnetic Field Laboratory	EMR								
Lu Yu (G)	C	University of Science and Technology of China	Chemistry and Materials Science								
Michael Nippe (S)	PI	Texas A&M University	Chemistry	No other support			P17842	Exploring Magnetic Coupling and Spin Relaxation in Ln-[1]metallocenophane Compounds using High-Field and Pulsed EPR spectroscopy	Chemistry, Geochemistry	2	6
Livia Batista Lopes Escobar (P)	C	Florida State University	Physics	NSF	CHE - Chemistry	CHE1753014					
Stephen Hill (S)	C	National High Magnetic Field Laboratory	EMR								
Trevor Latendresse (G)	C	Texas A&M University	Chemistry								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Jonathan Marbey (G)	C		National High Magnetic Field Laboratory	EMR								
Erik Cizmar (S)	PI	*	P.J.Safarik University	Institute of Physics	APVV, Slovakia	Other Non US Federal Agency		P17843	Quantum coherence of pinned solitons in a genuine organic anion-radical salt exhibiting a spin-Peierls transition	Condensed Matter Physics	2	5
John Cain (G)	C		University of North Florida	Chemistry								
Alexander Feher (S)	C		Pavol Jozef Safarik University in Kosice	Institute of Physics								
Mark Meisel (S)	C		University of Florida	Department of Physics								
Lawrence Que (S)	PI		University of Minnesota, Twin Cities	Chemistry	No other support			P17897	Investigation into the Electronic Structure of FeIV=O Intermediates Implicated in the Action of Non-Heme Iron Enzymes	Biology, Biochemistry, Biophysics	1	4
Kinga Kaniewska (G)	C		Gdansk University of Technology	Department of Inorganic Chemistry								
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Waqas Rasheed (G)	C		University of Minnesota, Twin Cities	Chemistry								
Joshua Telser (S)	C		Roosevelt University	Biological, Physical and Health Sciences								
Linda Shimizu (S)	PI	*	University of South Carolina	Chemistry and Biochemistry	NSF	CHE - Chemistry	CHE1608874	P17929	Investigating the Process of Energy Transfer in UV-Irradiated Triphenylamine bis-Urea Macrocycle Nanotubes	Chemistry, Geochemistry	3	8
Clifford Bowers (S)	C		University of Florida	Chemistry								
Baillie DeHaven (G)	C		University of South Carolina	Chemistry								
Ammon Sindt (G)	C		University of South Carolina	Chemistry and Biochemistry								
John Tokarski (G)	C		University of Florida	Chemistry								
Andrej Zorko (S)	PI		Jozef Stefan Institute	Solid State Physics Department	Slovenian Research Agency	Other Non US Federal Agency		P17949	ESR Investigation of Novel Spin-Liquid Candidates on Frustrated Lattices	Condensed Matter Physics	1	9
Oc Hee Han (S)	PI	*	Korea Basic Science Institute	Western Seoul Center	No other support			P17974	Dynamic Nuclear Polarization NMR on Secondary Ion Battery Electrode Materials	Magnets, Materials	1	2
Sungsool Wi (S)	C		National High Magnetic Field Laboratory	NMR								
Benjamin Stein (S)	PI	*	Los Alamos National Laboratory	C-PCS: Physical Chem & Applied Spectroscopy	No other support			P17990	Applications of Advanced Electron Paramagnetic Resonance Techniques to Actinide-Based Molecular Systems	Chemistry, Geochemistry	4	27
Thomas Albrecht-Schmitt (S)	C		Florida State University	Chemistry and Biochemistry	DOE	LDRD - Laboratory Directed R&D	DE-AC52-06NA25396					
Samuel Greer (P)	C		Los Alamos National Laboratory	C-PCS: Physical Chem & Applied Spectroscopy								
Stephen Hill (S)	C		National High Magnetic Field Laboratory	EMR								
Stosh Kozimor (S)	C		Los Alamos National Laboratory	C-IIAC: Inorganic Isotope & Actinide Chem								
Aaron Tondreau (S)	C		Los Alamos National Laboratory	C-IIAC: Inorganic Isotope & Actinide Chem								
Adam Fiedler (S)	PI	*	Marquette University	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM126522	P18030	Probing the Magnetic Anisotropy of Co(II) Complexes Featuring Radical Ligands	Chemistry, Geochemistry	1	4
John Berry (S)	C		University of Wisconsin, Madison	Department of Chemistry								
Kinga Kaniewska (G)	C		Gdansk University of Technology	Department of Inorganic Chemistry								
Jurek Krzystek (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science								
Mykhaylo Ozerov (S)	C		National High Magnetic Field Laboratory	Condensed Matter Science, DC Field CMS								
Joshua Telser (S)	C		Roosevelt University	Biological, Physical and Health Sciences								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Sandrine Heutz (S)	PI	*	Imperial College London	London Centre for Nano-technology	EPSRC	Other		P18041	Molecular magnetic superstructures	Chemistry, Geo-chemistry	2	8
Stephen Hill (S)	C		National High Magnetic Field Laboratory	EMR								
Daphné Lubert-Perquel (G)	C		Imperial College London	Materials and LCN								
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Jianyuan Zhang (S)	PI	*	Rutgers University	Chemistry and Chemical Biology	No other sup-port			P18049	A Route to Molecular Quantum Technologies Using Endohedral Metallofullerenes	Chemistry, Geo-chemistry	2	24
Stephen Hill (S)	C		National High Magnetic Field Laboratory	EMR								
Jonathan Marbey (G)	C		National High Magnetic Field Laboratory	EMR								
Maria Vaz (S)	PI		Federal Fluminense Univer-sity	Chemistry	No other sup-port			P18051	EPR and Mossbauer studies of coordination compounds	Condensed Matter Physics	1	1
Livia Batista Lopes Escobar (P)	C		Florida State University	Physics								
Stephen Hill (S)	C		National High Magnetic Field Laboratory	EMR								
Andrew Ozarowski (S)	C		National High Magnetic Field Laboratory	EMR								
Aaron Rossini (S)	PI	*	Iowa State University	Chemistry	DOE	Office of Science - BES – Basic Energy Sciences	none - funded via Ames Laboratory	P18077	Dynamic Nuclear Polarization and EPR of Gamma-Irradiated Solids	Chemistry, Geo-chemistry	1	1.5
Scott Carnahan (G)	C		Iowa State University	Chemistry								
Thierry Dubroca (S)	C		National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Linda Columbus (S)	PI		University of Virginia	Department of Chemistry	NSF	MCB - Molecular and Cellular Biosci-ences	MCB1817735	P18078	Membrane Protein Conformational Ensembles	Biology, Biochemis-try, Biophysics	1	12
Likai Song (S)	C		National High Magnetic Field Laboratory	EMR								
Theo Siegrist (S)	PI		National High Magnetic Field Laboratory	Chemical and Biomedical Engineering	NSF	DMR - Division of Materials Research	DMR1534818	P18087	Organic BEDT-TTF Crystals	Condensed Matter Physics	2	7
Alyssa Henderson (G)	C		National High Magnetic Field Laboratory	CMS	NSF	DMR - Division of Materials Research	DMR1644779					
John Schlueter (S)	C		Argonne National Labora-tory	Materials Science								
Komalavalli Thirunavuk-kuarasu (S)	C		Florida Agricultural and Mechanical University	Physics								
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Kaya Wei (P)	C		National High Magnetic Field Laboratory	CMS								
Danna Freedman (S)	PI		Northwestern University	Chemistry	No other sup-port			P19174	Optically Addressable Molecular Qubits	Chemistry, Geo-chemistry	4	19
Moses Amdur (G)	C		Northwestern University	Chemistry	NSF	CHE - Chemistry	CHE1455017					
Andrew Ozarowski (S)	C		National High Magnetic Field Laboratory	EMR								
Michael Wojnar (P)	C		Northwestern University	Chemistry								
Dmytro Nesterov (P)	PI	*	Technical University of Lis-bon	Chemistry Department	FCT - Fundação para a Ciência e Tecnologia (Por-tugal)	Non US Founda-tion		P19177	Magnetic Properties and EPR spectroscopy of Tetranuclear Copper Complexes	Chemistry, Geo-chemistry	1	14
Andrew Ozarowski (S)	C		National High Magnetic Field Laboratory	EMR								
Sossina Haile (S)	PI	*	Northwestern University	Materials Science and En-gineering, and Chemistry	NSF	DMR - Division of Materials Research	DMR1720139	P19180	Multinuclear Solid-state NMR Investigations of Oxyhalides, Oxynitrides and Chalcohalides	Biology, Biochemis-try, Biophysics	1	3

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Yan-Yan Hu (S)	C		Florida State University	Chemistry & Biochemistry								
Mercouri Kanatzidis (S)	C		Northwestern University	Chemistry								
Tobin Marks (S)	C		Northwestern University	Chemistry								
Sawankumar Patel (G)	C		Florida State University	Chemistry								
Kenneth Poeppelmeier (S)	C		Northwestern University	Chemistry								
George Christou (S)	PI		University of Florida	Chemistry	DOE	Office of Science - EFRC - Energy Frontier Research Centers	DE-SC0019330	P19185	High-Field EPR Studies of Exchange Coupling Within Single-Molecule Magnet Oligomers	Chemistry, Geochemistry	1	2
ChristiAnna Brantley (G)	C		University of Florida	Chemistry								
Tuhin Ghosh (P)	C		University of Florida	Department of Chemistry								
Stephen Hill (S)	C		National High Magnetic Field Laboratory	EMR								
Mary Ellen Zvanut (S)	PI		University of Alabama, Birmingham	Physics	NSF	DMR - Division of Materials Research	DMR1904325	P19202	Detection of STH in Ga2O3	Condensed Matter Physics	1	5.5
Suman Bhandari (G)	C		University of Alabama, Birmingham	Physics								
Jason Campbell (S)	PI	*	National Institute of Standards and Technology	Physical Measurements Laboratory/Engineering Physics Division	University of Maryland	US College and University		P19206	Probing Spin Character and Dynamics of Multiexcitonic States in Organic Semiconductors Using High Frequency Pulsed and Transient EPR Spectroscopy	Magnets, Materials	1	4
Jasleen Bindra (G)	C		National Institute of Standards and Technology	PML								
Johan van Tol (S)	C		National High Magnetic Field Laboratory	EMR								
Johan van Tol (S)	PI		National High Magnetic Field Laboratory	EMR	No other support			P19207	Testing and Maintenance	Condensed Matter Physics	2	5
Likai Song (S)	PI		National High Magnetic Field Laboratory	EMR	No other support			P19282	Instrument Development and Maintenance of the HiPER Spectrometer	Magnets, Materials	1	15
Krishnendu Kundu (P)	C		National High Magnetic Field Laboratory	EMR								
Jonathan Marbey (G)	C		National High Magnetic Field Laboratory	EMR								
									Total Proposals: **62**		Experiments: **120**	Days: **779**

4. High B/T Facility

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp . #	Days Used
Ryuji Nomura (S)	PI	Tokyo Institute of Technology	Physics	Japanese Society for Promotion of Sciences (JSPS)	Non US Foundation		P16308	Investigating Spin Degrees of Freedom of Surface Andreev Bound States of Non-unitary Superfluid Helium Three in High Magnetic Fields	Condensed Matter Physics	1	365
Keegan Gunther (G)	C	University of Florida	Physics								
Yoonseok Lee (S)	C	University of Florida	Department of Physics								
Lucia Steinke (P)	C	University of Florida	High B/T Facility								
Andrew Woods (P)	C	University of Florida	Physics								
Xuan Gao (S)	PI	Case Western Reserve University	Physics	NSF	DMR - Division of Materials Research	DMR1644779	P17388	The Effect of Spin Polarization on the Wigner Crystal to Liquid Transition in a Strongly Correlated 2D Hole System	Condensed Matter Physics	1	121
Loren Pfeiffer (S)	C	Princeton University	Electrical Engineering								
Alessandro Serafin (P)	C	University of Florida	Physics								
Ken West (S)	C	Princeton University	Princeton Institute for the Science and Technology of Materials								
Andrew Woods (P)	C	University of Florida	Physics								
Jian-sheng Xia (S)	C	University of Florida	Physics								
Liang Yin (P)	C	University of Florida	Physics								
Chao Huan (P)	PI	University of Florida	Physics	UCGP			P17606	Studies of Novel Phases of 3He in Extreme Conditions	Condensed Matter Physics	1	333
Johnny Adams (G)	C	University of Florida	Physics								
Donald Candela (S)	C	University of Massachusetts	Physics								
Marc Lewkowitz (G)	C	University of Florida	Physics								
Jenny Solomon (U)	C	University of Florida	Physics								
Neil Sullivan (S)	C	University of Florida	Physics								
								Total Proposals: **3**		Experiments: **3**	Days **819**

5. ICR Facility

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Robert Spencer (S)	PI	Florida State University	Earth, Ocean & Atmospheric Science	NSF	Other	PEER Grant	P14931	Determining the source, molecular composition, and bioavailability of Himalayan headwater stream dissolved organic carbon	Chemistry, Geochemistry	1	0.5
Jeffrey Chanton (S)	C	Florida State University	Department of Earth, Ocean and Atmospheric Science	NSF	DEB - Division of Environmental Biology	DEB1145932					
Travis Drake (G)	C	Florida State University	EOAS	NSF	GRFP - Graduate Research Fellowship Program	GRFP2012126					
Valier Galy (S)	C	Woods Hole Oceanographic Institution	Marine Chemistry & Geochemistry								
Francois Guillemette (S)	C	University of Quebec at Trois-Rivières	Dept. of Environmental Sciences								
Jordon Hemingway (G)	C	MIT/WHOI Joint Program in Oceanography	Marine Chemistry & Geochemistry								
David Podgorski (S)	C	University of New Orleans	Department of Chemistry								
Indra Sen (S)	C	Indian Institute of Technology, Kanpur	Department of Earth Sciences								
Robert Spencer (S)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Nikita Zimov (S)	C	Pacific Institute of Geography Russian Academy of Sciences	North-East Science Station								
Phoebe Zito (S)	C	University of New Orleans	Chemistry								
Huan Chen (S)	PI	National High Magnetic Field Laboratory	Ion Cyclotron Resonance	NSF	OCE - Ocean Sciences	OCE1333418	P16019	Unraveling of the Chemical Evolution of Weathered Macondo Oil: 2010-2018	Chemistry, Geochemistry	1	0.5
Christoph Aeppli (P)	C	Woods Hole Oceanographic Institution	Dept Marine Chemistry & Geochemistry	NSF	OCE - Ocean Sciences	OCE1635562					
Martha Chacon (P)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance	NSF	OCE - Ocean Sciences	OCE1634478					
Cameron Davis (U)	C	National High Magnetic Field Laboratory	ICR/CIRL	NSF	DMR - Division of Materials Research	DMR1644779					
Andre de Oliveira (G)	C	Institute of Marine Sciences-Federal UNiversity of Ceara LABOMAR_UFC	Laboratory for Assessment of Organic Contaminants	Gulf of Mexico Research Initiative	Other						
Ashley Deverteuil (U)	C	National High Magnetic Field Laboratory	ICR								
Deborah French-McKay (S)	C	RPS ASA	Chemistry								
Kelsey Gosselin (S)	C	Woods Hole Oceanographic Institution	Department of Marine Chemistry and Geochemistry,								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Sydney Niles (G)	C	National High Magnetic Field Laboratory	Chemistry								
Chris Reddy (S)	C	Woods Hole Oceanographic Institution	Geochemistry								
Ryan Rodgers (S)	C	National High Magnetic Field Laboratory	ICR								
Charles Sharpless (S)	C	University of Mary Washington	Department of Chemistry								
Alexys Sutton (U)	C	National High Magnetic Field Laboratory	NHMFL/ICR								
Collin Ward (S)	C	Woods Hole Oceanographic Institution	Department of Marine Chemistry and Geochemistry,								
Helen White (S)	C	Haverford College	Chemistry								
Ryan Rodgers (S)	PI	National High Magnetic Field Laboratory	ICR	NSF	CHE - Chemistry	CHE1507295	P16048	Characterization of Petroleum Interfacial Material by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry	Chemistry, Geochemistry	1	1
Martha Chacon (P)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Francois Guillemette (S)	C	University of Quebec at Trois-Rivières	Dept. of Environmental Sciences								
Joshua Johnson (U)	C	Gardner-Webb University	Natural Sciences								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Anne Kellerman (P)	C	Florida State University	Earth, Ocean and Atmospheric Science								
Sydney Niles (G)	C	National High Magnetic Field Laboratory	Chemistry								
Steven Rowland (S)	C	National Renewable Energy Laboratory	National Bioenergy Center								
Robert Spencer (S)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Matthew Tarr (S)	C	University of New Orleans	Department of Chemistry								
Phoebe Zito (S)	C	University of New Orleans	Chemistry								
Yunping Xu (S)	PI	Shanghai Ocean University	College of Marine Sciences	No other support			P16057	Optical properties and bioavailability of dissolved organic matter in an alpine stream from thawing and collapsing permafrost to Qinghai Lake	Chemistry, Geochemistry	2	7
Anne Kellerman (P)	C	Florida State University	Earth, Ocean and Atmospheric Science	Natinal Basic Research Program of CHina	Other Non US Federal Agency	2014CB954001					
Harunur Rashid (G)	C	Shanghai Ocean University	1Shanghai Engineering Research Center of Hadal Science and Technology,								
Robert Spencer (S)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Yinghui Wang (G)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Dandan Wei (G)	C	Shangai Ocean University	1Shanghai Engineering Research Center of Hadal Science and Technology,								
Wenjie Xiao (S)	C	Shanghai Ocean University	1Shanghai Engineering Research Center of Hadal Science and Technology								
Yuanhe Yang (S)	C	Institute of Botany, Chinese Academy of Sciences	5State Key Laboratory of Vegetation and Environmental Change								
Chad Weisbrod (S)	PI	National High Magnetic Field Laboratory	ICR	No other support			P16076	21T Instrument hardware and software development	Magnets, Materials	2	40.5
Greg Blakney (S)	C	National High Magnetic Field Laboratory	ICR								
John Quinn (T)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program								
Donald Smith (S)	C	National High Magnetic Field Laboratory	ICR								
Robert Spencer (S)	PI	Florida State University	Earth, Ocean & Atmospheric Science	NSF	Other	1257944	P16113	Land use change in Brazil: how do land use and seasonality influence in-stream composition of DOM?	Chemistry, Geochemistry	1	0.5
Travis Drake (G)	C	Florida State University	EOAS	NSF	EAR - Earth Sciences	EAR1739724					
KathiJo Jankowski (T)	C	U.S. Geological Survey	Upper Midwest Environmental Sciences Center	NSF	DEB - Division of Environmental Biology	DEB1457662					
Anne Kellerman (P)	C	Florida State University	Earth, Ocean and Atmospheric Science	NSF	OCE - Ocean Sciences	OCE1333157					
Marcia Macedo (S)	C	Woods Hole Oceanographic Institution	Amazon Program	NSF	DMR - Division of Materials Research	DMR1157490					
Darlisson Nunes (T)	C	Instituto de Pesquisa Ambiental da Amazônia	Instituto de Pesquisa Ambiental da Amazônia	NSF	DMR - Division of Materials Research	DMR1644779					
David Podgorski (S)	C	University of New Orleans	Department of Chemistry								
Gheorghe Bota (S)	PI	Ohio University	Chemical and Biomolecular Engineering	NSF	DMR - Division of Materials Research	DMR1157490	P16123	Characterization of Residual Acids and Ketones Generated From Iron Corrosion of HVGO Acids	Chemistry, Geochemistry	1	0.5
Peng Jin (P)	C	Ohio University	Chemical and Biomolecular Engineering	NSF	DMR - Division of Materials Research	DMR1644779					
Logan Krajewski (G)	C	National High Magnetic Field Laboratory	Chemistry and Biochemistry								
Winston Robbins (T)	C	Win Consulting Services	Petroleum Separations								
Steven Rowland (S)	C	National Renewable Energy Laboratory	National Bioenergy Center								
Robert Spencer (S)	PI	Florida State University	Earth, Ocean & Atmospheric Science	Natural Science Foundation of China		41230744, 41621002, 41501374	P16161	Controls of dissolved organic matter composition and its role in greenhouse gas emission	Chemistry, Geochemistry	1	0.33
Megan Behnke (G)	C	Florida State University	Earth, Ocean and Atmospheric Science	Natural Science Foundation of Zhejiang Province		LQ16D010001					

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Justin Brookes (S)	C	University of Adelaide	Environment Institute	NIGLAS Foundation		NIGLAS2017QD08					
Chunmei Chen (T)	C	University of New Orleans	Department of Chemistry	Natural Science Foundation of Zhejiang Province	Other	BK20181104					
Wenhao Ding (T)	C	University of Chinese Academy of Sciences	Taihu Laboratory for Lake Ecosystem Research	XDA19080304	Other						
erik jeppesen (S)	C	Sino-Danish Centre for Education and Research, Beijing 100190, China; Department of Bioscience and Arctic Research Centre, Aarhus University, Vejlsøvej 25, DK-8600 Silkeborg, Denmark	Sino-Danish Centre for Education and Research, Beijing 100190, China; Department of Bioscience and Arctic Research Centre, Aarhus University, Vejlsøvej 25, DK-8600 Silkeborg, Denmark								
Xuhui Lee (G)	C	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing								
Yuan Li (S)	C	Peking University	School of Physics								
David Podgorski (S)	C	University of New Orleans	Department of Chemistry								
Boqiang Qin (S)	C	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences	Nanjing Institute of Geography and Limnology								
Kun Shi (G)	C	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing								
Xiangming Tang (S)	C	Nanjing University	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing								
Huawu Wu (T)	C	University of Chinese Academy of Sciences	Academy of Sciences								
Qitao Xiao (G)	C	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing								
Xiaolong Yao (G)	C	University of Chinese Academy of Sciences	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences								
Mi Zhang (G)	C	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing								
Yibo Zhang (S)	C	University Chinese Academy of Sciences	Nanjing Institute of Geography and Limnology								
Yunlin Zhang (S)	C	Nanjing University	Geography and Limnology								
Yongqiang Zhou (G)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Phoebe Zito (S)	C	University of New Orleans	Chemistry								
Andy Baker (S)	PI	University of New South Wales	School of Biological, Earth and Environmental Sciences	Australian Research Council Discovery Program	Other	DP160101379	P16162	Groundwater organic matter: carbon source or sink?	Chemistry, Geochemistry	2	5.5
Martin Andersen (T)	C	University of New South Wales	School of Civil and Environmental Engineering	Australian Government Research Training Program and Australian Nuclear Science Technology Organisation (ANSTO)	Other						
Megan Behnke (G)	C	Florida State University	Earth, Ocean and Atmospheric Science	Centre for Accelerator Science at ANSTO, the Australia National Collaborative Research Infrastructure Strategy (NCRIS)	Other						

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Clément Brügger (T)	C	UNSW Sydney	Connected Waters Initiative Research Centre	NSW Department of Primary Industries Office of Water for bore infrastructure at Anna Bay and the National Centre for Ground water Research and Training (NCGRT)	Other						
Huang Hanxue (T)	C	UNSW Sydney	School of Civil and Environmental Engineering								
Christopher Marjo (T)	C	University of New South Wales	School of Biological, Earth and Environmental Sciences								
Liza McDonough (G)	C	University of New South Wales	School of Biological, Earth and Environmental Sciences								
Karina Meredith (T)	C	Australia's Nuclear Science and Technology Organisation	Australia's Nuclear Science and Technology Organisation								
Denis O'Carroll (T)	C	University of New South Wales	School of Civil and Environmental Engineering								
Phetdala Oudone (G)	C	University of New South Wales	School of Biological, Earth and Environmental Sciences,								
Helen Rutlidge (T)	C	University of New South Wales	School of Civil and Environmental Engineering								
Robert Spencer (S)	C	Florida State University	Earth, Ocean & Atmospheric Science								
John Headley (S)	PI	Environment and Climate Change Canada	National Hydrology Research Centre	Energy Research and Development			P16243	Characterization of constructed treatment wetland degraded Oil sands process-affected water-NAFCs.	Chemistry, Geochemistry	1	1
Chukwuemeka Ajaero (G)	C	University of Regina	Environmental Systems Engineering								
Monique Haakensen (S)	C	Contango Strategies	N/A								
Sarah Hughes (S)	C	Shell Canada	Risk Science Team								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Dena McMartin (S)	C	University of Regina	Faculty of Engineering and Applied Science								
Kerry Peru (T)	C	Environment and Climate Change Canada	Water Science and Technology								
Pascal Boeckx (S)	PI	Ghent University	Applied analytical and physical chemistry	VLIR-UOS			P16300	Tracing fire-derived organic components in canopy leachates from a tropical forest	Chemistry, Geochemistry	1	0.5
Matti Barthel (T)	C	ETH Zurich	Department of Environmental Systems Science	NSF	DMR - Division of Materials Research	DMR1157490					
Marijn Bauters (G)	C	Ghent University	Applied analytical and Physical chemistry	NSF	DMR - Division of Materials Research	DMR1644779					
Samuel Bode (S)	C	Ghent University	aIsotope Bioscience Laboratory–ISOFYS								
Faustin Boyemba (S)	C	University of Kisangani	Plant Department								
Travis Drake (G)	C	Florida State University	EOAS								
Pedro Hervé-Fernández (S)	C	Ghent University	Laboratory of Hydrology and Water Management								
Alison Hoyt (T)	C	Ghent University	Max Planck Institute for Biogeochemistry								
Isaac Makelele (G)	C	University of Kisangani	Plant Department								
Landry Ntaboba (S)	C	Université Catholique de Bukavu	Faculty of Agronomy								
David Podgorski (S)	C	University of New Orleans	Department of Chemistry								
Indra Sen (S)	C	Indian Institute of Technology, Kanpur	Department of Earth Sciences								
Johan Six (S)	C	Swiss Federal Institute of Technology in Zurich	Earth Sciences								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Robert Spencer (S)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Susan Trumbore (T)	C	Ghent University	Max Planck Institute for Biogeochemistry								
Kristof Van Oost (S)	C	University of Leuven	Earth Sciences								
Hans Verbeeck (S)	C	Ghent University	bCAVElab, Computational and Applied Vegetation Ecology								
Zhiyong Ren (S)	PI	University of Colorado, Boulder	Civil Environmental Architectural Engineering	Chevron Energy Company			P17328	Mechanisms of Enhanced of Petroleum Hydrocarbon Degradation by Bioelectrochemical Systems	Chemistry, Geochemistry	1	1
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance	NSF	CAREER - Faculty Early Career Development Program	1453906					
Logan Krajewski (G)	C	National High Magnetic Field Laboratory	Chemistry and Biochemistry	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1512705					
Lu Lu (P)	C	University of Colorado, Boulder	Civil, Environmental, and Architectural Engineering	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1510682					
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1704921					
Fernando Rosario-Ortiz (S)	C	University of Colorado, Boulder	Environmental Engineering								
Huan Wang (P)	C	University of Colorado, Boulder	Environmental Engineering								
Yi Zuo (S)	C	Chevron, San Ramon	Environmental Unit								
Juliana D'Andrilli (S)	PI	Louisiana Universities Marine Consortium (LUMCON)	Environmental Chemistry	Environment and Climate (CAGE),The Arctic University of Norway	Non US College and University		P17385	Methane driven carbon cycling dynamics in the Arctic Ocean	Chemistry, Geochemistry	1	1
Benedicte Ferre (S)	C	University of Tromso, the Arctic University of Norway	Centre for Arctic Gas Hydrate								
Christine Foreman (S)	C	Montana State University	Center for Biofilm Engineering & Dept. of Land Resources and Environmental Sciences								
Friederike Grundger (S)	C	University of Tromso, the Arctic University of Norway	Department of Geosciences; CAGE								
James Junker (S)	C	Louisiana Universities Marine Consortium	Aquatic Ecology								
Muhammed Sert (G)	C	University of Tromso, the Arctic University of Norway	Centre for Arctic Gas Hydrate, Environment and Climate								
Anna Silyakova (S)	C	University of Tromso, the Arctic University of Norway	Centre for Arctic Gas Hydrate								
Heidi Smith (G)	C	Montana State University	Environmental Sciences								
Rebecca Ware (G)	C	National High Magnetic Field Laboratory	Chemistry								
Robert Spencer (S)	PI	Florida State University	Earth, Ocean & Atmospheric Science	NASA		14-TE14-0012	P17426	Diel variability of DOM in a sub-Arctic lake	Chemistry, Geochemistry	1	1
Matthew Bogard (S)	C	University of Lethbridge	Biological Sciences	NSF	OCE - Ocean Sciences	OCE1464392					
David Butman (T)	C	University of Washington	Civil & Environmental Engineering								
Ruben del Campo (G)	C	Universidad de Navarra / University of Navarra	Ecology and Hydrology								
Mark Dornblaser (T)	C	U.S. Geological Survey	Water Resource MIssion Area								
Francois Guillemette (S)	C	University of Quebec at Trois-Rivières	Dept. of Environmental Sciences								
Sarah Johnston (P)	C	University of Lethbridge	Biological Sciences								
David Podgorski (S)	C	University of New Orleans	Department of Chemistry								
Jennifer Rogers (U)	C	Florida State University	EOAS								
Rob Striegl (T)	C	U.S. Geological Survey	Water Resources Mission Area								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Sadie Textor (U)	C	Florida State University	Earth, Ocean, and Atmospheric Science								
Kimberly Wickland (S)	C	U.S. Geological Survey	National Research Program								
Phoebe Zito (S)	C	University of New Orleans	Chemistry								
Neil Kelleher (S)	PI	Northwestern University	Department of Biochemistry, Molecular Biology, and Cell Biology	UCGP		227000-520-038653	P17465	Characterization of Higher-MW Proteoforms from FACS-Sorted Patient B- and T- Cells	Biology, Biochemistry, Biophysics	5	37
Lissa Anderson (S)	C	National High Magnetic Field Laboratory	ICR	NIH	NIGMS - National Institute of General Medical Sciences	GM411085					
Caroline DeHart (P)	C	Northwestern University	Proteomics Center of Excellence								
Benjamin DesSoye (P)	C	Northwestern University	Chemistry								
Rafael Melani (P)	C	Northwestern university	CLP								
Kristina Srzentic (P)	C	Northwestern University	Chemistry								
Paul Thomas (S)	C	Northwestern University	Departments of Chemistry and Molecular Biosciences and the Proteomics Center of Excellence								
Archana Agarwal (S)	PI	University of Utah	Department of Pathology/ARUP Laboratories	NSF	DMR - Division of Materials Research	DMR1644779	P17485	21 Tesla FT-ICR MS Analysis of Hemoglobinopathy	Biology, Biochemistry, Biophysics	1	0.33
Lissa Anderson (S)	C	National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1157490					
Didia Coelho Graca (T)	C	Hôpitaux Universitaires de Genève	Division of Laboratory Medicine,								
Lidong He (G)	C	National High Magnetic Field Laboratory	Chemistry								
Chris Hendrickson (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program								
Pierre Lescuyer (T)	C	Universitaires de Gene`ve	Service de Me´decine de laboratoire								
Yuan Lin (G)	C	Florida State University	Department of Chemistry and Biochemistry								
Alan Marshall (S)	C	National High Magnetic Field Laboratory	ICR								
Alan Rockwood (S)	C	University of Utah	School of Medicine and ARUP Laboratories								
Jemma Wadham (S)	PI	University of Bristol	School of Geographical Sciences	Patagonia Ice Field Shrinkage Impacts on Coastal and Fjord Ecosystems	Other		P17562	Glacial influence on organic matter export in Patagonian watersheds	Chemistry, Geochemistry	1	1
Jon Hawkings (P)	C	Florida State University	Earth, Ocean and Atmospheric Sciences								
Anne Kellerman (P)	C	Florida State University	Earth, Ocean and Atmospheric Science								
Matthew Marshall (G)	C	University of Bristol	School of Geographical Sciences								
Jonathan Putman (G)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance User Facility								
Donald Smith (S)	C	National High Magnetic Field Laboratory	ICR								
Robert Spencer (S)	C	Florida State University	Earth, Ocean & Atmospheric Science								
Alan Marshall (S)	PI	National High Magnetic Field Laboratory	ICR	No other support			P17575	Fragmentation Studies of Aromatic Hydrocarbons Fractionated from Municipal Solid Waste Pyrolysis Oils	Chemistry, Geochemistry	1	0.33
Martha Chacon (P)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Caterina Ducati (T)	C	University of Cambridge	Department of Materials Science & Metallurgy								
Markus Kraft (T)	C	University of Cambridge	Department of Chemical Engineering and Biotechnology								
Merilyn Manley-Harris (T)	C	University of Waikato	Science and Engineering								
Jacob Martin (T)	C	University of Cambridge	Department of Chemical Engineering and Biotechnology								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Leonard Nyadong (P)	C	National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	C	National High Magnetic Field Laboratory	ICR								
Steven Rowland (S)	C	National Renewable Energy Laboratory	National Bioenergy Center								
Chris Hendrickson (S)	PI	National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program	No other support			P17599	Analytical Method Development for FT-ICR MS	Magnets, Materials	4	160.83
Lissa Anderson (S)	C	National High Magnetic Field Laboratory	ICR								
Greg Blakney (S)	C	National High Magnetic Field Laboratory	ICR								
Paul Dunk (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance, MagLab								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Donald Smith (S)	C	National High Magnetic Field Laboratory	ICR								
Chad Weisbrod (S)	C	National High Magnetic Field Laboratory	ICR								
Donald Smith (S)	PI	National High Magnetic Field Laboratory	ICR	No other support			P17604	Complex Mixture Method Development	Chemistry, Geochemistry	3	26.33
Greg Blakney (S)	C	National High Magnetic Field Laboratory	ICR	UCGP		Don Smith					
Chris Hendrickson (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	C	National High Magnetic Field Laboratory	ICR								
Steven Rowland (S)	C	National Renewable Energy Laboratory	National Bioenergy Center								
Chad Weisbrod (S)	C	National High Magnetic Field Laboratory	ICR								
Chad Weisbrod (S)	PI	National High Magnetic Field Laboratory	ICR	No other support			P17608	3 Omega Testing and Development	Magnets, Materials	2	96
Lissa Anderson (S)	C	National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1644779					
Greg Blakney (S)	C	National High Magnetic Field Laboratory	ICR								
Donald Smith (S)	C	National High Magnetic Field Laboratory	ICR								
Robert Masserini (S)	PI	University of Tampa	Chemistry Biochemistry and Physics	USGS	US Government Lab		P17696	Characterization of naturally occurring carbon in Lake Okeechobee water and its compositional change following recharge and storage in the Upper Floridan Aquifer	Chemistry, Geochemistry	1	1.33
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Miranda Conley (U)	C	University of Tampa	Chemistry, Biochemistry, and Physics								
Cameron Davis (U)	C	National High Magnetic Field Laboratory	ICR/CIRL								
John Lisle (S)	C	U.S. Geological Survey	Microbial Ecologist								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Carley Reid (U)	C	University of Tampa	Chemistry, Biochemistry, and Physics								
Kimberly Yates (S)	C	U.S. Geological Survey	Coastal and Marine Geology Program								
Alan Marshall (S)	PI	National High Magnetic Field Laboratory	ICR	No other support			P17699	Comprehensive Compositional and Structural Comparison of Coal and Petroleum Asphaltenes based on Extrography Fractionation Coupled	Chemistry, Geochemistry	2	14
Martha Chacon (P)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Taylor Glattke (G)	C	Florida State University	ICR								

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Sydney Niles (G)	C		National High Magnetic Field Laboratory	Chemistry					with Fourier Transform Ion Cyclotron Resonance MS and MS/MS Analysis			
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								
Stephen Rappaport (S)	PI		University of California, Berkeley	School of Public Health	UCGP		227000-520-038653	P17700	Using ion cyclotron resonance mass spectrometry to investigate adducts of intact human serum albumin	Biology, Biochemistry, Biophysics	3	28.5
Lissa Anderson (S)	C		National High Magnetic Field Laboratory	ICR	NIH	NCI - National Cancer Institute	CA191159					
Henrik Carlsson (P)	C		University of California, Berkeley	School of Public Health								
Evan Williams (S)	C		University of California, Berkeley	Department of Chemistry								
Isabel Romero (S)	PI	*	University of South Florida	College of Marine Science	Gulf of Mexico Research Initiative (GOMRI) – Program funding RFP-VI	Other US Federal Agency		P17709	Identification of DWH recalcitrant hydrocarbons to offshoredepocenters using FT-ICR-MS	Chemistry, Geochemistry	2	18
Gregg Brooks (S)	C		Eckerd College	Geology								
Jeffrey Chanton (S)	C		Florida State University	Department of Earth, Ocean and Atmospheric Science								
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Arne Dierks (S)	C		University of Southern Mississippi	School of Ocean Science and Technology								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Nathan Kaiser (S)	PI		Biodesix, Inc.	Development	Biodesix			P17715	Identification of Circulating Proteins in patients with advanced Non-Small Cell Lung Cancer	Biology, Biochemistry, Biophysics	1	2
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Harvey Yarranton (S)	PI		University of Calgary	Chemical and Petroleum Engineering	No other support		0	P17722	Comprehensive Characterization of Athabasca Bitumen and its Visbreaking Products by Ultra High-Resolution Mass Spectrometry Coupled to Advanced Separations	Chemistry, Geochemistry	1	2
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Cameron Davis (U)	C		National High Magnetic Field Laboratory	ICR/CIRL								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								
Steven Rowland (S)	C		National Renewable Energy Laboratory	National Bioenergy Center								
Luis Echegoyen (S)	PI		University of Texas, El Paso	Chemistry	NSF	CHE - Chemistry	CHE1408865	P17723	Intramolecular Reactions and Transformations of Metallic Nitride Clusterfullerenes	Chemistry, Geochemistry	1	1
Wenting Cai (P)	C		University of Texas, El Paso	Chemistry and Computor Science	NSF	CHE - Chemistry	CHE1827875					
Edison Castro (G)	C		University of Texas, El Paso	Chemistry								
Maira Cerón (G)	C		University of Texas, El Paso	Department of Chemistry								
Paul Dunk (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance, MagLab								
Olivia Fernandez (G)	C		University of Texas, El Paso	Chemistry and Biochemistry								
Maria Gomez Torres (G)	C		University of Texas, El Paso	Chemistry								
Roser Morales-Martínez (T)	C		Rovira i Virgili University	Departament de Quimica Fisica i Inorganic								
Josep Poblet (S)	C		Rovira i Virgili University	Departament de Quimica Fisica i Inorganic								
Antonio Rodriguez-Fortea (S)	C		Rovira i Virgili University	Departament de Química Física i Inorganica								
Christy Santoyo (U)	C		University of Texas, El Paso	Chemistry								

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Lisa DiPinto (S)	PI	NOAA	Office of Response and Restoration	No other support			P17735	Molecular Characterization of differentially weathered surface oil from Taylor Energy oil spill by FT-ICR MS	Biology, Biochemistry, Biophysics	1	1
Christoph Aeppli (P)	C	Woods Hole Oceanographic Institution	Dept Marine Chemistry & Geochemistry								
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	C	National High Magnetic Field Laboratory	ICR								
Ni-Bin Chang (S)	PI	University of Central Florida	Department of Civil Engineering	No other support			P17749	Carbon and copper Impacts on biological removal of dissolved organicnitrogen (DON) via biosorption activated media (BAM)	Engineering	2	4
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance	Florida Dept of Transportation	US Government Lab	Grant No. BDV24 TWO 977-14)					
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Diana Ordonez (U)	C	University of Central Florida	CECE								
Andrea Valencia (G)	C	University of Central Florida	Civil, Environmental and Construction Engineering								
Dan Wen (G)	C	University of Central Florida	Civil Environmental & Construction Engineering								
Aixin Hou (S)	PI	Louisiana State University	Department of Environmental Sciences	Gulf of Mexico Alliance/Gulf of Mexico Research Initiative	US Foundation	G-231810	P17789	A Decade-long Study on Impact, Recovery, and Resilience in Louisiana Salt Marshes: The evolution of oil transformation compounds and plant-soil-microbialresponses to the Deepwater Horizon oil spill	Chemistry, Geochemistry	2	24.83
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance	Gulf of Mexico Research Initiaitve	Other US Federal Agency						
Cameron Davis (U)	C	National High Magnetic Field Laboratory	ICR/CIRL								
Qianxin Lin (S)	C	Louisiana State University	Department of Oceanography and Coastal Science								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Robert Spencer (S)	PI	Florida State University	Earth, Ocean & Atmospheric Science	Florida State University Research Foundation	US College and University	Winchester Fund	P17791	Land use change in the Congo Basin: how does seasonality and land-use control the composition of DOM?	Chemistry, Geochemistry	1	1
Pascal Boeckx (S)	C	Ghent University	Applied analytical and physical chemistry								
Bienvenu Dinga (S)	C	Institut de Recherche en Sciences et Exactes et Naturelles	Plant Science								
Travis Drake (G)	C	Florida State University	EOAS								
Landry Ntaboba (S)	C	Université Catholique de Bukavu	Faculty of Agronomy								
Benjamin Nyilitya (G)	C	University of ghent	Green Chemistry								
David Podgorski (S)	C	University of New Orleans	Department of Chemistry								
Johan Six (S)	C	Swiss Federal Institute of Technology in Zurich	Earth Sciences								
Kristof Van Oost (S)	C	University of Leuven	Earth Sciences								
Omics LLC (S)	PI	Omics, LLC	Omics	FFI			P17792	Omics LLC	Chemistry, Geochemistry	2	4
Martha Chacon (P)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Chris Hendrickson (S)	PI	National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program	No other support			P17794	Training of students on ICR techniques	Biology, Biochemistry, Biophysics	3	9.5
Lissa Anderson (S)	C	National High Magnetic Field Laboratory	ICR								
David Butcher (P)	C	National High Magnetic Field Laboratory	ICR								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Yuan Lin (G)	C		Florida State University	Department of Chemistry and Biochemistry								
Peilu Liu (G)	C		Florida State University	Chemistry								
Zeljka Popovic (G)	C		Florida State University	Ion Cyclotron Resonance								
Jens Blotevogel (S)	PI		Colorado State University	Civil & Environmental Engineering	ExxonMobil		NA	P17798	Biomarkers for hydrocarbon weathering in sediments	Chemistry, Geochemistry	2	3.33
Olivia Bojan (G)	C		Colorado State University	Civil and Environmental Engineering	ExxonMobil							
Thomas Borch (S)	C		Colorado State University	Soil and Crop Science								
Jie Lu (T)	C		National High Magnetic Field Laboratory	ICR								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Robert Young (S)	C		Colorado State University	Soil & Crop Sciences								
Christian Bleiholder (S)	PI	*	Florida State University	Chemistry and Biochemistry	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1654608	P17804	Conformational Analysis of Homozygous Hemoglobin Variants by Trapped-Ion Mobility Spectrometry (TIMS) and Hydrogen/Deuterium Exchange Monitored by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (HDX FT-ICR MS)	Chemistry, Geochemistry	2	10
Lissa Anderson (S)	C		National High Magnetic Field Laboratory	ICR	FSU	Other						
Yuan Lin (G)	C		Florida State University	Department of Chemistry and Biochemistry								
Fanny Liu (P)	C		Florida State University	Chemistry and Biochemistry								
Alan Marshall (S)	C		National High Magnetic Field Laboratory	ICR								
Brian Bothner (S)	PI		Montana State University	Chemistry and Biochemistry	NSF	MCB - Molecular and Cellular Biosciences	MCB1714556	P17821	Describing the Thermoalkaline Environments in Yellowstone National Park: The Effects of pH, Temperature and Location on Organisms and the Dissolved Organic Matter Composition	Chemistry, Geochemistry	1	1
Jesse Peach (G)	C		Montana State University	Biochemistry	NSF	MCB - Molecular and Cellular Biosciences	MCB1413534					
David Podgorski (S)	C		University of New Orleans	Department of Chemistry								
Youneng Tang (S)	PI	*	Florida State University	Civil and Environmental Engineering	Florida State University	US College and University		P17822	Detection of Organic Compound sin Wastewater and Leachate	Chemistry, Geochemistry	2	3.67
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Runwei Li (G)	C		FSU-FAMU College of Engineering	Civil and Environmental Engineering								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Xiong Yi (G)	C		FAMU-FSU College of Engineering	FAMU-FSU College of Engineering								
Zhiming Zhang (G)	C		Florida State University	Department of Civil and Environmental Engineering								
Robert Spencer (S)	PI		Florida State University	Earth, Ocean & Atmospheric Science	Patagonia Ice Field Shrinkage Impacts on Coastal and Fjord Ecosystems	Other		P17826	Insights into Organic Matter Sources in Glacier Environments	Chemistry, Geochemistry	2	4.5
Jon Hawkings (P)	C		Florida State University	Earth, Ocean and Atmospheric Sciences								
Anne Kellerman (P)	C		Florida State University	Earth, Ocean and Atmospheric Science								
Wenbo Li (G)	C		Florida State University	Earth, Ocean& Atomospheric Science								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Aron Stubbins (S)	C		Northeastern University	Marine and Environmental Science								
Sasha Wagner (P)	C		University of Georgia	Marine Sciences and Oceanography								
Carlos Afonso (S)	PI	*	Normandy University	Chemistry	European Research Council, PrimChem (grant agreement No. 636829	Other Non US Federal Agency	European Research Council, PrimChem (grant agreement No. 636829	P17828	Characterization of the oxidation in the soluble organic matter of analogues of the Titan's haze by high field Fourier transform ion cyclotron resonance mass spectrometer	Chemistry, Geochemistry	1	5
Nathalie Carrasco (S)	C		Sorbonne University	Chemistry								

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Audrey Chatain (G)	C	Versailles Saint-Quentin-en-Yvelines University	LATMOS/IPSL								
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Thomas Gautier (S)	C	Sorbonne University	Chemistry								
Julien Maillard (G)	C	Versailles Saint-Quentin-en-Yvelines University	LATMOS								
Christopher Rüger (S)	C	University of Rostock	Interdisciplinary Faculty, Department Life, Light & Matter								
ISabelle Schmitz-Afonso (S)	C	University of Rouen	Chemistry								
Chad Weisbrod (S)	C	National High Magnetic Field Laboratory	ICR								
Angela Knapp (S)	PI	Florida State University	Earth, Ocean and Atmospheric Sciences	NSF	OCE - Ocean Sciences	OCE1736557	P17850	Characterizing the chemical composition of dissolved organic matter in submarine groundwater discharge collected on the South Carolina and West Florida Shelves	Chemistry, Geochemistry	1	2
Rene Boiteau (S)	C	Oregon State University	College of Earth, Ocean, Atmospheric Sciences								
Kristen Buck (S)	C	University of South Florida	College of Marine Science								
Dreux Chappell (S)	C	Old Dominion University	Ocean, Earth and Atmospheric Science								
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Susan Lang (S)	C	University of South Carolina	School of the Earth, Ocean, and Environment								
Carlos Miranda (U)	C	Florida State University	Oceanography								
Willard Moore (S)	C	University of South Carolina	School of the Earth, Ocean, and Environment								
James Pinckney (S)	C	University of South Carolina	School of the Earth, Ocean, and Environment								
Rachel Thomas (G)	C	Florida State University	Earth, Ocean, and Atmospheric Science								
Alicia Wilson (S)	C	University of South Carolina	School of the Earth, Ocean, and Environment								
Susan Richardson (S)	PI	University of South Carolina	Chemistry	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1438625	P17855	Impact of Wastewater from Oil and Gas Extraction on Formation of Disinfection By-Products in Drinking Water	Biology, Biochemistry, Biophysics	1	3.5
Joshua Allen (G)	C	University of South Carolina	Chemistry	Department of Education; GAANN	Other US Federal Agency	P200A120075					
Amy Cuthbertson (G)	C	University of South Carolina	Chemistry								
Huiyu Dong (P)	C	University of South Carolina	Chemistry								
Hannah Liberatore (G)	C	University of South Carolina	Chemistry								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Chad Weisbrod (S)	C	National High Magnetic Field Laboratory	ICR								
Jens Blotevogel (S)	PI	Colorado State University	Civil & Environmental Engineering	DOD	ER - Environmental Research Program	ER-2718	P17857	Transformation of per- and polyfluoroalkyl substances (PFASs) during bioelectrochemical treatment of aqueous film-forming foam (AFFF)	Engineering	2	4.5
Thomas Borch (S)	C	Colorado State University	Soil and Crop Science								
Huan Chen (S)	C	National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Amy McKenna (S)	C	National High Magnetic Field Laboratory	ICR								
Nasim Pica (P)	C	Colorado State University	Environmental engineering								
Chad Weisbrod (S)	C	National High Magnetic Field Laboratory	ICR								
Robert Young (S)	C	Colorado State University	Soil & Crop Sciences								

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Matthew Tarr (S)	PI		University of New Orleans	Department of Chemistry	NSF	CHE - Chemistry	CHE1507295	P17858	The use of barium ion chemistry to assess the photoproduction of carboxylic acids from crude oil-seawater systems under solar irradiation	Chemistry, Geochemistry	3	4
Donald Smith (S)	C		National High Magnetic Field Laboratory	ICR	NSF	Other	1658637					
Phoebe Zito (S)	C		University of New Orleans	Chemistry								
Huiyu Dong (P)	PI		University of South Carolina	Chemistry	NSF	CHE - Chemistry	CHE1708461	P17868	Fractionation and Assessment of Disinfection By-Products and Organic Precursors via Ultrafiltration	Biology, Biochemistry, Biophysics	1	0.5
Joshua Allen (G)	C		University of South Carolina	Chemistry								
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Hannah Liberatore (G)	C		University of South Carolina	Chemistry								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Susan Richardson (S)	C		University of South Carolina	Chemistry								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Zhenghe Xu (S)	PI	*	University of Alberta	Chemical and Materials Engineering	This project has been funded by Natural Science and Engineering Research Council of Canada and Alberta Innovates-Energy and Environmental Solutions under the Industrial Research Chair in Oil Sands Engineering.	Non US Council		P17937	Compositional Characterization of Asphaltene Subfractions Extracted by Extended-SARA Analysis	Biology, Biochemistry, Biophysics	1	5
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
David Harbottle (S)	C		University of Leeds	School of Chemical and Process Engineering								
Peiqi Qiao (G)	C		University of Alberta	Department of Chemical and Materials Engineering								
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								
Robert Spencer (S)	PI		Florida State University	Earth, Ocean & Atmospheric Science	No other support			P17943	Changes to Permafrost and Vegetation Dissolved Organic Matter: an insight into the Kolyma River	Chemistry, Geochemistry	1	4
Valier Galy (S)	C		Woods Hole Oceanographic Institution	Marine Chemistry & Geochemistry								
Anne Kellerman (P)	C		Florida State University	Earth, Ocean and Atmospheric Science								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Jennifer Rogers (U)	C		Florida State University	EOAS								
Martha Chacon (P)	PI		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	No other support			P17944	Comprehensive characterization of asphaltenes by FT-ICR MS and chromatography separations	Chemistry, Geochemistry	8	48
Sibani Biswal (S)	C		Rice University	Chemical and Biomolecular Engineering	NSF	DMR - Division of Materials Research	DMR1644779					
Tran Cao (S)	C		NALCO	Flow Assurance								
Taylor Glattke (G)	C		Florida State University	ICR								
Yu-Jiun Lin (P)	C		University of Delaware	Chemical and Biomolecular Engineering								
Sydney Niles (G)	C		National High Magnetic Field Laboratory	Chemistry								
Jonathan Putman (G)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance User Facility								
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								

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Donald Smith (S)	C		National High Magnetic Field Laboratory	ICR								
Andrew Yen (S)	C		Shell Global Solutions US, Inc.	Deepwater Technology								
Timothy Yen (U)	C		National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	PI		National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1644779	P17945	The Structural Dependence of Photo Generated Transformation Products for Aromatic Hydrocarbons Isolated from Petroleum	Chemistry, Geochemistry	4	15.83
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	Gulf of Mexico Research Initiative	Other US Federal Agency						
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	Gulf of Mexico Research Iniative	Other US Federal Agency						
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Sydney Niles (G)	C		National High Magnetic Field Laboratory	Chemistry								
Jackie Jarvis (S)	PI		New Mexico State University	Plant and Environmental Sciences	NSF	Other	1031346	P17965	Evaluation of Hydrothermal Liquefaction Biocrude Product Quality by Ultrahigh Resolution Mass Spectrometry	Biology, Biochemistry, Biophysics	2	7
Meshack Audu (G)	C		New Mexico State University	Chemical and Materials Engineering								
Hengameh Bayat (G)	C		New Mexico State University	Chemical and Materials Engineering								
Catherine Brewer (S)	C		New Mexico State University	Chemical and Materials Engineering								
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Zheng Cui (G)	C		New Mexico State University	Chemical and Materials Engineering								
Mostafa Dehghanizadeh (G)	C		New Mexico State University	Chemical and Materials Engineering								
F. Omar Holguin (S)	C		New Mexico State University	Department of Plant and Environmental Science								
Umakanta Jena (S)	C		New Mexico State University	Chemical and Materials Engineering								
Bijoyaa Mohapatra (S)	C		1984	Chemical and Materials Engineering								
Alma Salas (G)	C		New Mexico State University	Chemical and Materials Engineering								
Thomas Borch (S)	PI		Colorado State University	Soil and Crop Science	Swiss National Science Foundation	Other	200021_157007, 200020_169557/1	P17966	Arsenic interactions with Natural Organic Matter in the Mekong Delta	Biology, Biochemistry, Biophysics	1	2.33
Maria Asta (P)	C		Institute of Earth Sciences	Geochimie								
William Bahureksa (G)	C		Colorado State University	Chemistry								
Rizlan Bernier-Latmani (S)	C		Ecole Polytechnique Federale de Lausanne	Environmental Engineering Institute								
Merritt Logan (G)	C		Colorado State University	Chemistry								
Patricia Medeiros (S)	PI		University of Georgia	Marine Sciences	NSF	OCE - Ocean Sciences	OCE1832178	P17972	Dissolved Organic Matter Composition and Transformations in Coastal Systems	Chemistry, Geochemistry	2	10
Renato Castelao (S)	C		University of Georgia	Marine Sciences	NSF	OCE - Ocean Sciences	OCE1902131					
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Maria Letourneau (G)	C		University of Georgia	Marine Sciences								
Rachel Martineac (G)	C		University of Georgia	Marine Sciences								
Franklin Leach (S)	PI	*	University of Georgia	Environmental Health Science	UCGP			P17979	High-Speed Molecular Imaging by FT-ICR MS with Multiple Frequency Detection	Chemistry, Geochemistry	2	10
Chris Hendrickson (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program	University of Georgia	US College and University	Startup Funds					
Donald Smith (S)	C		National High Magnetic Field Laboratory	ICR								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Nobuaki Takemori (S)	PI	*	Ehime University	Proteo-Science Center	UCGP		227000-520-038653	P17980		Biology, Biochemistry, Biophysics	5	60

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Lissa Anderson (S)	C		National High Magnetic Field Laboratory	ICR	Japan Society for the Promotion of Science	Other	18H04559		Development of a novel top-down proteomics workflow using a poly-acrylamide gel electrophoresis			
David Butcher (P)	C		National High Magnetic Field Laboratory	ICR	Japan Society for the Promotion of Science	Other Non US Federal Agency	18H04559					
Chris Hendrickson (S)	PI		National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program	NSF	DMR - Division of Materials Research	DMR1644779	P17981	Simulated Impacts of Resolving Power in Mass Accuracy of FT-ICR Mass Spectrometry	Chemistry, Geochem-istry	1	3
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Melaine Couch (P)	C		High Magnetic Field Labor-atory	ICR								
Chris Boreham (S)	PI	*	Geoscience Australia	Basin Resources Group	Australian Research Council Grants	Other Non US Federal Agency		P17983	Molecular interrogation of Condor and Julia Creek porphyrins by FT-ICR MS	Chemistry, Geochem-istry	1	4
Jochen Brocks (S)	C		Australian National Uni-versity	Research School of Earth Sciences	European Research Council Starting Grant	Other						
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
John Eiler (S)	C		California Institute of Technology	Division of Geological and Planetary Sciences								
Naohiko Ohkouchi (S)	C		Japan Agency for Marine Earth Science & Technol-ogy	Dept of Biogeochemistry								
Dave Valentine (S)	PI		University of California, Santa Barbara	Department of Geological Sciences	NSF	OCE - Ocean Sciences	OCE1337400	P17984	Chemical Composition of Thomas Fire Ash	Chemistry, Geochem-istry	1	2.33
Eleanor Arrington (G)	C		University of California, Santa Barbara	Marine Science	NSF	OCE - Ocean Sciences	OCE1635562					
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	NSF	OCE - Ocean Sciences	OCE1821916					
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								
Yuanhui Zhang (S)	PI	*	University of Illinois at Ur-bana-Champaign	Agricultural and Biological Engineering	NSF	CBET - Chemical, Bioengineering, Envi-ronmental, and Transport Systems	CBET1804453	P17988	Biocrude Oil Upgrading and Petro-chemical Extraction Techniques Via FT-ICR Analysis	Engineering	1	1
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Buchun Si (P)	C		University of Illinois at Ur-bana-Champaign	agricultural and biological engneering								
Jamison Watson (G)	C		University of Illinois at Ur-bana-Champaign	Agricultural and Biological Engineering								
Mark Nimlos (S)	PI	*	National Renewable En-ergy Laboratory	National Bioenergy Center	DOE	EERE - Energy Efficiency and Renewable Energy	DE-EE33392__	P18047	High Resolution Mass Spectral Anal-ysis of Biomass Pyrolysis Residues Used to Prepare Graphite for Lith-ium Ion Batteries	Chemistry, Geochem-istry	1	2
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Ermias Dheressa (U)	C		National Renewable En-ergy Laboratory	5100								
Steven Rowland (S)	C		National Renewable En-ergy Laboratory	National Bioenergy Center								
Nolan Wilson (S)	C		National Renewable En-ergy Lab	National Bioscience Center								
Mengqiang Zhu (S)	PI	*	University of Wyoming	Ecosystem Science and Management	NSF	CAREER - Faculty Early Career Develop-ment Program	EAR-1752903	P18048	Oxidation of Dissolved Organic Matter by Manganese Oxides	Chemistry, Geochem-istry	3	5.33
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Than Dam (G)	C		Univesity of Wyoming	Department of Ecosystem Science and Management								
Hairuo Mao (P)	C		University of Wyoming	Ecosystem science and management								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Jianchao Zhang (P)	C		University of Wyoming	Ecosystem Science and Management								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Thomas Borch (S)	PI		Colorado State University	Soil and Crop Science	University Tuebingen	Non US College and University		P18055	Investigation into Dissolved Organic Matter in Arctic Soil	Chemistry, Geochemistry	1	1.33
William Bahureksa (G)	C		Colorado State University	Chemistry	German Academic Scholarship Foundation	Other Non US Federal Agency						
Casey Bryce (P)	C		University of Tuebingen	Center for Applied Geoscience								
Andreas Kappler (S)	C		Eberhard Karls University of Tübingen	Center for Applied Geosciences								
Merritt Logan (G)	C		Colorado State University	Chemistry								
Monique Sézanne Patzner (G)	C		University Tuebingen	Geoscience								
Meilian Chen (S)	PI	*	Guangdong Technion	Environmental program	Guangdong Technion	Non US College and University		P18102	Dynamics of dissolved organic matter from Alpine watersheds in the Himalayan-Tibetan Plateau	Chemistry, Geochemistry	1	1
Anne Kellerman (P)	C		Florida State University	Earth, Ocean and Atmospheric Science								
Sydney Niles (G)	C		National High Magnetic Field Laboratory	Chemistry								
Robert Spencer (S)	C		Florida State University	Earth, Ocean & Atmospheric Science								
Francisco Fernandez-Lima (S)	PI	*	Florida International Unversity	Chemistry and Biochemistry	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI135469	P19108	Lipids dynamics during the mosquito reproductive cycle	Biology, Biochemistry, Biophysics	2	13
Lilian Tose (P)	C		Florida International University	Chemistry and Biochemistry								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Stephen Blanksby (S)	PI	*	Queensland University of Technology	Central Analytical Research Facility	Queensland University of Technology	Non US College and University		P19112	Coupling Ozone Ion-neutral (OzID) Reaction Capabilities on the 15 T and 21 T FT-ICR MS Instruments for the Identification and Structural Elucidation of Isomeric Lipid Species	Biology, Biochemistry, Biophysics	1	9.5
Berwyck Poad (P)	C		Queensland University of Technology	Central Analytical Research Facility								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Amy McKenna (S)	PI		National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1644779	P19116	REU Project: Characterization of the Interfacial Material and Sulfur Components in Field Samples from Historic Oil Spills and Seeps	Chemistry, Geochemistry	2	5
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Joseph Frye (G)	C		National High Magnetic Field Laboratory	CIMAR								
Sydney Niles (G)	C		National High Magnetic Field Laboratory	Chemistry								
Taniya Thomas (U)	C		National High Magnetic Field Laboratory	CIMAR								
Collin Ward (S)	PI	*	Woods Hole Oceanographic Institution	Department of Marine Chemistry and Geochemistry,	No other support			P19124	Chemical characterization of marine plastic partial photochemical oxidation	Chemistry, Geochemistry	2	5
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								
Anna Walsh (G)	C		Woods Hole Oceanographic Institution	Marine Chemistry and Geochemistry								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Andrew Wozniak (S)	PI	*	University of Delaware	School of Marine Science and Policy	University of Delaware	US College and University	Start Up	P19159	Environmental controls on the chemical composition of Delaware Bay's surface microlayer	Chemistry, Geochemistry	2	4.5
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	Univ of Delaware	US College and University						
Nicole Coffey (G)	C		University of Delaware	School of Marine Science and Policy								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Roman Zubarev (S)	PI		Karolinska Institute	Division of Molecular Biometry	UCGP		227000-520-038653	P19161	FT-ICR MS analysis of monoisotopic mammalian proteome and antibodies	Biology, Biochemistry, Biophysics	1	8
Lissa Anderson (S)	C		National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1644779					
Greg Blakney (S)	C		National High Magnetic Field Laboratory	ICR								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
David Butcher (P)	C		National High Magnetic Field Laboratory	ICR								
Chris Hendrickson (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program								
Alan Marshall (S)	C		National High Magnetic Field Laboratory	ICR								
Zeljka Popovic (G)	C		Florida State University	Ion Cyclotron Resonance								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Xuepei Zhang (P)	C		Karolinska Institutet	Department of Medical Biochemistry & Biophysics (MBB)								
Donald Smith (S)	PI		National High Magnetic Field Laboratory	ICR	UCGP			P19165	MALDI Mass Spectrometry Imaging Development	Chemistry, Geochemistry	1	39.5
Greg Blakney (S)	C		National High Magnetic Field Laboratory	ICR								
Chris Hendrickson (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance Program								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
David Harbottle (S)	PI	*	University of Leeds	School of Chemical and Process Engineering	UK Goverment	Other		P19176	Compositional Characterization of Asphaltene Subfractions Extracted by Extended-SARA Analysis and Correlations with Interfacial Activity	Chemistry, Geochemistry	2	6
Dewi Ballard (G)	C		University of Leeds	School of Chemical and Process Engineering								
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Peiqi Qiao (G)	C		University of Alberta	Department of Chemical and Materials Engineering								
Zhenghe Xu (S)	C		University of Alberta	Chemical and Materials Engineering								
Jose Cerrato (S)	PI	*	University of New Mexico	Civil Engineering	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1652619	P19179	Investigation of the effect of natural organic matter and pH on the precipitation of U (VI)	Engineering	1	3
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
F. Omar Holguin (S)	C		New Mexico State University	Department of Plant and Environmental Science								
Jackie Jarvis (S)	C		New Mexico State University	Plant and Environmental Sciences								
Carmen Velasco (G)	C		University of New Mexico	Civil Engineering								
Allison Oliver (S)	PI	*	Skeena Fisheries Commission	Fisheries	Fisheries and Oceans Canada	Non US Government Lab		P19184	From ice to rainforest: Delineation of complex DOM sources in coastal Canadian waters	Chemistry, Geochemistry	1	5
Paul Covert (S)	C		Fisheries and Oceans Canada	Institute of Ocean Sciences	Prince Rupert Port Authority	Non US Government Lab						
Sophia Johannessen (S)	C		Fisheries and Oceans Canada	Institute of Ocean Sciences	Skeena River Salmon Enhancement Program	Non US Government Lab						
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Robert Spencer (S)	C		Florida State University	Earth, Ocean & Atmospheric Science								
Robert Spencer (S)	PI		Florida State University	Earth, Ocean & Atmospheric Science	NASA			P19189	The dark side of DOM: probing obscured and functionalized freshwater DOM signatures	Chemistry, Geochemistry	2	3
Taylor Glattke (G)	C		Florida State University	ICR								
Anne Kellerman (P)	C		Florida State University	Earth, Ocean and Atmospheric Science								
Martin Kurek (G)	C		FSU	Earth, Ocean, and Atmospheric Science								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Jennifer Rogers (U)	C		Florida State University	EOAS								
Sarah Johnston (P)	PI	*	University of Lethbridge	Biological Sciences	NASA		ABoVE Project 14-TE14-0012	P19190	The Chemical Composition of Freshwater Zooplankton Dissolved Organic Matter Cycling	Chemistry, Geochemistry	1	2
Matthew Bogard (S)	C		University of Lethbridge	Biological Sciences	Delta Stewardship Council Delta Science Program	Other	5298					

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Kerri Finlay (S)	C		University of Regina	Department of Biology								
Robert Spencer (S)	C		Florida State University	Earth, Ocean & Atmospheric Science								
Gayan Rubasinghege (S)	PI	*	New Mexico Tech	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM103451	P19192	Fate, Transformation, and Toxicological Impacts of Pharmaceuticals and Personal Care Products	Chemistry, Geochemistry	1	0.5
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	DOE	Office of Science - BER - Biological & Environmental Research	DE-SC547055_					
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR	Center for Integrated Nanotechnologies	Other US Federal Agency						
Boris Lau (S)	PI	*	University of Massachusetts	Civil and Environmental Engineering	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1454443	P19198	Probing the Effects of Sulfidation on the Reactivity of Natural Organic Matter with Polymer-Capped Silver Nanoparticles by Fourier-Transform Ion Cyclotron Resonance Mass Spectrometry	Biology, Biochemistry, Biophysics	1	2
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Salimar Cordero (O)	C		University of Massachusetts	Civil and Environmental Engineering								
William Hockaday (S)	C		Baylor University	Geosciences								
Richard Vachet (S)	C		University of Massachusetts Amherst	Chemistry								
Viji Sitther (S)	PI		Morgan State University	Biology	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1900966	P19201	Excellence in Research: Oxidative stress induced impact of cell-penetrating nanoparticles on cellular constituents in a cyanobacterial model	Biology, Biochemistry, Biophysics	1	1
AnithaChristy Arumanayagam (T)	C		Methodist Hospital Research Institute	Department of Pathology								
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Somayeh Fathabad (T)	C		Morgan State University	Biology Department								
Behnam Tabatabai (G)	C		Morgan State University	Biology								
Robert Spencer (S)	PI		Florida State University	Earth, Ocean & Atmospheric Science	NSF	GRFP - Graduate Research Fellowship Program	GRFP2017239	P19210	Contribution of anthropogenic fossil fuel emissions and wildfire smoke to glacier dissolved organic matter	Chemistry, Geochemistry	1	3
Megan Behnke (G)	C		Florida State University	Earth, Ocean and Atmospheric Science								
Jason Fellman (S)	C		University of Alaska Southeast	Environmental Science								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Nishanth Tharayil (S)	PI	*	Clemson University	Plant & Environmental Sciences	NSF	DEB - Division of Environmental Biology	DEB1754679	P19212	Chemical characterization of dissolved organic matter originating from decomposing leaf and root litter to elucidate their differential ability to influence soil organic matter sequestration	Chemistry, Geochemistry	1	1
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Nishanth Tharayil (S)	C		Clemson University	Plant & Environmental Sciences								
Mengxue Xia (P)	C		Clemson University	Plant and Environmental Sciences Department								
Alan Marshall (S)	PI		National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1644779	P19213	Derivatization of carboxylic acid and alcohol functional groups from photo-oxidized petroleum samples	Chemistry, Geochemistry	1	3
Lissa Anderson (S)	C		National High Magnetic Field Laboratory	ICR								
Joseph Frye (G)	C		National High Magnetic Field Laboratory	CIMAR								
Ryan Rodgers (S)	C		National High Magnetic Field Laboratory	ICR								
David Griffith (S)	PI	*	Willamette University	Chemistry	No other support			P19215	Idenification and resolution of isobaric interferences of estrogens in wastewater	Chemistry, Geochemistry	1	0.5
Carolyn Hutchinson (G)	C		Iowa State University	Chemistry								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Chad Weisbrod (S)	C		National High Magnetic Field Laboratory	ICR								
Juliana D'Andrilli (S)	PI		Louisiana Universities Marine Consortium (LUMCON)	Environmental Chemistry	No other support			P19216	Molecular characterization of natural organic matter (NOM) and its fractions (humic and fulvic acids) from ores, peat, and compost and	Chemistry, Geochemistry	1	4
Ryan Fountain (T)	C		Bio Huma Netics, Inc.	Humic Lab Research								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
James Junker (S)	C		Louisiana Universities Marine Consortium	Aquatic Ecology					correlation with their plant biostimulant activity			
Richard Lamar (S)	C		Bio Huma Netics, Inc.	R&D								
Hiarhi Monda (S)	C		Bio Huma Netics, Inc.	Humic Lab Research								
Elena Vialykh (P)	C		University of Colorado, Boulder	Civil, Environmental & Architectural Engineering								
Cynthia Heil (S)	PI	*	Mote Marine Laboratory	Red Tide Institute	NOAA/NOS/NCCOS/Competitive Research Award	Other	NA19NOS4780183	P19223	Molecular composition and bioavailability of dissolved organic nutrients in urban stormwater and municipal wastewater discharges to the Florida red tide dinoflagellate Karenia brevis	Biology, Biochemistry, Biophysics	1	2.5
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Mary Lusk (G)	C		University of Florida	Soil and Water Science Dept.								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Ryan Rodgers (S)	PI		National High Magnetic Field Laboratory	ICR	NSF	DMR - Division of Materials Research	DMR1644779	P19237	The Role of Sulfur Functionality in the Production of Photogenerated Water-Soluble Compounds from Surrogate and MC252 Crude Oils	Chemistry, Geochemistry	1	5
Martha Chacon (P)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance								
Alan Marshall (S)	C		National High Magnetic Field Laboratory	ICR								
Sydney Niles (G)	C		National High Magnetic Field Laboratory	Chemistry								
Mary Zeller (P)	PI	*	Florida International University (FIU)	Biology	NSF	DEB - Division of Environmental Biology	DEB1237517	P19274	Molecular characterization of Florida Bay DOM	Chemistry, Geochemistry	1	1
Huan Chen (S)	C		National High Magnetic Field Laboratory	Ion Cyclotron Resonance	NSF	DEB - Division of Environmental Biology	DEB1832229					
John Kominoski (S)	C		Florida International University	Biological Sciences								
Christian Lopes (G)	C		Florida International University	Biology								
Amy McKenna (S)	C		National High Magnetic Field Laboratory	ICR								
Bryce Van Dam (P)	C		Helmholtz-Zentrum Geesthacht	Coastal Science								
									Total Proposals: 85		Experiments: 139	Days: 845

6. NMR Facility

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Gang Wu (S)	PI	Queen's University at Kingston	Chemistry	NSERC of Canada			P14705	Heteronuclear 13C{17O} and 1H{17O} correlation spectroscopy for organic solids	Chemistry, Geochemistry	1	5
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Frederic Mentink (S)	C	National High Magnetic Field Laboratory	NMR Division								
William Brey (S)	PI	National High Magnetic Field Laboratory	NMR	NIH	NIGMS - National Institute of General Medical Sciences	GM122698	P14828	Probe testing, development, maintenance, repairs	Magnets, Materials	1	2
Ghoncheh Amouzandeh (G)	C	Florida State University	Physics								
Rajendra Arora (S)	C	Florida Agricultural and Mechanical University	Electrical and Computer Engineering								
Art Edison (S)	C	University of Georgia	CCRC, Biochemistry and Genetics								
Nicolas Freytag (S)	C	Bruker Biospin	n/a								
Jerris Hooker (P)	C	Florida Agricultural and Mechanical University	NMR								
Lawrence Hornak (S)	C	University of Georgia	School of Electrical and Computer Engineering								
Erik Olson (U)	C	Florida State University	Electrical and Computer Engineering								
Vijay Ramaswamy (T)	C	Bruker Biospin	n/a								
Omid Sanati (G)	C	University of Georgia	School of Electrical and Computer Engineering								
Sabyasachi Sen (S)	PI	University of California, Davis	Chemical Engineering and Materials Science	NSF	DMR - Division of Materials Research	DMR1505185	P14934	Elucidation Of Structure-Functionality Relationships In Amorphous And Crystalline Materials By High-Field Solid-State Nmr Spectroscopy	Chemistry, Geochemistry	4	25
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Maxwell Marple (G)	C	University of California, Davis	Chemical Engineering and Materials Science								
Hans Jakobsen (S)	PI	Aarhus University	Department of Chemistry	Aarhus University/Haldor Topsøe A/S, Copenhagen, Denmark	Non US College and University		P14957	Dynamic and Structure NMR Studies of Tetraoxoanions and Gas-Solid Materials Mimicking Environments on Planet Mars	Chemistry, Geochemistry	3	17
Henrik Bildsoe (S)	C	Aarhus University	Chemistry	Aarhus Unjiversity-Haldor Topsøe, Lyngby	Other Non US Federal Agency						
Michael Brorson (S)	C	Haldor Topsoe	Catalysis	Aarhus University/Haldor Topsoe, Denmark	Non US College and University						
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Hailong Chen (S)	PI	Georgia Institute of Technology	School of Mechanical Engineering	NSF	DMR - Division of Materials Research	DMR1808517	P14967	In situ and/or Operando NMR and EPR imaging of energy materials	Chemistry, Geochemistry	4	17
Zhenxing Feng (S)	C	Oregon State University	School of Chemical, Biological, and Environmental Engineering	NSF	DMR - Division of Materials Research	DMR1508404					
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Xiong Shan (G)	C	Georgia Institute of Technology	Chemistry								
Lufeng Yang (P)	C	Georgia Institute of Technology	Mechanical Engineering								
Lucio Frydman (S)	PI	National High Magnetic Field Laboratory	NMR	Weizmann Institute of Science	Non US College and University		P14983	Magnetic resonance imaging of maternal glycemic state by glucose tolerance test during pregnancy in mice	Biology, Biochemistry, Biophysics	2	4

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Ghoncheh Amouzandeh (G)	C	Florida State University	Physics	Weizmann Institute	Non US College and University						
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Stefan Markovic (P)	C	Weizmann Institute of Science	Department of Chemical Physics								
Michal Neeman (S)	C	Weizmann Institute of Science	Department of Biological Regulation								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Michael Harrington (S)	PI	Huntington Medical Research Institutes	Molecular Neurology	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS072497	P16008	Evaluation of Sodium and Metabolic Dysfunction in a Rat Migraine Model	Biology, Biochemistry, Biophysics	9	47
Nastaren Abad (G)	C	Florida State University	Chemical-Biomedical Engineering	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS102395					
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Dillon Grice (U)	C	Florida State University	Chemical and Biomedical Engineering								
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Steve Blackband (S)	PI	University of Florida	CIMAR	UCGP			P16012	Cellular Level MR microscopy of Mammalian Cells at 900MHz	Biology, Biochemistry, Biophysics	1	59
Jeremy Flint (S)	C	University of Florida	Neuroscience								
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Brian Hansen (S)	C	Aarhus University	University of Aarhus								
John Forder (S)	PI	University of Florida	Radiology	NIH	NHLBI - National Heart and Blood Institute	R56 HL122064-01	P16013	MR Microscopy and Fiber Tract Mapping of Isolated Rabbit Hearts at 900MHz	Biology, Biochemistry, Biophysics	1	7
Steve Blackband (S)	C	University of Florida	CIMAR								
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Anant Paravastu (S)	PI	Georgia Institute of Technology	School of Chemical & Biomolecular Engineering	No other support			P16020	Structure determination of ß-amyloid oligomers and investigation of their formation pathways	Biology, Biochemistry, Biophysics	2	10
Yuan Gao (G)	C	Georgia Institute of Technology	School of Chemical and Biomolecular Engineering	NIH	NIA - National Institute on Aging	AG701045					
Cong Guo (P)	C	National High Magnetic Field Laboratory	physics								
Terrone Rosenberry (S)	C	Mayo Clinic, Jacksonville	Neuroscience								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Jens Watzlawik (P)	C	Mayo Clinic, Jacksonville	College of Medicine								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Huan-Xiang Zhou (S)	C	University of Illinois at Chicago	Physics and Chemistry								
Frederic Mentink (S)	PI	National High Magnetic Field Laboratory	NMR Division	No other support			P16032	Towards more efficient Magic Angle Spinning – Dynamic Nuclear Polarization at 14 T	Chemistry, Geochemistry	4	28
Gael De Paepe (S)	C	The French Alternative Energies and Atomic Energy Commission	Institute for Nanoscience and Cryogenics	NIH	NIGMS - National Institute of General Medical Sciences	GM018519					
Sabine Hediger (S)	C	The French Alternative Energies and Atomic Energy Commission	Institute for Nanoscience and Cryogenics								
Snorri Sigurdsson (S)	C	University of Iceland	Chemistry								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
William Dichtel (S)	PI	Northwestern University	Chemistrry	NSF	CHE - Chemistry	CHE1413862	P16036	Understanding the microstructure of ß-cyclodextrin polymers with solid state fluorine NMR	Magnets, Materials	3	8
Sossina Haile (S)	PI	Northwestern University	Materials Science and Engineering, and Chemistry	NSF	DMR - Division of Materials Research	DMR1720139	P16051	19F and 15N Solid-state NMR Investigations of Oxyfluorides and Oxynitrides	Chemistry, Geochemistry	29	233
Songting Cai (G)	C	Northwestern University	Materials Science and Engineering	NSF	DMR - Division of Materials Research	DMR1644779					
Po-Hsiu Chien (G)	C	Florida State University	Chemistry and Biochemistry	NSF	DMR - Division of Materials Research	DMR1508404					
Jaye Harada (G)	C	Northwestern University	Chemistry	NSF	DMR - Division of Materials Research	DMR1808517					
Yan-Yan Hu (S)	C	Florida State University	Chemistry & Biochemistry	NSF	DMR - Division of Materials Research	DMR1157490					
Wei Huang (S)	C	Northwestern University	Chemistry								
Xiang Li (P)	C	Argonne National Laboratory (ANL)	Chemistry Science Engery								
Becca McClain (G)	C	Northwestern University	Chemistry								
Sawankumar Patel (G)	C	Florida State University	Chemistry								
Aritra Sil (G)	C	Northwestern University	Chemistry								
Pengbo Wang (G)	C	Florida State University	Chemistry								
Jin Zheng (G)	C	Florida State University	Chemistry & Biochemistry								
Jun Xu (S)	PI	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	Wuhan NMR center	The National Natural Science Foundation of China	Other		P16062	Study of active site and reaction intermediates on heterogeneous catalysis by DNP-NMR	Biology, Biochemistry, Biophysics	3	10
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	National Natural Science Foundation of China	Other						
Qiang Wang (T)	C	Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	Wuhan NMR center								
Katye Fichter (S)	PI	Missouri State University	Chemistry	Missouri State University	US College and University		P16080	Gd-doped quantum dots with multimodal imaging capabilities for the detection of motor neuron diseases in vivo	Biology, Biochemistry, Biophysics	1	4
Ramesh Badisa (S)	PI	Florida Agricultural and Mechanical University	College of Pharmacy and Pharmaceutical Sciences	No other support			P16090	Identification of Biochemical Changes in Cocaine-treated PC12 Cells	Biology, Biochemistry, Biophysics	1	13.5
Carl Goodman (S)	C	Florida Agricultural and Mechanical University	Pharmacy								
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Elizabeth Mazzio (P)	C	Florida Agricultural and Mechanical University	FAMU College of Pharmacy & Pharmacological Sciences								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Tim Cross (S)	PI	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI119178	P16117	Structural Characterization of CwsA with Solid-State NMR	Biology, Biochemistry, Biophysics	39	312
Huajun Qin (T)	C	Florida State University	Chemistry & Biochemistry	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI101119					
Rongfu Zhang (P)	C	National High Magnetic Field Laboratory	NHMFL								
Samuel Grant (S)	PI	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS102395	P16122	Electrical Properties Derivation using Radiofrequency Field Propagation in Ultra-High Field MRI	Biology, Biochemistry, Biophysics	7	13
Ghoncheh Amouzandeh (G)	C	Florida State University	Physics								
Scott Boebinger (U)	C	Florida State University	Chemical and Biomedical Engineering								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
David Hike (G)	C	Florida State University	Chemical and Biomedical Engineering								
Abdol Aziz Ould Ismail (T)	C	University of Pennsylvania	Department of Radiology								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Victor Wong (U)	C	Florida State University	Chemical and Biomedical Engineering								
Bruce Bunnell (S)	PI	Tulane University	Pharmacology	UCGP			P16124	Attenuation of Experimental Autoimmune Encephalomyelitis Model of Multiple Sclerosis by 3D-organized Adipose-derived Human Mesenchymal Stem Cells	Biology, Biochemistry, Biophysics	1	7
Ghoncheh Amouzandeh (G)	C	Florida State University	Physics								
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Teng Ma (S)	C	Florida State University	Chemistry & Biomedical Engineering								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Samuel Grant (S)	PI	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering	No other support			P16147	Maintenance on the 500 MHz at Engineering School	Magnets, Materials	1	50.5
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Zhong Chen (S)	PI	Xiamen University	Electronic Science	No other support			P16159	Ultrafast high-resolution magnetic resonance spectroscopy at high fields	Biology, Biochemistry, Biophysics	2	11
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR	NSFC	Other Non US Federal Agency						
Yuqing Huang (S)	C	Xiamen University	Electronic Science								
Xiaomei Liu (G)	C	University of Science and Technology of China	Modern Physics								
Kaiyu Wang (G)	C	Xiamen University	Electronic Science								
Elan Eisenmesser (S)	PI	University of Colorado, Denver	Biochemistry & Molecular Genetics	NSF	CHE - Chemistry	CHE1807326	P16165	Engineering enzyme function through dynamics.	Biology, Biochemistry, Biophysics	2	28
Avigdor Leftin (P)	PI	Weizmann Institute of Science	Chemical Physics	NIH	NCI - National Cancer Institute	1F32CA206277-01	P16232	Ultrahigh-field iron MRI microscopy of macrophage infiltration in breast cancer	Biology, Biochemistry, Biophysics	1	7
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Fang Tian (S)	PI	Pennsylvania State University	Biochemistry and Molecular Biology, Penn State Medical School	NIH	NIGMS - National Institute of General Medical Sciences	GM127730	P16233	Structure Determination of the Transmembrane Domain of Human Amyloid Precursor Protein Binding Receptor LR11 (sorLA) in a Biological Membrane	Biology, Biochemistry, Biophysics	6	32
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
Liliya Vugmeyster (S)	PI	University of Colorado, Denver	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM111681	P16309	Dynamics of amyloid-beta fibrils by deuteron NMR	Biology, Biochemistry, Biophysics	4	18
Dan Au (G)	C	University of Colorado, Denver	Bioengineering								
Dmitry Ostrovsky (S)	C	University of Alaska, Anchorage	Mathematics								
Sungsool Wi (S)	PI	National High Magnetic Field Laboratory	NMR	NSF	DMR - Division of Materials Research	DMR1644779	P16311	Development of the state-of-the-art solid-state NMR methods suitable at ultrahigh magnetic fields and MAS spinning rates	Biology, Biochemistry, Biophysics	26	202
Tim Cross (S)	C	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry	Israel Science Foundation	Non US Foundation	965/18					
Lucio Frydman (S)	C	National High Magnetic Field Laboratory	NMR								
Kwang Hun Lim (S)	C	East Carolina University	Chemistry								
Yiseul Shin (G)	C	Florida State University	Chemistry								
Ashley Blue (T)	PI	National High Magnetic Field Laboratory	NHMFL	No other support			P16319	NMR System Maintenance	Magnets, Materials	14	175
Kevin Chalek (G)	C	University of California, Riverside	Chemistry	NSF	DMR - Division of Materials Research	DMR1644779					
Banghao CHen (S)	C	Florida State University	Chemistry & Biochemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM122698					
Thierry Dubroca (S)	C	National High Magnetic Field Laboratory	EMR								
Emily Foley (G)	C	University of California, Santa Barbara	Materials								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Frederic Mentink (S)	C	National High Magnetic Field Laboratory	NMR Division								
Lakshmi Bhai N Vidyadharan (G)	C	Ohio State University	Department of Chemistry and Biochemistry								
Lauren O'Donnell (P)	C	Hunter College of CUNY	Physics								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Tanya Whitmer (S)	C	Ohio State University	Chemistry and Biochemistry / CCIC								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Qiong Wu (S)	C	University of Texas, Southwestern	Biophysics								
Benito Marinas (S)	PI	University of Illinois at Urbana-Champaign	Civil and Environmental Engineering	NSF	DGE - Division of Graduate Education	DGE1746047	P17334	Determination of fluoride chemical environment on calcium hydroxyapatite nanoparticles of different crystallinities – distinguishing the dominant mechanism(s) of fluoride removal	Engineering	4	10
Daniel Mosiman (G)	C	University of Illinois at Urbana-Champaign	Civil and Environmental Engineering	NSF	GRFP - Graduate Research Fellowship Program	GRFP1746047					
Tuo Wang (S)	PI	Louisiana State University	Chemistry	NSF	Other	1833040	P17348	Structure and Packing of Complex Carbohydrates in Native Plant and Fungal Cell Walls from Solid-State DNP-NMR	Biology, Biochemistry, Biophysics	11	50.5
Arnab Chakraborty (G)	C	Louisiana State University	Chemistry	NSF	OIA - Office of Integrative Activities	1833040					
Tim Cross (S)	C	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry								
Malitha Dickwella Widanage (G)	C	Louisiana State University	chemistry								
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Alex Kirui (G)	C	Louisiana State University	Chemistry								
Frederic Mentink (S)	C	National High Magnetic Field Laboratory	NMR Division								
Cecil Dybowski (S)	PI	University of Delaware	Chemistry and Biochemistry	NSF	DMR - Division of Materials Research	DMR1608594	P17354	Assessing the potential of high-field, natural abundance 67Zn solid-state NMR for understanding the reactivity of ZnO-based pigments in paint films	Chemistry, Geochemistry	5	22
Silvia Centeno (S)	C	The Metropolitan Museum of Art	Scientifi Research								
Valeria Di Tullio (P)	C	The Metropolitan Museum of Art	Scientific Research								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Nicholas Zumbulyadis (S)	C	Independent Scholar and Consultant	Consultancy								
Joseph Ippolito (S)	PI	Washington University in St. Louis	Radiology	NSF	DMR - Division of Materials Research	DMR1644779	P17381	Characterization of biosynthetic lactate metabolism in cancer	Biology, Biochemistry, Biophysics	1	5
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Edward Agyare (S)	PI	Florida Agricultural and Mechanical University	Pharmaceutics	FAMU	US College and University		P17382	Development of theranostic liposomal nanoparticle to target pancreatic cancer in patient-derived xenograft mouse model	Biology, Biochemistry, Biophysics	1	1
Kevin Affram (G)	C	Florida Agricultural and Mechanical University	College of Pharmacy and Pharmaceutical Sciences								
Andriana Inkoom (G)	C	Florida A&M University	Pharmacy								
Sunil Krishnan (S)	C	University of Texas, MD Anderson Cancer Center	Radiation Oncology								
Nkafu Bechem Ndemazie (G)	C	Florida A&M University	Pharmacy								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Renee Reams (S)	C	Florida Agricultural and Mechanical University	College of Pharmacy and Pharmaceutical Sciences								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Mandip Singh (S)	C	Florida Agricultural and Mechanical University	College of Pharmacy and Pharmaceutical Sciences								
Taylor Smith (G)	C	Florida Agricultural and Mechanical University	College of Pharmacy and Pharmaceutical Sciences								
Kwang Hun Lim (S)	PI	East Carolina University	Chemistry	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS097490	P17409	Solid-state NMR Structural Characterizations of Polymorphic Transthyretin Amyloids	Biology, Biochemistry, Biophysics	2	10
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS097460					
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Justin Kennemur (S)	PI	Florida State University	Chemistry and Biochemistry	No other support			P17413	Probing By Variable Temperature MAS NMR the Mechanism of Glass Transition in Precisely Designed Polymers	Condensed Matter Physics	4	34
Naresh Dalal (S)	C	National High Magnetic Field Laboratory	Chemistry	NSF	CAREER - Faculty Early Career Development Program	CAREER DMR-1750852					
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
William Neary (G)	C	Florida State University	Chemistry and Biochemistry								
Sonia Waiczies (S)	PI	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)	BUFF	Non US Government Lab		P17420	Fluorine MRI of Experimental Autoimmune Encephalomyelitis at 21.1 Tesla	Biology, Biochemistry, Biophysics	2	3
Paula Delgado (S)	C	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)	DFG	Non US Government Lab						
Andre Kuehne (S)	C	MRI.TOOLS GmbH	MRI Coils								
Jason Millward (P)	C	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)								
Thoralf Niendorf (S)	C	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)								
Andreas Pohlmann (S)	C	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)								
Christian Prinz (G)	C	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Ludger Starke (G)	C	Max Delbrück Center for Molecular Medicine in the Helmholtz Association	Berlin Ultrahigh Field Facility (B.U.F.F.)								
Helmar Waiczies (S)	C	MRI.TOOLS GmbH	MRI Coils								
Myriam Cotten (S)	PI	College of William and Mary	Applied Science	NSF	MCB - Molecular and Cellular Biosciences	MCB1716608	P17425	Investigating Host Defense Mechanisms at Biological Membranes	Biology, Biochemistry, Biophysics	4	17
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
Leonard Mueller (S)	PI	University of California, Riverside	Chemistry	NSF	CHE - Chemistry	CHE097569_	P17435	Chemically-Rich Structure and Dynamics in the Active Site of Tryptophan Synthase from 17O Quadrupole Central Transition NMR at 36 T	Biology, Biochemistry, Biophysics	2	11
Rittik Ghosh (G)	C	University of California, Riverside	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM097569					
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Chang Hyun Lee (S)	PI	Dankook University	Energy Engineering Department	Korea Institute of Energy Technology Evaluation and Planning (KETEP) and	Non US Foundation	No. 20153010031920	P17436	Solid-state NMR characterization of nanodispersed polymeric membrane materials for energy generation and valued chemicals production	Chemistry, Geochemistry	11	101

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				the Ministry of Trade, Industry & Energy (MOTIE)							
Juhee Ahn (G)	C	Dankook University	Energy Engineering	Korea Institute of Energy Technology Evaluation and Planning (KETEP) and theMinistry of Trade, Industry & Energy (MOTIE)	Non US Foundation	No. 20153010031920					
Jin Pyo Hwang (G)	C	Dankook University	Energy Engineering	Korea Institute of Energy Technology Evaluation and Planning (KETEP) and the Ministry of Trade, Industry & Energy (MOTIE) of the Republic of Korea	Non US Foundation	2.0153E+13					
Woo Young Kim (G)	C	Dankook University	Energy Engineering								
Yoon Jae Lim (G)	C	Dankook University	Energy Engineering								
Chang Hoon Oh (G)	C	Dankook University	Energy Engineering								
In Kee Park (G)	C	Dankook University	Energy Engineering								
Se Youn Pyo (G)	C	Dankook University	Energy engineering								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Danielle Laurencin (S)	PI	University of Montpellier	Institut Charles Gerhardt de Montpellier	CNRS	Non US College and University		P17464	High resolution solid state NMR studies of biomaterials at 36 T:analysis of calcium and oxygen local environments	Chemistry, Geochemistry	4	22
Christian Bonhomme (S)	C	Pierre and Marie Curie University	Laboratoire de Chimie de la Matière Condensée	ANR	Other	12-BS08-0022-01					
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	CNRS							
Christel Gervais (S)	C	Sorbonne University	Laboratoire de Chimie de la Matière Condensée	ERC	Non US Council						
Frederic Mentink (S)	C	National High Magnetic Field Laboratory	NMR Division	CNRS	Other						
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Francesca Marassi (S)	PI	Sanford Burnham Prebys Medical Discovery Institute	Cancer Center	NIH	NIGMS - National Institute of General Medical Sciences	GM118186	P17471	Structure of Y. pestis Ail in lipid bilayers	Biology, Biochemistry, Biophysics	1	5
Tim Cross (S)	C	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Rongfu Zhang (P)	C	National High Magnetic Field Laboratory	NHMFL								
Ayyalusamy Ramamoorthy (S)	PI	University of Michigan	Chemistry & Biophysics	NIH	NIGMS - National Institute of General Medical Sciences	GM084018	P17486	Solid-State NMR Experiments on Magnetically-Aligned Polymer Macro-Nanodiscs	Biology, Biochemistry, Biophysics	2	14
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Thirupathi Ravula (P)	C	University of Michigan	Chemistry								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Rachel Martin (S)	PI	University of California, Irvine	Chemistry	University of California, Irvine	US College and University	N/A	P17490	High-field NMR study of the interaction of the Droserasin 1 PSI with microbial lipids	Biology, Biochemistry, Biophysics	3	9
Jan Bierma (G)	C	University of California, Irvine	Molecular Biology and Blochemistry	NSF	DMS - Division of Mathematical Sciences	DMS1361425					
Kuizhi Chen (P)	C	National High Magnetic Field Laboratory	NMR	University of California, Irvine	US College and University						
Po-Hsiu Chien (G)	C	Florida State University	Chemistry and Biochemistry								
Riqiang Fu (S)	C	National High Magnetic Field Laboratory	NMR								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Xiaoling Wang (P)	C	National High Magnetic Field Laboratory	NMR								
Rongfu Zhang (P)	C	National High Magnetic Field Laboratory	NHMFL								
Tim Cross (S)	PI	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI101119	P17493	Mycobacterium tuberculosis Divisome: Insights on protein structure and protein-protein interaction of important drug targets	Biology, Biochemistry, Biophysics	24	141
Cristian Escobar (P)	C	National High Magnetic Field Laboratory	IMB	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI119178					
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Huajun Qin (T)	C	Florida State University	Chemistry & Biochemistry								
Yiseul Shin (G)	C	Florida State University	Chemistry								
Joshua Taylor (U)	C	Florida State University	Chemistry & Biochemistry								
Rongfu Zhang (P)	C	National High Magnetic Field Laboratory	NHMFL								
Aaron Rossini (S)	PI	Iowa State University	Chemistry	NSF	CHE - Chemistry	CHE1709972	P17500	Enhancing the Resolution of 1H Solid-State NMR Spectra With Fast MAS and High Magnetic Fields	Chemistry, Geochemistry	4	25
Scott Carnahan (G)	C	Iowa State University	Chemistry	NSF	CBET - Chemical, Bioengineering, Environmental, and Transport Systems	CBET1916809					
Rick Dorn (G)	C	Iowa State University	Chemistry								
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Amrit Venkatesh (G)	C	Iowa State University	Chemistry								
Viraj Wijesekara (G)	C	Iowa State University	Chemistry								
Yining Huang (S)	PI	University of Western Ontario	Chemistry	Natural Sciences and Engineering Research Council of Canada	Other Non US Federal Agency		P17504	O-17 solid-state NMR of metal-organic frameworks	Chemistry, Geochemistry	2	8
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	NSERC	Other Non US Federal Agency						
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Vinicius Martins (G)	C	University of Western Ontario	Chemistry								
Robert Griffin (S)	PI	Massachusetts Institute of Technology	Chemistry	NIH	NIA - National Institute on Aging	AG058504	P17507	17O NMR on Biological Solids	Biology, Biochemistry, Biophysics	1	3
Daniel Banks (G)	C	Massachusetts Institute of Technology	Chemistry								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Hadi Mohammadigoushki (S)	PI	Florida State University	Chemical and Biomedical Engineering	No other support			P17560	Dynamics and structural characterization of living polymers via NMR spectroscopy	Engineering	1	12
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Sophia Hayes (S)	PI	Washington University in St. Louis	Chemistry	NSF	DMR - Division of Materials Research	DMR1640899	P17588	Low temperature MAS NMR study of carbon capture materials	Chemistry, Geochemistry	1	5
Chia-Hsin Chen (G)	C	Washington University in St. Louis	Chemistry								
Frederic Mentink (S)	C	National High Magnetic Field Laboratory	NMR Division								
Zhehong Gan (S)	PI	National High Magnetic Field Laboratory	NHMFL	No other support			P17597	Development of 1.5 GHz NMR using 36T Series-Connected-Hybrid (SCH) Magnet	Magnets, Materials	2	8
William Brey (S)	C	National High Magnetic Field Laboratory	NMR								
Kuizhi Chen (P)	C	National High Magnetic Field Laboratory	NMR								
Po-Hsiu Chien (G)	C	Florida State University	Chemistry and Biochemistry								
Tim Cross (S)	C	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Jeffrey Schiano (S)	C	Pennsylvania State University	Electrical Engineering								
Tim Cross (S)	PI	National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry	NIH	NIAID - National Institute of Allergy and Infectious Diseases	AI119178	P17605	Interactions of Tuberculosis Divisome Membrane Domains ChiZ, CrgA and FtsQ	Biology, Biochemistry, Biophysics	22	240.5
Jeanine Brady (S)	PI	University of Florida	Oral Biology	NIH	NIDCR - National Institute of Dental and Craniofacial Research	DE000000	P17623	Structural studies of adhesion protein P1 of Streptococcus mutans, its quaternary structure, and its formation of amyloid fibrils	Biology, Biochemistry, Biophysics	4	19.5
Ana Barran-Berdon (P)	C	University of Florida	Oral Biology								
Albert Brotgandel (U)	C	University of Florida	Biochemistry and Molecular Biology								
Joanna Long (S)	C	University of Florida	Biochemistry & Molecular Biology								
Qingqing (Emily) Peng (G)	C	University of Florida	Department of Biochemistry and Molecular Biology								
Gwladys Riviere (P)	C	University of Florida	Biochemistry and molecular biology								
Nhi Tran (G)	C	University of Florida	Chemistry								
Samuel Grant (S)	PI	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS102395	P17628	In vivo tracking of cell therapy to treat stroke: Cell migration & 23Na MRI	Biology, Biochemistry, Biophysics	38	123.5
Frederick Bagdasarian (G)	C	Florida State University	College of Engineering								
Cesario Borlongan (S)	C	University of South Florida	College of Medicine, Neurosurgery								
Bruce Bunnell (S)	C	Tulane University	Pharmacology								
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Teng Ma (S)	C	Florida State University	Chemistry & Biomedical Engineering								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Xuegang Yuan (G)	C	Florida State University	Chemical & Biomedical Engineering								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Kwang Hun Lim (S)	PI	East Carolina University	Chemistry	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS097490	P17630	Molecular Basis of Distinct Tau Strains and their Prion-like Propagation	Biology, Biochemistry, Biophysics	7	35
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Daniel Lee (S)	PI	University of Grenoble Alpes	INAC/MEM	ERC	Non US Council	ERC-CoG- 2015, no. 682895	P17632	Ultra-high field NMR for assessing the stability of the organic-inorganic interfaces of metal oxide nanocrystals	Chemistry, Geochemistry	1	5
Gael De Paepe (S)	C	The French Alternative Energies and Atomic Energy Commission	Institute for Nanoscience and Cryogenics	European commission	Other	3549/H2020/CO-FUND/2016/2, CO-FUN22					
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Janusz Lewinski (S)	C	Warsaw University of Technology	Chemistry and Institute of Physical Chemistry								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Natalia Olejnik-Fehér (G)	C	Institute of Physics, Polish Academy of Sciences	Institute of Physical Chemistry								
Joana Paulino (P)	C	National High Magnetic Field Laboratory	CIMAR								
Malgorzata Wolska-Pietkiewicz (S)	C	Warsaw University of Technology	Chemistry								
Debra Fadool (S)	PI	Florida State University	Biological Sciences	NIH	NIDCD - National Institute on Deafness and Other Communication Disorders	DC013080	P17686	Intranasal Delivery and Biodistribution Study Towards Unique Modulator of Metabolism in the Olfactory Bulb	Biology, Biochemistry, Biophysics	1	8
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Austin Schwartz (G)	C	Florida State University	Biological Sciences								
David Guilfoyle (S)	PI	Nathan Kline Institute for Psychiatric Research	C-BIN	NSF	DMR - Division of Materials Research	DMR1644779	P17721	An Investigation Of Resting State Naa And Naag Fluctuations In Rat Brain At 21.1 T	Biology, Biochemistry, Biophysics	3	27
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering	Nathan Klein Institute	Other						
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR	NKI							
Victor Schepkin (S)	C	National High Magnetic Field Laboratory	CIMAR								
Michael McMahon (S)	PI	Johns Hopkins University	The Russell H. Morgan Department of Radiology and Radiological Sciences	John Hopkins	US College and University		P17727	Using Creatine and Salicylate infusions to monitor kidney injuries	Biology, Biochemistry, Biophysics	1	1
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Kowsalyadevi Pavuluri (P)	C	Johns Hopkins University	The Russell H. Morgan Department of Radiology and Radiological Sciences								
Jens Rosenberg (S)	C	National High Magnetic Field Laboratory	NMR								
Mei Hong (S)	PI	Massachusetts Institute of Technology	Department of Chemistry	NIH	NIA - National Institute on Aging	AG059661	P17746	Resonance assignment of membrane proteins and amyloid fibrils	Biology, Biochemistry, Biophysics	2	17
Venkata Mandala (G)	C	Massachusetts Institute of Technology	Department of Chemistry								
Roger Koeppe (S)	PI	University of Arkansas	Department of Chemistry and Biochemistry	NSF	MCB - Molecular and Cellular Biosciences	MCB1713242	P17753	Confirming the Presence of a 3(10)-Helix within an Arginine Containing Model Peptide Bound on a Lipid Membrane Surface	Biology, Biochemistry, Biophysics	2	8
Matthew McKay (G)	C	University of Arkansas	Chemistry & Biochemistry								

Participants (Name, Role, Org., Dept.)				Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Cathy Levenson (S)	PI	Florida State University	Biomedical Sciences	No other support			P17801	CHEMORESISTANT GLIOMA: IDENTIFICATION OF IMAGING BIOMARKERS AND EVALUATION OF MECHANISMS	Biology, Biochemistry, Biophysics	3	6
Victor Schepkin (S)	C	National High Magnetic Field Laboratory	CIMAR								
Sabyasachi Sen (S)	PI	University of California, Davis	Chemical Engineering and Materials Science	NSF	DMR - Division of Materials Research	DMR1505185	P17811	Investigation of the atomistic basis of structural relaxation and viscous flow in supercooled chalcogenide liquids by high field dynamical NMR spectroscopy	Condensed Matter Physics	10	69
Zhehong Gan (S)	C	National High Magnetic Field Laboratory	NHMFL	NSF	DMR - Division of Materials Research	DMR1855176					
Ivan Hung (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Bing Yuan (G)	C	University of California, Davis	Engineering								
Weidi Zhu (G)	C	University of California, Davis	Materials Science & Engineering								
Jeffrey Schiano (S)	PI *	Pennsylvania State University	Electrical Engineering	NIH	NIGMS - National Institute of General Medical Sciences	GM122698	P17819	Flux Regulation for Powered Magnets	Engineering	2	9
William Brey (S)	C	National High Magnetic Field Laboratory	NMR								
Ilya Litvak (S)	C	National High Magnetic Field Laboratory	CIMAR/NMR								
Wenping Mao (P)	C	National High Magnetic Field Laboratory	NMR								
Xinxing Meng (G)	C	Pennsylvania State University	Electrical Engineering								
Waroch Tangbampensountorn (G)	C	Pennsylvania State University	Electrical Engineering								
Alexander Nevzorov (S)	PI	North Carolina State University	Chemistry	NSF	CHE - Chemistry	CHE1508400	P17825	NMR spectroscopic assignment of magnetically aligned samples at high fields	Biology, Biochemistry, Biophysics	2	4
Paul Maggard (S)	C	North Carolina State University	Chemistry								
Alex Smirnov (S)	C	North Carolina State University	Chemistry								
Smita Mohanty (S)	PI	Oklahoma State University	Chemistry	UCGP			P17830	Asparagine-linked N-glycosylation: structure & function studies	Biology, Biochemistry, Biophysics	4	42
Bharat Chaudhary (G)	C	Oklahoma State University	Department of Chemistry	No other support							
Salik Dahal (G)	C	Oklahoma State University	Chemistry								
Joseph Schlenoff (S)	PI	Florida State University	Chemistry and Biochemistry	No other support			P17845	Water Relaxation in Saloplastic Complexes	Chemistry, Geochemistry	1	21
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Naresh Dalal (S)	PI	National High Magnetic Field Laboratory	Chemistry	NSF	CHE - Chemistry	CHE1464955	P17847	Probing Site Symmetry of Al dopants in Doped ZnSe Quanutm Dots Using MAS NMR	Condensed Matter Physics	11	60
Jasleen Bindra (G)	C	National Institute of Standards and Technology	PML	NSF	CHE - Chemistry	CHE1608364					
Sanath Kumar Rama Krishna (G)	C	Florida State University	Condensed Matter Physics								
Geoffrey Strouse (S)	C	National High Magnetic Field Laboratory	Chemistry								
Mark Davis (S)	PI	California Institute of Technology	Chemical Engineering	Chevron Corporation		15038035/15051812	P17852	Zn-67 NMR Investigation of strong Lewis Acid Sites in Zincosilicates	Chemistry, Geochemistry	5	19
Sonjong Hwang (S)	C	California Institute of Technology	Chemistry and Chemical Engineering								
Sungsool Wi (S)	C	National High Magnetic Field Laboratory	NMR								
Jens Rosenberg (S)	PI	National High Magnetic Field Laboratory	NMR	NSF	DMR - Division of Materials Research	DMR1644779	P17853	Investigation into neurobiological and metabolic markers of mild Traumatic Brain Injury: 1H-MRI/S & 31P-MRS	Biology, Biochemistry, Biophysics	3	12.5
Samuel Grant (S)	C	National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Shannon Helsper (G)	C	National High Magnetic Field Laboratory	NMR								
Cathy Levenson (S)	C	Florida State University	Biomedical Sciences								
Zhehong Gan (S)	PI	National High Magnetic Field Laboratory	NHMFL	No other support			P17856	Development of solid-state NMR methods for applications at high-field and the 36 T SCH magnet	Chemistry, Geochemistry	17	97
David Bryce (S)	C	University of Ottawa	Department of Chemistry and Biomolecular Sciences								
Kuizhi Chen (P)	C	National High Magnetic Field Laboratory	NMR								

Participants (Name, Role, Org., Dept.)					Funding (Funding Agency, Division, Award #)			Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Po-Hsiu Chien (G)	C		Florida State University	Chemistry and Biochemistry									
Tim Cross (S)	C		National High Magnetic Field Laboratory	NHMFL/Chemistry & Biochemistry									
Robert Griffin (S)	C		Massachusetts Institute of Technology	Chemistry									
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR									
Sabyasachi Sen (S)	C		University of California, Davis	Chemical Engineering and Materials Science									
Gang Wu (S)	C		Queen's University at Kingston	Chemistry									
Sophia Hayes (S)	PI		Washington University in St. Louis	Chemistry	NSF	Other	1640899		P17909	Quadrupolar Nuclei Study of Inorganic Materials	Chemistry, Geochemistry	1	3
Chia-Hsin Chen (G)	C		Washington University in St. Louis	Chemistry									
Jinlei Cui (G)	C		Washington University in St. Louis	Chemistry									
he sun (G)	C		Washington University in St. Louis	chemistry									
Michael West (G)	C		Washington University in St. Louis	Chemistry									
Luming Peng (S)	PI		Nanjing University	School of Chemistry and Chemical Engineering	National Natural Science Foundation of China	Non US Foundation	21573103		P17924	Multinuclear NMR studies of oxide nanostructures	Chemistry, Geochemistry	6	26
Kuizhi Chen (P)	C		National High Magnetic Field Laboratory	NMR	National Natural Science Foundation of China	Non US Foundation	91745202						
Po-Hsiu Chien (G)	C		Florida State University	Chemistry and Biochemistry	National Natural Science Foundation of China	Non US Foundation	21573103, 91745202						
Jiahuan Du (G)	C		Nanjing University	School of Chemistry and Chemical Engineering	National Natural Science of China	Non US Foundation	21573103						
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL									
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR									
Jeffery White (S)	PI		Oklahoma State University	Chemical Engineering	NSF	CHE - Chemistry	CHE1764116		P17925	Elucidating H+/Al Siting and Chemical Structures in Zeolites by Ultra-High Field NMR	Chemistry, Geochemistry	25	117
maryam Abdolrahmani (G)	C		Oklahoma State University	Chemistry									
Kuizhi Chen (P)	C		National High Magnetic Field Laboratory	NMR									
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL									
Sarah Horstmeier (G)	C		Oklahoma State University	Chemistry									
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR									
Gang Wu (S)	PI		Queen's University at Kingston	Chemistry	NSERC of Canada	Other Non US Federal Agency			P17926	Probing the hydrogen nuclear wavefunction in OHO low-barrier hydrogen bonds by 1H-17O double resonance NMR	Chemistry, Geochemistry	4	24.5
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL	NSERC of Canada	Non US Council							
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR									
Linda Shimizu (S)	PI		University of South Carolina	Chemistry and Biochemistry	NSF	CHE - Chemistry	CHE1608874		P17929	Investigating the Process of Energy Transfer in UV-Irradiated Triphenylamine bis-Urea Macrocycle Nanotubes	Chemistry, Geochemistry	1	5
Clifford Bowers (S)	C		University of Florida	Chemistry									
Baillie DeHaven (G)	C		University of South Carolina	Chemistry									
Ammon Sindt (G)	C		University of South Carolina	Chemistry and Biochemistry									
John Tokarski (G)	C		University of Florida	Chemistry									
Gary Meints (S)	PI	*	Missouri State University	Chemistry	No other support				P17938	Local Dynamics of Damaged DNA by 2H SSNMR	Chemistry, Geochemistry	1	7
Dylan Murray (S)	PI	*	University of California Davis	Chemistry	No other support				P17941	Molecular Determinants for the Assembly of Low Complexity Protein Domains	Biology, Biochemistry, Biophysics	6	40
Robert Schurko (S)	PI		Florida State University	Chemistry	State of Florida	Other	n/a		P17946	Multinuclear Solid-State NMR of Quadrupolar Nuclei in Active Pharmaceutical Ingredients	Biology, Biochemistry, Biophysics	21	86

Participants (Name, Role, Org., Dept.)					Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Christer Aakeroy (S)	C		Kansas State University	Chemistry and Biochemistry	State of Florida	Other						
Louae Abdulla (G)	C		University of Windsor	Chemistry	National High Magnetic Field Laboratory	US Government Lab						
Adam Altenhof (G)	C		Florida State University	Chemistry and Biochemistry	NSERC (Canada)	Other Non US Federal Agency	n/a					
Ulrich Fekl (S)	C		University of Toronto (Mississauga)	Chemistry and Biochemistry	NSERC (Canada)	Other Non US Federal Agency	RGPIN-2016-06642					
Tomislav Friscic (S)	C		McGill University	Chemistry	NSERC DG	Other	RGPIN-2016-06642					
Lucio Frydman (S)	C		National High Magnetic Field Laboratory	NMR	NSERC	Non US Council	NSERC RGPIN-2016_06642					
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL	NSERC	Other	NSERC RGPIN-2016_06642					
Sean Holmes (P)	C		Florida State University	Chemistry and Biochemistry	NSERC	Other Non US Federal Agency	NSERC RGPIN-2016_06642					
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Igor Huskic (P)	C		McGill University	Chemistry and Biochemistry								
Austin Peach (G)	C		Florida State University	Chemistry and Biochemistry								
Ernest Prack (G)	C		University of Toronto (Mississauga)	Chemistry and Biochemistry								
John Purdie (U)	C		University of Windsor	Chemistry								
Jennifer Swift (S)	C		Georgetown University	Chemistry								
Cameron Vojvodin (G)	C		Florida State University	Chemistry and Biochemistry								
Taylor Watts (G)	C		Georgetown University	Chemistry								
Joanna Long (S)	PI		University of Florida	Biochemistry & Molecular Biology	No other support			P17947	Cholesterol-AMUPol and AMUPol for Dynamic Nuclear Polarization of Membrane Proteins	Biology, Biochemistry, Biophysics	5	27
Anil Mehta (O)	C		University of Florida	AMRIS	NIH	NIGMS - National Institute of General Medical Sciences	GM122698					
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division	NIH	NIGMS - National Institute of General Medical Sciences	GM018519					
Olivier Ouari (S)	C		Aix-Marseille University	Institute of Free Radical Chemistry	NSF	Other	5P41GM122698-02					
Gwladys Riviere (P)	C		University of Florida	Biochemistry and molecular biology								
Nhi Tran (G)	C		University of Florida	Chemistry								
Bradley Nilsson (S)	PI	*	University of Rochester	Chemistry	NIH	NHLBI - National Heart and Blood Institute	HL138538	P17957	Structural interrogation of the packing architecture in hydrogel biomaterials: Towards rational design	Biology, Biochemistry, Biophysics	3	26
Elena Quigley (G)	C		University of Rochester	Chemistry	NSF	CHE - Chemistry	CHE1904528					
Kendra Frederick (S)	PI		University of Texas, Southwestern	Biophysics	NSF	MCB - Molecular and Cellular Biosciences	MCB1751174	P17968	Protein conformation determined in native cellular environments	Biology, Biochemistry, Biophysics	1	12
Whitney Costello (G)	C		University of Texas, Southwestern	Biophysics								
Jaka Kragelj (P)	C		University of Texas, Southwestern	Biophysics								
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								
Yiling Xiao (P)	C		University of Texas, Southwestern	Biophysics								
Diana Bernin (S)	PI	*	Chalmers University of Technology	Chemistry and Chemical Engineering	No other support			P17969	Resource-efficient wood chips conversion to produce biobased chemicals	Engineering	3	15
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR	Vinnova	Non US Council	2018-03787					
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								
Daniel Topgaard (S)	C		University of Lund	Department of Chemistry								
Oc Hee Han (S)	PI		Korea Basic Science Institute	Western Seoul Center	Ministry of Science & ICT in Korean Government	Non US Ministry		P17974	Dynamic Nuclear Polarization NMR on Secondary Ion Battery Electrode Materials	Magnets, Materials	2	15

Participants (Name, Role, Org., Dept.)					Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Sungsool Wi (S)	C		National High Magnetic Field Laboratory	NMR								
Conggang Li (S)	PI		Wuhan Institute of Physics & Mathematics, Chinese Academy of Sciences	State Key Lab of Magnetic Resonance	Chinese Academy of Sciences	Non US College and University		P17977	Structural characterization of synaptobrevin-2 and its complex in lipid bilayer	Biology, Biochemistry, Biophysics	1	7
Riqiang Fu (S)	C		National High Magnetic Field Laboratory	NMR								
Fang Tian (S)	C		Pennsylvania State University	Biochemistry and Molecular Biology, Penn State Medical School								
Bo Chen (S)	PI		University of Central Florida	Department of Physics	Florida Department of Health, and LIFE program at UCF	Other	7AZ27	P18044	Structure of Beta Amyloid Peptide Ab1-42 and pEAb3-42 in Membrane Environment Using ssNMR	Biology, Biochemistry, Biophysics	4	22
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL	Florida Department of Health	Other	7AZ27					
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
William Brey (S)	PI		National High Magnetic Field Laboratory	NMR	No other support			P18045	Probe testing, development, maintenance, repairs	Magnets, Materials	8	31
Taylor Johnston (G)	C		Florida State University	Chemistry	NIH	NIGMS - National Institute of General Medical Sciences	GM122698					
Omid Sanati (G)	C		University of Georgia	School of Electrical and Computer Engineering	NIH	NIGMS - National Institute of General Medical Sciences	GM120151					
Sungsool Wi (S)	PI		National High Magnetic Field Laboratory	NMR	NSF	CHE - Chemistry	CHE1808660	P18056	Solution State Overhauser DNP at 14 T	Chemistry, Geochemistry	3	8
Shuhui Cai (S)	PI	*	Xiamen University	Department of Electronic Science	National Natural Science Foundation of China	Other		P18057	Development of high-resolution two-dimensional (2D) J-resolved NMR spectroscopy at high fields	Biology, Biochemistry, Biophysics	16	64
Zhong Chen (S)	C		Xiamen University	Electronic Science	National natural science foundation of china	Other						
Riqiang Fu (S)	C		National High Magnetic Field Laboratory	NMR	Xiamen University	Non US College and University						
Yuqing Huang (S)	C		Xiamen University	Electronic Science	National Natural Science Foundation of China	Non US Foundation						
Chunhua Tan (G)	C		Xiamen University	Department of Electronic Science	National Natural Science Foundation of China	Other						
					National Natural Science Foundation of China	Non US College and University						
					Natural Science Foundation of China	Other						
					Natural Science Foundation of China	Non US Foundation						
John Stringer (S)	PI	*	PhoenixNMR	R&D	PhoenixNMR, LLC			P18065	600MHz HFXY 2.5mm DNP Probe Testing/Validation	Biology, Biochemistry, Biophysics	1	7
Loren Andreas (S)	C		Max Planck Institute for Biophysical Chemistry, Goettingen	NMR based structural biology								
Joanna Long (S)	C		University of Florida	Biochemistry & Molecular Biology								
Thorsten Maly (S)	C		Bridge12, Technologies, Inc.	R&D								
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								

Participants (Name, Role, Org., Dept.)					Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Guiming Zhong (S)	PI	*	Chinese Academy of Sciences	Xiamen Institute of Rare Earth Materials	National Natural Science Foundation	Non US Foundation	21603231	P18086	Probing storage mechanisms of anode materials for potassium ion batteries by employing high-magnetic field MAS NMR spectroscopy	Chemistry, Geochemistry	3	8
Huixin Chen (T)	C		Chinese Academy of Sciences	Xiamen Institute of Rare Earth Materials								
Riqiang Fu (S)	C		National High Magnetic Field Laboratory	NMR	National Natural Science Foundation	Non US College and University	21603231					
Faith Scott (P)	PI	*	National High Magnetic Field Laboratory	Biochemistry & Molecular Biology	NIH	NIGMS - National Institute of General Medical Sciences	GM411226	P18089	MAS-DNP Probe development	Chemistry, Geochemistry	1	6.5
Thierry Dubroca (S)	C		National High Magnetic Field Laboratory	EMR								
Petr Gor'kov (S)	C		National High Magnetic Field Laboratory	CIMAR								
Joanna Long (S)	C		University of Florida	Biochemistry & Molecular Biology								
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								
Naresh Dalal (S)	PI		National High Magnetic Field Laboratory	Chemistry	NSF	CHE - Chemistry	CHE907445_	P18094	Study of molecular dynamics on metal organic framework [(CH3)2NH2]Mg(HCOO)3] using solid state NMR spectroscopy	Chemistry, Geochemistry	7	43
Riqiang Fu (S)	C		National High Magnetic Field Laboratory	NMR	NSF	CHE - Chemistry	CHE1464955					
Sanath Kumar Rama Krishna (G)	C		Florida State University	Condensed Matter Physics	Chemistry/FSU Florida State University	US College and University US College and University						
Neeraj Sinha (S)	PI	*	Centre of Bio-Medical Research (CBMR)	Bio-medical department	Science and Engineering Research Board, Government of India	Non US Foundation	EMR/2015/001758	P18099	Structural and interaction study of collagen protein in native bone and cartilage through dynamic nuclear polarization	Biology, Biochemistry, Biophysics	3	14
Sungsool Wi (S)	C		National High Magnetic Field Laboratory	NMR	Science and Engineering Research Board, Government of India	Other Non US Federal Agency	EMR/2015/001758					
Victor Schepkin (S)	PI		National High Magnetic Field Laboratory	CIMAR	No other support			P18100	Non-invasive assessment of rat glioma using 17O labeled glucose	Biology, Biochemistry, Biophysics	1	3
William Brey (S)	C		National High Magnetic Field Laboratory	NMR								
Shannon Helsper (G)	C		National High Magnetic Field Laboratory	NMR								
Cathy Levenson (S)	C		Florida State University	Biomedical Sciences								
Steven Ranner (T)	C		National High Magnetic Field Laboratory	Instrumentation & Operations								
Lothar Schad (S)	C		Heidelberg University	Computer Assisted Clinical Medicine								
Daniel Topgaard (S)	PI	*	University of Lund	Department of Chemistry	Swedish Foundation for Strategic Research	Other	ITM17-0267	P19104	White matter relaxation anisotropy at ultrahigh magnetic field	Biology, Biochemistry, Biophysics	1	5
Jens Rosenberg (S)	C		National High Magnetic Field Laboratory	NMR								
Robert Silvers (S)	PI	*	Florida State University	Chemistry and Biochemistry	Florida State University	Other	STARTUP	P19107	Development of ssNMR methods for structural elucidation of RNAs and RNPs	Biology, Biochemistry, Biophysics	4	7
Yimin Miao (P)	C		Florida State University	Chemistry & Biochemistry	Florida State University	US College and University	STARTUP					
Ansgar Siemer (S)	PI	*	University of Southern California	Physiology and Neuroscience	NIH	NIA - National Institute on Aging	AG061865	P19109	High MAS frequency fingerprint spectra of Amyloid-ß fibrils or mammalian origin	Biology, Biochemistry, Biophysics	1	2
Yan-Yan Hu (S)	PI	*	Florida State University	Chemistry & Biochemistry	No other support			P19111	Structure-property correlation in Cl-doped tetragonal Na3PS4 (t-Na3PS4)	Chemistry, Geochemistry	7	21
Xuyong Feng (P)	C		Florida State University	Chemistry and Biochemistry	NSF	DMR - Division of Materials Research	DMR1157490					
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								

Participants (Name, Role, Org., Dept.)					Funding (Funding Agency, Division, Award #) Sources			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Xiangwu Zhang (G)	PI	*	North Carolina State University	Wilson College of Textiles	DOE	EERE - Energy Efficiency and Renewable Energy	DE-EE0007806	P19119	Interconnected Double Layers with Ultrafast and Continuous Li+ Conduction from Cathode to Anode for solid-state Li-S batteries	Engineering	5	18
Yan-Yan Hu (S)	C		Florida State University	Chemistry & Biochemistry	NSF	DMR - Division of Materials Research	DMR1720139					
Jin Zheng (G)	C		Florida State University	Chemistry & Biochemistry								
Guangjin Hou (S)	PI	*	Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis	National Natural Science Foundation of China	Non US Foundation		P19138	High field NMR and DNP enhanced NMR study of metal oxide catalysts	Chemistry, Geochemistry	5	29
Hongyu Chen (G)	C		Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis								
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Ivan Hung (S)	C		National High Magnetic Field Laboratory	CIMAR/NMR								
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								
Dong Xiao (P)	C		Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis								
Zhenchao Zhao (S)	C		Dalian Institute of Chemical Physics	State Key Laboratory of Catalysis								
Michael Harrington (S)	PI		Huntington Medical Research Institutes	Molecular Neurology	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS010724	P19167	Evaluating Brain Dysfunction in Migraine	Biology, Biochemistry, Biophysics	6	52.5
Nastaren Abad (G)	C		Florida State University	Chemical-Biomedical Engineering	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS201072					
Hannah Alderson (U)	C		Florida State University	Chemical & Biomedical Engineering	NIH	NINDS - National Institute of Neurological Disorders and Stroke	NS072497					
Samuel Grant (S)	C		National High Magnetic Field Laboratory	Chemical & Biomedical Engineering								
Samuel Holder (G)	C		Florida State University	Chemical & Biomedical Engineering								
Linda Petzold (S)	C		University of California, Santa Barbara	Computer Science								
Yan-Yan Hu (S)	PI	*	Florida State University	Chemistry & Biochemistry	NSF	DMR - Division of Materials Research	DMR1808517	P19169	In-situ and Operando MRI studies of All-solid-state Batteries	Chemistry, Geochemistry	1	12
Po-Hsiu Chien (G)	C		Florida State University	Chemistry and Biochemistry								
Haoyu Liu (G)	C		Florida State University	Chemistry								
Frederic Mentink (S)	C		National High Magnetic Field Laboratory	NMR Division								
Sossina Haile (S)	PI		Northwestern University	Materials Science and Engineering, and Chemistry	NSF	DMR - Division of Materials Research	DMR1720139	P19180	Multinuclear Solid-state NMR Investigations of Oxyhalides, Oxynitrides and Chalcohalides	Biology, Biochemistry, Biophysics	6	51
Michael Deck (G)	C		Florida State University	Chemistry								
Yan-Yan Hu (S)	C		Florida State University	Chemistry & Biochemistry								
Mercouri Kanatzidis (S)	C		Northwestern University	Chemistry								
Haoyu Liu (G)	C		Florida State University	Chemistry								
Tobin Marks (S)	C		Northwestern University	Chemistry								
Shobhit Pandey (G)	C		Northwestern University	Chemistry								
Sawankumar Patel (G)	C		Florida State University	Chemistry								
Kenneth Poeppelmeier (S)	C		Northwestern University	Chemistry								
Sheel Sangvi (G)	C		Northwestern University	Chemistry								
Louis Wang (G)	C		Northwestern University	Chemistry								
Pengbo Wang (G)	C		Florida State University	Chemistry								

Participants (Name, Role, Org., Dept.)					Funding (Funding Agency, Division, Award #)		Sources	Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Xueqian Kong (S)	PI	*	Zhejiang University	Chemistry	Zhejiang university	Non US College and University		P19234	Solid state NMR Investigation of highly conductive solid electrolytes	Biology, Biochemistry, Biophysics	2	5
Waseem Afzaal (G)	C		Florida State University	Chemistry								
Lina Gao (G)	C		Florida State University	Department of Chemistry & Biochemistry								
Yan-Yan Hu (S)	C		Florida State University	Chemistry & Biochemistry								
Xueqian Kong (S)	PI	*	Zhejiang University	Chemistry	Zhejiang University	Non US College and University		P19235	Ultrahigh Field NMR Study of the Formation and Decomposition Mechanisms of MOFs	Magnets, Materials	2	6
Zhehong Gan (S)	C		National High Magnetic Field Laboratory	NHMFL								
Hanxi Guan (G)	C		Zhejiang University	Chemistry								
									Total Proposals: **104**		Experiments: **570**	Days: **3,511**

7. Pulsed Field Facility

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Brian Maple (S)	PI	University of California, San Diego	Inst for Pure & Applied Physical Sciences	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-04ER46105	P14714	Electrical Resistivity, Magnetization and Specific Heat Measurements of PrT2Cd20 (T = Ni, Pd) at Low Temperatures in High Magnetic Fields	Condensed Matter Physics	1	5
Alexander Breindel (G)	C	University of California, San Diego	Physics	DOE	NNSA - National Nuclear Security Administration	DE-NA0002909					
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics	ICAM and the Gordon and Betty Moore Foundation	US Foundation	GBMF5305					
Sheng Ran (P)	C	University of California, San Diego	Physics								
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Vivien Zapf (S)	C	National High Magnetic Field Laboratory	Physics								
Paul Goddard (S)	PI	University of Warwick	Department of Physics	ERC	Non US Council	681260	P14754	Investigating random exchange in a molecular spin layer	Condensed Matter Physics	1	5
Sam Curley (G)	C	University of Warwick	Physics and Astronomy								
Tom Lancaster (S)	C	University of Oxford	Department of Physics								
Chris Landee (S)	C	Clark University	Department of Physics								
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Mark Turnbull (S)	C	Clark University	Chemistry								
Fan Xiao (G)	C	Clark University	Physics								
Arkady Shehter (S)	PI	National High Magnetic Field Laboratory	NHMFL, DC Field Facility	NSF	DMR - Division of Materials Research	DMR1644779	P14902	Bulk linear magnetoresistance in the quantum critical regime of La2-xSrxCuO4	Condensed Matter Physics	1	5
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF								
Jonathan Betts (S)	C	National High Magnetic Field Laboratory	NHMFL-PFF								
Greg Boebinger (S)	C	National High Magnetic Field Laboratory	Directors Office								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
Kimberly Modic (G)	C	National High Magnetic Field Laboratory	PFF								
Brad Ramshaw (S)	C	Cornell University	Laboratory of Atomic and Solid State Physics								
Ni Ni (S)	PI	University of California, Los Angeles	Physics and Astronomy	NSF	DMR - Division of Materials Research	DMR1157490	P14905	High magnetic field study of semimetals with nontrivial topology	Condensed Matter Physics	1	5
Jazmine Green (G)	C	University of California, Los Angeles	Physics								
Chaowei Hu (G)	C	University of California, Los Angeles	Department of Physics and Astronomy								
Eleni Pagona Kyriazi (U)	C	University of California, Los Angeles	Physics								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
James Analytis (S)	PI	University of California, Berkeley	Physics	Gordon and Betty Moore Foundation	Other		P14906	Magnetotransport Studies of the Strange Metal State in an Unconventional High-Temperature Superconductor	Condensed Matter Physics	1	5
Nicholas Breznay (P)	C	Lawrence Berkeley National Laboratory	Materials Science								
Mun Chan (P)	C	National High Magnetic Field Laboratory	Pulsed field Facility								
Shannon Haley (G)	C	University of California, Berkeley	Physics								
Ian Hayes (G)	C	University of California, Berkeley	physics								
Robert Kealhofer (G)	C	University of California, Berkeley	Physics								
Nikola Maksimovic (G)	C	University of California, Berkeley	Physics								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
Brad Ramshaw (S)	C	Cornell University	Laboratory of Atomic and Solid State Physics								
Krzysztof Gofryk (S)	PI	Idaho National Laboratory	Fuel Performance & Design	DOE	Office of Science - ECRP - Early Career Research Program	K. Gofry's Early Career Award	P14907	Magnetoelestic behavior in uranium antimonide (USb) probed by magnetostriction and magnetization at high magnetic fields.	Condensed Matter Physics	2	10
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF	DOE	Office of Science - BES – Basic Energy Sciences	K. Gofryk's Early Career Award					
Xiaxin Ding (P)	C	Idaho National Laboratory	NST								
Neil Harrison (S)	C	National High Magnetic Field Laboratory	Physics								
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics								
Narayan Poudel (P)	C	Idaho National Laboratory	Nuclear Materials								
Dagmar Weickert (S)	C	National High Magnetic Field Laboratory	MPA-Mag								
Jamie Manson (S)	PI	Eastern Washington University	Chemistry and Biochemistry	NSF	DMR - Division of Materials Research	DMR1703003	P15991	Structure-property relationships in spin-1 quantum magnets	Condensed Matter Physics	1	5
Paul Goddard (S)	C	University of Warwick	Department of Physics								

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Craig Topping (G)	C	National High Magnetic Field Laboratory	MPA-CMMS								
Brad Ramshaw (S)	PI	Cornell University	Laboratory of Atomic and Solid State Physics	Cornell university	US College and University		P16083	Ultrasonic exploration of the high-eld phase of TaAs	Condensed Matter Physics	1	10
Maja Bachmann (G)	C	Max Planck Institute for Chemical Physics of Solids, Dresden	Microstructured Quantum Mater								
Eric Bauer (S)	C	Los Alamos National Laboratory	MST-10								
Yawen Fang (G)	C	Cornell University	Laboratory of Atomic and Solid State Physics								
Xiangwei Huang (G)	C	Ecole Polytechnique Federale de Lausanne	IMX								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
Kimberly Modic (G)	C	National High Magnetic Field Laboratory	PFF								
Philip Moll (S)	C	Ecole Polytechnique Federale de Lausanne	Institute of Materials								
Filip Ronning (S)	C	Los Alamos National Laboratory	MPA-CMMS								
Johnpierre Paglione (S)	PI	University of Maryland, College Park	Center for Nanophysics and Advanced Materials, Department of Physics	NSF	DMR - Division of Materials Research	DMR1610349	P16084	Fermi Surface Study by Quantum Oscillations in Transition Metal Phosphides	Condensed Matter Physics	1	5
Daniel Campbell (G)	C	University of Maryland, College Park	Physics	Gordon and Betty Moore Foundation	US Foundation	GBMF4419					
Yun Suk Eo (G)	C	University of Michigan	Physics Department								
David Graf (S)	C	National High Magnetic Field Laboratory	DC Field CMS								
Paul Neves (U)	C	University of Maryland, College Park	Center for Nanophysics and Advanced Materials								
Kefeng Wang (P)	C	University of Maryland, College Park	Department of Physics								
Brandon Wilfong (G)	C	University of Maryland, College Park	Center for Nanophysics and Advanced Materials								
Janice Musfeldt (S)	PI	University of Tennessee, Knoxville	Department of Chemistry	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-01ER45885	P16137	High field spectroscopy of materials	Chemistry, Geochemistry	2	10
Avery Blockmon (G)	C	University of Tennessee, Knoxville	Chemistry	NSF	DMR - Division of Materials Research	DMR170784_					
Amanda Clune (G)	C	University of Tennessee, Knoxville	Chemistry								
Kendall Hughey (G)	C	University of Tennessee, Knoxville	Chemistry								
Kiman Park (G)	C	University of Tennessee, Knoxville	Chemistry								
Michael Yokosuk (G)	C	University of Tennessee, Knoxville	Chemistry								
Joseph Checkelsky (S)	PI	Massachusetts Institute of Technology	Physics	Massachusetts Institute of Technology	US College and University		P16258	High Field Studies of Magnetic Weyl Semimetals	Condensed Matter Physics	3	23
Aravind Devarakonda (G)	C	Massachusetts Institute of Technology	Physics	MIT	US College and University						
Minyong Han (G)	C	Massachusetts Institute of Technology	Physics								
Hisashi Inoue (P)	C	Massachusetts Institute of Technology	Physics								
Takashi Kurumaji (P)	C	Massachusetts Institute of Technology	Physics								
Takehito Suzuki (P)	C	Massachusetts Institute of Technology	Department of Physics								
Linda Ye (G)	C	Massachusetts Institute of Technology	Physics								
Junbo Zhu (G)	C	Massachusetts Institute of Technology	Physics								
Grace Morgan (S)	PI	University College Dublin	School of Chemistry and Chemical Biology	No other support			P16285	Multiferroic behavior at spin-state transitions – beyond Mn(taa)	Condensed Matter Physics	1	10
Shalinee Chikara (S)	C	National High Magnetic Field Laboratory	CMS, DC Field Facility								
Xiaxin Ding (P)	C	Idaho National Laboratory	NST								
Vibe Jakobsen (G)	C	University College Dublin	School of Chemistry								
Conor Kelly (G)	C	University College Dublin	Department of Chemistry								
Jurek Krzystek (S)	C	National High Magnetic Field Laboratory	Condensed Matter Science								
Irina Kuehne (P)	C	University College Dublin	School of Chemistry								
Andrew Ozarowski (S)	C	National High Magnetic Field Laboratory	EMR								
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Johan van Tol (S)	C	National High Magnetic Field Laboratory	EMR								
Vivien Zapf (S)	C	National High Magnetic Field Laboratory	Physics								
Masashi Miura (S)	PI	Seikei University	Graduate School of Science and Technology	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC1092	P16306	V-I curves in pulsed fields to study vortex matter		3	15

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Maxime Leroux (P)	C	Los Alamos National Laboratory	MPA-CMMS	DOE	Office of Science - BES – Basic Energy Sciences	LANL06			Condensed Matter Physics		
Boris Maiorov (S)	C	Los Alamos National Laboratory	MPA-STC								
Ivan Nekrashevich (P)	C	CMMS	MPA								
Zhiqiang Mao (S)	PI	Pennsylvania State University	Department of Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC0012432	P16316	Studies of exotic quantum phenomena near the quantum limit in Dirac semimetals AMnSb2 (A=Sr, Ba and Yb)	Condensed Matter Physics	2	10
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF	DOE	LDRD - Laboratory Directed R&D	20160085DR					
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics	DOE	Office of Science - ASCR - Advanced Scientific Computing Research	DE-SC0019068					
Jinyu Liu (G)	C	Tulane University	Department of Physics and Engineering Physics								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
Lujin Min (G)	C	Pennsylvania State University	Department of Physics								
Wei Ning (P)	C	Pennsylvania State University	Department of Physics								
Yanglin Zhu (G)	C	Tulane University	Department of Physics and Engineering Physics								
Brian Maple (S)	PI	University of California, San Diego	Inst for Pure & Applied Physical Sciences	DOE	Office of Science - BES – Basic Energy Sciences	DE-FG02-04ER46105	P17341	Physical properties of the URu2Si2 system with chemical substitution in high magnetic fields	Condensed Matter Physics	1	5
Alexander Breindel (G)	C	University of California, San Diego	Physics								
Yuankan Fang (P)	C	University of California, San Diego	Physics								
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Paul Goddard (S)	PI	University of Warwick	Department of Physics	European Research Council	Non US Council	Grant Agreement No. 681260	P17349	Controlled introduction of disorder in coordination polymer quantum magnets	Condensed Matter Physics	1	12
Jamie Manson (S)	C	Eastern Washington University	Chemistry and Biochemistry								
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Robert Williams (P)	C	University of Warwick	Dept of Physics								
Lu Li (S)	PI	University of Michigan	Physics	NSF	DMR - Division of Materials Research	DMR1707620	P17467	Interaction-Driven Topological Materials	Condensed Matter Physics	4	28
Tomoya Asaba (G)	C	University of Michigan	Physics								
Kuan-Wen Chen (P)	C	University of Michigan	Physics								
Lu Chen (G)	C	University of Michigan	Physics								
Zachary Fisk (S)	C	University of California, Irvine	Physics and Astronomy								
Yuji Matsuda (S)	C	Kyoto University	Physics								
Colin Tinsman (G)	C	University of Michigan	Physics								
Ziji Xiang (P)	C	University of Michigan	Physics								
Huiqiu Yuan (S)	PI	Zhejiang University	Physics Department	National Natural Science Foundation of China (NSFC)	Non US Foundation	No. U1632275	P17475	High field study of topological Kondo semimetals	Condensed Matter Physics	2	15
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF								
Chunyu Guo (G)	C	Zhejiang University	Center for Correlated Matter and Department of Physics								
Bin Shen (G)	C	Zhejiang University	Physics								
John Singleton (S)	C	National High Magnetic Field Laboratory	Physics								
Michael Smidman (P)	C	Zhejiang University	Center for Correlated Matter and Department of Physics								
An Wang (G)	C	Zhejiang University	Physics								
Kent Shirer (P)	PI	Max Planck Institute for Chemical Physics of Solids, Dresden	Microstructured Quantum Matter and Physics of Quantum Materials	No other support			P17502	Magnetoresistance anomaly in CeRhIn5 at 100 T	Condensed Matter Physics	1	5
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF								
Eric Bauer (S)	C	Los Alamos National Laboratory	MST-10								
Ross McDonald (S)	C	National High Magnetic Field Laboratory	Physics								
Philip Moll (S)	C	Ecole Polytechnique Federale de Lausanne	Institute of Materials								
Brad Ramshaw (S)	C	Cornell University	Laboratory of Atomic and Solid State Physics								
Filip Ronning (S)	C	Los Alamos National Laboratory	MPA-CMMS								
Eric Bauer (S)	PI	Los Alamos National Laboratory	MST-10	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC100	P17510	The ground-state of cuprate high-temperature superconductors		4	37

Participants (Name, Role, Org., Dept.)				Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Joonbum Park (P)	C	Los Alamos National Laboratory	National High Magnetic Field Laboratory	DOE	Office of Science - BES – Basic Energy Sciences	F10100 "Science at 100 T"			Condensed Matter Physics		
Katherine Schreiber (P)	C	National High Magnetic Field Laboratory	NHMFL Pulsed Field Facility	DOE	Office of Science - BES – Basic Energy Sciences	F10100 "Science of 100 Tesla"					
				DOE	Office of Science - BES – Basic Energy Sciences	F10100					
Jens Haenisch (S)	PI	Karlsruhe Institute of Technology	Institute for Technicla Physics	Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (B)	Other	16H04646	P17518	Anisotropic electrical transport in pinning-enhanced Fe-based and HTS superconducting thin films	Condensed Matter Physics	2	10
Pablo Cayado (P)	C	Karlsruhe Institute Of Technology	Institute for Technical Physics (ITEP)	JSPS Grant-in-Aid for Scientic Research (B)	Other	16H04646					
Kazumasa Iida (S)	C	Nagoya University	Dep. of Crystalline Materials Science, Graduate School of Engineering	JST CREST	Other	JPMJCR18J4					
Mayraluna Lao (P)	C	Karlsruhe Institute of Technology	Institute of Technical Physics								
Chiara Tarantini (S)	C	National High Magnetic Field Laboratory	Applied Superconductivity Center								
Eric Bauer (S)	PI	Los Alamos National Laboratory	MST-10	No other support			P17522	Electronic properties of putative topological Kondo insulators.	Condensed Matter Physics	2	17
Mun Chan (P)	C	National High Magnetic Field Laboratory	Pulsed field Facility	DOE	Other	XWR-500					
Daniel Jackson (P)	C	National High Magnetic Field Laboratory	MPA/MAG								
Joonbum Park (P)	C	Los Alamos National Laboratory	National High Magnetic Field Laboratory								
James Analytis (S)	PI	University of California, Berkeley	Physics	Gordon and Betty Moore Foundation			P17533	Extreme magnetoresistance and unconventional transport in rare-earth monopnictides	Condensed Matter Physics	1	5
Toni Helm (P)	C	Max Planck Institute, Dresden	Physics of Quantummaterials	NSF	GRFP - Graduate Research Fellowship Program	GRFP1106400					
Robert Kealhofer (G)	C	University of California, Berkeley	Physics								
Nikola Maksimovic (G)	C	University of California, Berkeley	Physics								
eran maniv (P)	C	University of California, Berkeley	Physics								
Philip Moll (S)	C	Ecole Polytechnique Federale de Lausanne	Institute of Materials								
Vikram Nagarajan (G)	C	University of California, Berkeley	Physics								
Marcelo Jaime (S)	PI	National High Magnetic Field Laboratory	Physics	No other support			P17600	Ultrahigh magnetic field dilatometry	Magnets, Materials	1	12
Dwight Rickel (S)	C	National High Magnetic Field Laboratory	National High Magnetic Field Laboratory								
George Rodriguez (S)	C	Los Alamos National Laboratory	MPA-CINT								
Andreas Stier (P)	C	National High Magnetic Field Laboratory	MPA-CMMS								
Stefan Sullow (S)	PI	Technical University of Braunschweig	IPKM	No other support			P17614	Investigation of the quantum saw-tooth chain atacamite, Cu_2Cl(OH)_3, in high magnetic fields	Condensed Matter Physics	2	10
Neil Harrison (S)	C	National High Magnetic Field Laboratory	Physics	VSP		DMR 1157490					
Marcelo Jaime (S)	C	National High Magnetic Field Laboratory	Physics								
Raivo Stern (S)	C	National Institute of Chemical Physics and Biophysics	Chemical Physics								
Dagmar Weickert (S)	C	National High Magnetic Field Laboratory	MPA-Mag								
Mijkhail Eremets (S)	PI	Max Planck Institute for Chemistry, Mainz	Chemistry and Physics at High Pressures Group	Max Planck Society	Non US Foundation		P17644	High field superconducting phase-diagram of sulphur hydride/deuteride	Condensed Matter Physics	1	10
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF								
Luis Balicas (S)	C	National High Magnetic Field Laboratory	Condensed Matter Experiment								
Laura Greene (S)	C	National High Magnetic Field Laboratory	Management and Administration								
Shirin Mozaffari (P)	C	National High Magnetic Field Laboratory	Condensed Matter Sciences								
Dan Sun (P)	C	Los Alamos National Laboratory	MPA-MAG								
Swee Goh (S)	PI	Chinese University of Hong Kong	Department of Physics	UCGP		TBA	P17646	Pressure-driven quantum magneto-transport phenomena in topological semimetals	Condensed Matter Physics	1	5
Fedor Balakirev (S)	C	National High Magnetic Field Laboratory	PFF	Research Grants Council Hong Kong	Other						
Kwing To Lai (P)	C	Chinese University of Hong Kong	Physics								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Joonbum Park (P)	C		Los Alamos National Laboratory	National High Magnetic Field Laboratory								
Dan Sun (P)	C		Los Alamos National Laboratory	MPA-MAG								
Jianyu Xie (G)	C		Chinese University of Hong Kong	Physics								
Wei Zhang (G)	C		Chinese University of Hong Kong	Physics								
Dan Sun (P)	PI		Los Alamos National Laboratory	MPA-MAG	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-07CH11358	P17654	High field high pressure measurements on low carrier density semimetals	Condensed Matter Physics	1	5
Sergey Bud'ko (S)	C		Ames Laboratory	Physics and Astronomy								
Na Hyun Jo (G)	C		Ames Laboratory	Division of Materials Science & Engineering								
Priscila Ferrari Silveira Rosa (P)	PI		Los Alamos National Laboratory	MPA-CMMS	DOE	Office of Science - BES – Basic Energy Sciences	DE-LANLF101	P17682	Pulsed field measurements on topological semi-metals	Condensed Matter Physics	3	29
Eric Bauer (S)	C		Los Alamos National Laboratory	MST-10	DOE	Office of Science - BES – Basic Energy Sciences	F101					
Mun Chan (P)	C		National High Magnetic Field Laboratory	Pulsed field Facility								
Neil Harrison (S)	C		National High Magnetic Field Laboratory	Physics								
Satya Kushwaha (P)	C		Los Alamos National Laboratory	MPA-MAG								
Ross McDonald (S)	C		National High Magnetic Field Laboratory	Physics								
Ulrich Welp (S)	PI		Argonne National Laboratory	Materials Science Division	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-06CH11357	P17689	High field phase diagrams and Fermi-surface topologies of the new magnetic superconductors AEuFe4As4	Condensed Matter Physics	1	17
Fedor Balakirev (S)	C		National High Magnetic Field Laboratory	PFF								
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
Matthew Smylie (P)	C		Argonne National Laboratory	Materials Science Division								
Emilia Morosan (S)	PI		Rice University	Physics and Astronomy	The Gordon and Betty Moore Foundation EPiQS initiative	US Foundation	GBMF 4417	P17706	Ferromagnetic Correlations in an Antiferromagnetically Ordered Yb-based Intermetallic Compound	Condensed Matter Physics	1	5
Chien-Lung Huang (S)	C		Rice University	Physics and Astronomy								
Vivien Zapf (S)	C		National High Magnetic Field Laboratory	Physics								
Joonbum Park (P)	PI	*	Los Alamos National Laboratory	National High Magnetic Field Laboratory	UCGP		DMR-1644779	P17717	Development of pulse magnetic field uniaxial pressure cells	Magnets, Materials	3	15
Neil Harrison (S)	C		National High Magnetic Field Laboratory	Physics	No other support							
Hideaki Sakai (S)	C		Osaka University	Department of Physics								
Nicholas Butch (S)	PI		National Institute of Standards and Technology	NIST Center for Neutron Research	NIST	US Government Lab		P17740	High magnetic field study of physical properties of U chalcogenides	Condensed Matter Physics	2	10
I-LIn Liu (G)	C		University of Maryland, College Park	Chemical Physics								
Sheng Ran (P)	C		University of Maryland, College Park	Physics								
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
Scott Crooker (S)	PI		National High Magnetic Field Laboratory	Nat High Magnetic Field Lab	DOE	LDRD - Laboratory Directed R&D		P17750	Optical Spectroscopy of Excited Rydberg Excitons (& Determination of Exciton Mass) in Monolayer Semiconductors	Condensed Matter Physics	2	15
Mateusz Goryca (P)	C		National High Magnetic Field Laboratory	NHMFL	DOE	LDRD - Laboratory Directed R&D	DE-AA99-99AR65656					
Jing Li (P)	C		Los Alamos National Laboratory	MPA-MAGLAB								
Xavier Marie (S)	C		National Institute for Applied Sciences, Toulouse	Laboratoire de Physique et Chimie des Nano-objets								
Andreas Stier (P)	C		National High Magnetic Field Laboratory	MPA-CMMS								
Bernhard Urbaszek (S)	C		National Institute for Applied Sciences, Toulouse	Laboratoire de Physique et Chimie des Nano-objets								
Nathan Wilson (G)	C		University of Washington	Physics								
Xiaodong Xu (S)	C		University of Washington	Physics								
Takao Ebihara (S)	PI	*	Shizuoka University	Physics	japan society for the promotion of science	Non US Foundation	18K03537	P17751	Quantum oscillation in heavy fermion system at high magnetic fields	Condensed Matter Physics	1	10
Neil Harrison (S)	C		National High Magnetic Field Laboratory	Physics								
Marcelo Jaime (S)	C		National High Magnetic Field Laboratory	Physics								
John Mitchell (S)	PI		Argonne National Laboratory	Materials Science Division	DOE	Office of Science - BES – Basic Energy Sciences	DE-BES-58916	P17759	Fermi surface and Berry Phase in a newly proposed triply degenerate topological semimetal	Condensed Matter Physics	1	5
Nirmal Ghimire (P)	C		Argonne National Laboratory	Materials Science Division								
Mojammel Alam Khan (P)	C		Argonne National Laboratory	Materials Science Division								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Neil Harrison (S)	PI		National High Magnetic Field Laboratory	Physics	DOE	Other	LDRD	P17768	Electronic Structure and Equation of State of Plutonium	Condensed Matter Physics	6	49
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics	LANL LDRD	US Government Lab	XWPF00					
Paul Tobash (P)	C		National High Magnetic Field Laboratory	MPA-cmms	los alamos national laboratory	US Government Lab						
Mark Wartenbe (P)	C		Los Alamos National Laboratory	MST-16								
Laurel Winter (S)	C		National High Magnetic Field Laboratory	Physics								
Dagmar Weickert (S)	PI		National High Magnetic Field Laboratory	MPA-Mag	DOE	Office of Science - BES – Basic Energy Sciences	DE-LANLF100	P17769	Exotic ordered ground states in low-dimensional spin systems induced by high magnetic fields	Condensed Matter Physics	2	10
Mun Chan (P)	C		National High Magnetic Field Laboratory	Pulsed field Facility	NSF	DMR - Division of Materials Research	DMR1644779					
Carolina Corvalan Moya (S)	C		Los Alamos National Laboratory	MPA-MAG								
Hanna Dabkowska (S)	C		McMaster University	Physics and Astronomy								
Bruce Gaulin (S)	C		McMaster University	Physics and Astronomy								
Myron Salamon (S)	C		University of Texas, Dallas	Physics								
Andres Saul (S)	C		Aix-Marseille University	CINaM/CNRS								
Katherine Schreiber (P)	C		National High Magnetic Field Laboratory	NHMFL Pulsed Field Facility								
Hidekazu Tanaka (S)	C		Tokyo Institute of Technology	Physics								
Alexander Tsirlin (S)	C		National Institute of Chemical Physics and Biophysics	Chemical physics								
Brad Ramshaw (S)	PI		Cornell University	Laboratory of Atomic and Solid State Physics	Kavli Institute at Cornell	US Foundation		P17776	The fractional quantum Hall effect in a polarization induced 2-D electron gas	Condensed Matter Physics	1	5
Debdeep Jena (S)	C		Cornell University	ECE								
Menyoung Lee (P)	C		Cornell University	KIC & LASSP								
Paul McEuen (S)	C		Cornell University	Physics								
John Wright (G)	C		Cornell University	Material Science and Engineering								
Huili Xing (S)	C		Cornell University	ECE								
Qi Li (S)	PI	*	Pennsylvania State University	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-SC46531___	P17849	Shubnikov de Haas oscillation of two dimensional electron gases with strong spin-orbit coupling at transition metal oxide interfaces	Condensed Matter Physics	1	19
Shalini Kumari (P)	C		Pennsylvania State University	Physics								
Ziqiao Wang (G)	C		Pennsylvania State University	Physics								
Susanne Stemmer (S)	PI	*	University of California, Santa Barbara	Materials	DOD	US Navy	N00014-16-1-2814	P17876	3D Dirac Semimetal Thin Films	Condensed Matter Physics	1	5
Luca Galletti (P)	C		University of California, Santa Barbara	Materials Department	DOE	Office of Science - BES – Basic Energy Sciences	DE-AA99-99AA99999					
David Kealhofer (G)	C		University of California, Santa Barbara	Physics								
Ross McDonald (S)	C		National High Magnetic Field Laboratory	Physics								
Timo Schumann (P)	C		University of California, Santa Barbara	Materials Department								
James Analytis (S)	PI		University of California, Berkeley	Physics	DOE	Office of Science - BES – Basic Energy Sciences	DE-AC02-05CH11231	P17891	High field magnetic phase transitions in intercalated transition metal dichalcogenides	Condensed Matter Physics	1	5
Shannon Haley (G)	C		University of California, Berkeley	Physics								
Vikram Nagarajan (U)	C		University of Minnesota, Twin Cities	Physics								
Nityan Nair (G)	C		University of California, Berkeley	Physics								
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
Ryan Baumbach (S)	PI		National High Magnetic Field Laboratory	CMS	DOE	Office of Science - BES – Basic Energy Sciences	DESC0016568	P17894	Investigation of dual nature f-electron intermetallics using high magnetic fields	Condensed Matter Physics	1	6
You Lai (G)	C		National High Magnetic Field Laboratory	Physics								
Jamie Manson (S)	PI		Eastern Washington University	Chemistry and Biochemistry	NSF	DMR - Division of Materials Research	DMR1703003	P17903	Pressure-dependent magnetization measurements on low-dimensional quantum magnets	Condensed Matter Physics	1	12
Sam Curley (G)	C		University of Warwick	Physics and Astronomy								
Paul Goddard (S)	C		University of Warwick	Department of Physics								
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
Dan Sun (P)	C		Los Alamos National Laboratory	MPA-MAG								
Minhyea Lee (S)	PI	*	University of Colorado, Boulder	Physics	Colorado Energy Research Collaboratory	US Council		P17906	Investigation on unusual magnetic responses in quantum magnets	Condensed Matter Physics	2	10
Gang Cao (S)	C		University of Colorado, Boulder	Department of Physics.	Colorado Energy Research Collaboratory	Other						
Ian Leahy (G)	C		University of Colorado, Boulder	Physics								
Ross McDonald (S)	C		National High Magnetic Field Laboratory	Physics								
Christopher Pocs (G)	C		University of Colorado, Boulder	Physics								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Arkady Shehter (S)	C		National High Magnetic Field Laboratory	NHMFL, DC Field Facility								
Peter Siegfried (G)	C		University of Colorado, Boulder	Physics								
John DiTusa (S)	PI	*	Louisiana State University	Department of Physics and Astronomy	DOE	EPSCoR - Established Program to Stimulate Competitive Research	DESC0012432	P17911	Investigation of high field magnetization in non-centrosymmetric helimagnet ScFeGe and chiral Fe1/3NbS2	Condensed Matter Physics	1	16
Jessica Herbert (O)	C		Los Alamos National Laboratory	MST-16: Nuclear Materials Science								
Sunil Karna (P)	C		Louisiana State University	Physics and Astronomy Department								
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
James Analytis (S)	PI		University of California, Berkeley	Physics	Moore foundation	Other		P17919	Magnetotransport Studies of Ferromagnetic Weyl semimetals	Condensed Matter Physics	1	5
Shannon Haley (G)	C		University of California, Berkeley	Physics								
Ella Lachman (P)	C		University of California, Berkeley	Physics								
Nikola Maksimovic (G)	C		University of California, Berkeley	Physics								
Bob Cava (S)	PI		Princeton University	+	NSF	Other	DMR-1420541	P17921	An investigation of 2D van der Waals magnetic materials by pulse-magnetic field of 65 T	Biology, Biochemistry, Biophysics	1	5
Mun Chan (P)	C		National High Magnetic Field Laboratory	Pulsed field Facility	The Gordon and Betty Moore Foundation EPiQS Program	Other	GBMF-4412					
Neil Harrison (S)	C		National High Magnetic Field Laboratory	Physics								
Tai Kong (P)	C		Princeton University	Department of Chemistry								
Satya Kushwaha (P)	C		Los Alamos National Laboratory	MPA-MAG								
Philip Moll (S)	PI		Ecole Polytechnique Federale de Lausanne	Institute of Materials	No other support			P17942	Interlayer quantum coherence: A novel oscillatory magnetoresistance phenomenon	Condensed Matter Physics	1	12
Maja Bachmann (G)	C		Max Planck Institute for Chemical Physics of Solids, Dresden	Microstructured Quantum Mater								
Seunghyun Khim (G)	C		Seoul National University	Department of Physics and Astronomy								
Andrew Mackenzie (S)	C		University of St. Andrews	School of Physics & Astronomy								
Carsten Putzke (U)	C		University of Bristol	Physics								
Sang Wook Cheong (S)	PI		Rutgers University, New Brunswick	Physics and Astronomy	Gordon and Betty Moore Foundation	US Foundation	GBMF4413	P18025	High magnetic field study of layered chiral magnets	Condensed Matter Physics	1	12
Jae Wook Kim (P)	C		Rutgers University, New Brunswick	Physics and Astronomy								
Choongjae Won (P)	C		Pohang University of Science and Technology	Physics								
Xianghan Xu (G)	C		Rutgers University, New Brunswick	Physics and Astronomy								
Filip Ronning (S)	PI		Los Alamos National Laboratory	MPA-CMMS	DOE	Office of Science - BES – Basic Energy Sciences	E1FR	P18032	Fermiology of quasi-1d heavy fermions	Condensed Matter Physics	1	5
Tomoya Asaba (G)	C		University of Michigan	Physics								
Eric Bauer (S)	C		Los Alamos National Laboratory	MST-10								
Ross McDonald (S)	C		National High Magnetic Field Laboratory	Physics								
Filip Ronning (S)	C		Los Alamos National Laboratory	MPA-CMMS								
Vivien Zapf (S)	C		National High Magnetic Field Laboratory	Physics								
Tomoya Asaba (P)	PI	*	Los Alamos National Laboratory	MPA-CMMS	No other support			P18035	Consequences of non-collinear spin textures in high magnetic fields	Condensed Matter Physics	1	5
Eric Bauer (S)	C		Los Alamos National Laboratory	MST-10								
Filip Ronning (S)	C		Los Alamos National Laboratory	MPA-CMMS								
Marcelo Jaime (S)	PI		National High Magnetic Field Laboratory	Physics	UCGP		Revealing hidden anisotropies in quantum matter via thermal properties under strain	P18046	Thermal and lattice properties of materials under uniaxial strain in pulsed magnetic fields	Condensed Matter Physics	2	15
Krzysztof Gofryk (S)	C		Idaho National Laboratory	Fuel Performance & Design	DOE	Other	NA					
Shusaku Imajo (S)	C		University of Tokyo	International MegaGauss Science Laboratory								
Yoshimitsu Kohama (S)	C		University of Tokyo	Institute for Solid State Physics (ISSP)								
Priscilla Rosa (G)	C		University Estadual de Campinas	Instituto Gleb Wataghin								
Myron Salamon (S)	C		University of Texas, Dallas	Physics								
Rico Schoenemann (P)	C		Los Alamos National Laboratory	MPA-MAG								

Participants (Name, Role, Org., Dept.)					Funding Sources (Funding Agency, Division, Award #)			Proposal #	Proposal Title	Discipline	Exp. #	Days Used
Sean Thomas (T)	C		Los Alamos National Laboratory	CMMS								
Dagmar Weickert (S)	C		National High Magnetic Field Laboratory	MPA-Mag								
Scott Crooker (S)	PI		National High Magnetic Field Laboratory	Nat High Magnetic Field Lab	DOE	Office of Science - BES – Basic Energy Sciences	1234-5678	P18064	Spin dynamics of coexisting core- and shell-based excitonsin semiconductor hetero-nanocrystals	Condensed Matter Physics	1	2
Victor Klimov (S)	C		Los Alamos National Laboratory	C-PCS								
Vivien Zapf (S)	PI		National High Magnetic Field Laboratory	Physics	DOE	LDRD - Laboratory Directed R&D	DE-AA00-00AA00000	P19135	Magnetic field induced spin liquids and quantum phase transitions in orbital-assisted dimerized quantum magnets.	Condensed Matter Physics	1	5
Sang Wook Cheong (S)	C		Rutgers University, New Brunswick	Physics and Astronomy								
Haidong Zhou (S)	C		University of Tennessee, Knoxville	Physics and Astronomy								
James Analytis (S)	PI		University of California, Berkeley	Physics	DOE	MSE - Materials Science and Engineering	DE-SC0000723	P19137	High-field phase transitions in the Kitaev hyperhoneycomb beta-Li2IrO3	Condensed Matter Physics	1	5
Nikola Maksimovic (G)	C		University of California, Berkeley	Physics								
Kimberly Modic (G)	C		National High Magnetic Field Laboratory	PFF								
Hsinhan Tsai (P)	PI	*	Los Alamos National Laboratory	MPA-11	No other support			P19141	New 2D perovskites for high temperature multiferroics	Magnets, Materials	1	5
Wanyi Nie (S)	C		Los Alamos National Laboratory	MPA-11								
Vivien Zapf (S)	C		National High Magnetic Field Laboratory	Physics								
Nirmal Ghimire (S)	PI	*	George Mason University	Physics and Astronomy	George Mason University	US College and University		P19163	High field magnetization and quantum oscillations of metallic Kagome net magnets	Condensed Matter Physics	1	10
John Singleton (S)	C		National High Magnetic Field Laboratory	Physics								
Nishchal Thapa Magar (G)	C		George Mason University	Physics and Astronomy								
Athena Safa-Sefat (S)	PI	*	Oak Ridge National Laboratory	Athena Safa-Sefat Staff Scientist Correlated Electron Materials Group	DOE	Office of Science - BES – Basic Energy Sciences	LANLF101	P19173	Metamagnetic transitions in quantum spin liquid candidates CsRESe2	Biology, Biochemistry, Biophysics	1	5
Neil Harrison (S)	C		National High Magnetic Field Laboratory	Physics								
Satya Kushwaha (P)	C		Los Alamos National Laboratory	MPA-MAG								
Duminda Sanjeewa (G)	C		Oakridge	Physical Sciences Directorate								
Jie Xing (P)	C		Oak Ridge National Lab	Materials Science and Technology Division								
Na Hyun Jo (G)	PI	*	Ames Laboratory	Division of Materials Science & Engineering	DOE	Office of Science - EFRC - Energy Frontier Research Centers	DE-AC02-07CH11358	P19250	Investigation of exotic topological states using high magnetic fields	Condensed Matter Physics	1	2
Paul Canfield (S)	C		Ames Laboratory	Physics & Astronomy								
Brinda Kuthanazhi (G)	C		Ames Laboratory	Division of Material Sciences and Engineering								
You Lai (G)	C		National High Magnetic Field Laboratory	Physics								
Ross McDonald (S)	C		National High Magnetic Field Laboratory	Physics								
Robert McQueeney (S)	C		Ames Laboratory	physics & astronomy								
Dmitry Yarotski (S)	C		Los Alamos National Laboratory	Center for Integrated Nanotechnologies								
									Total Proposals: **60**		Experiments: **91**	Days: **635**

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