High Field Heat Capacity of Under-Doped LSCO

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Introduction

The experiments focused on the field dependence of the absolute values of the low temperature heat capacity in the cuprate superconductors known as LSCO ($La_{2-x}Sr_xCuO_4$). The goal was to explore the effect of field on the low lying electronic excitations of the superconducting state and normal conducting state, as well as any kind of mixed states. Some of the time was used to study a related material $YBa_2Cu_3O_{6+\delta}$ (YBCO).

Experimental

All experiments took place at the DC field facility in the 35 tesla magnet in Cell 12, using the system D top loading cryostat. The experimental heat capacity cell is made by our group but employs user program cabling and top loading probe. The measurement determines the heat capacity of a sample using thermometers that are calibrated at the NHMFL pulsed field facility to ensure high accuracy in any attainable magnetic field.

Results and Discussion

Measurement of LSCO was unsuccessful due to experimental complications but the measurement of YBCO was highly successful.

Conclusions

The results of the YBCO study are currently being written into a manuscript for peer-reviewed publication.

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