**High magnetic field study of hexagonal rare earth indate**

Kim, J.W.; Li, Y.; Cheong, S.-W. (Rutgers University); Ding, X.; Harrison, N. and Zapf, V. (NHMFL-PFF)

**Introduction**

 The hexagonal-*R*InO3 (*R* = rare earths) compounds are isostructural to the hexagonal-*R*MnO3 that shows improper ferroelectricity in which the polarization (*P*) is induced by a structural instability (trimerization mode) that occur below Tc = 1300-1500 K [1]. However, unlike *h*-*R*MnO3, the magnetism in *R*InO3 is governed solely by rare earth spins making it a unique platform to study spins in 2-dimensional triangular lattice structure. Here, we report the measurement of GdInO3 where an anomalous magnetization behavior is observed at low temperature.

**Experimental**

 Single-crystalline samples were grown by a laser floating zone technique. Magnetization was measured using an extraction magnetometer in a capacitor-driven 65 T pulse magnet. A 3He cryostat was used to reach temperature as low as 0.5 K.

**Results and Discussion**

 Left panel in Fig. 1 shows the M-H curve of GdInO3 with magnetic field applied along the *c* axis at 0.55 K. It shows two anomalies that correspond to 1/3 and 2/3 values of saturation magnetization. The 1/3 magnetization plateau occurs at ~2.7 T and the 2/3 magnetization jump occurs at ~5.5 T. The magnetization reaches a saturation with above 8 T. Right panel shows the derivative of the magnetization as a function of magnetic field. It clearly shows a dip and a peak corresponding to a magnetization plateau and jump, respectively.



**Conclusions**

 The pulse field data demonstrates two features at 1/3 and 2/3 of the saturation magnetization of GdInO3. Such fractional magnetization features are characteristic of certain frustrated chain magnets [2] and quantum chain systems [3]. Combined with other measurements this data will help select a minimal spin model to model our magnetization behavior.

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**References**

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