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A new spinel selenide spin ice material DALMAU REIG-I-PLESSIS, University of Illinois, ADAM ACZEL, Oak Ridge National Lab, SEAN VAN GELDERN, GREGORY MACDOUGALL, University of Illinois — Rare earth pyrochlores such as the rare earth stannates and titanates are well known for having a variety of exotic magnetic ground states. The variety stems from the unique combination of the highly frustrated lattice geometry of corner sharing tetrahedra that forms the pyrochlore lattice, and from how each rare earth ion behaves in the local crystal electric field. In this talk we extend the discussion to a new class of materials with rare earth spins on the pyrochlore sublattice of the spinel structure: $MgRE_2Se_4$ (RE = rare earth). Since the local crystal field is vastly different in the spinels, the materials have distinctly different ground states from the pyrochlores with the same rare earth. In this talk, we focus on the RE = Er case, and present data demonstrating spin ice behavior. Heat capacity data shows the expected $1/2ln(3/2)$ residual entropy. We show magnetic diffuse scattering from neutron powder diffraction, and with reverse Monte Carlo fits show it is consistent with expectations for a spin ice. Lastly, we present measurements of the crystal electric field levels via inelastic neutron spectroscopy, and subsequent Monte Carlo fits of that data which confirm the local Ising nature of the material.

Dalmau Reig-i-Plessis
University of Illinois

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