Probing the spin ice state in the cubic pyrochlore Ho$_2$Ge$_2$O$_7$ ALANNAH HALLAS, University of Manitoba, HAIDONG ZHOU, National High Magnetic Field Laboratory, STEVEN BRAMWELL, University College London, CHRIS WIEBE, University of Winnipeg, JASON GARDNER, National Institute of Standards and Technology — Spin ices are a remarkable magnetic ground state that can arise in geometrically frustrated pyrochlores, A$_2$B$_2$O$_7$, when magnetic rare earth ions are situated on the vertices of a lattice of corner sharing tetrahedra. Competing nearest-neighbor and long-range dipolar interactions result in a short-range ordered ground state for each tetrahedron in which two spins point in and two spins point out [1]. The excitations in spin ices are equally remarkable; spin ices are the only known hosts of magnetic monopoles, emergent quasiparticles with a net magnetic charge. The cubic pyrochlore Ho$_2$Ge$_2$O$_7$ was prepared with a high temperature and high pressure technique. Preliminary DC susceptibility, heat capacity and X-ray diffraction experiments confirmed that Ho$_2$Ge$_2$O$_7$ has the bulk properties of a spin ice including residual entropy equal to the Pauling value for water ice [2]. The results of a polarized neutron scattering experiment performed at ILL as well as AC susceptibility and heat capacity measurements will be presented, and compared to the canonical spin ices.


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