Abstract Submitted
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An Exchange Hamiltonian for $Yb_2Ti_2O_7$ JORDAN THOMPSON, PAUL MCCLARTY, University of Waterloo, HENRIK RøNNOW, Laboratory for Quantum Magnetism, EPFL, LOUIS-PIERRE REGNAULT, CEA-Grenoble, ANDREAS SORGE, Network Dynamics Group, MPI for Dynamics and Self-Organization, MICHEL GINGRAS, University of Waterloo — $Yb_2Ti_2O_7$ is a pyrochlore material with many strange properties at low temperature. Specific heat measurements on this material find evidence for a first order phase transition at a temperature of $T_c \approx 240$ mK, but several experiments fail to find any evidence of long range order below T_c. In order to understand the behaviour of the magnetic moments of the Yb^{3+} ions below T_c it is necessary to quantift how they interact. I will present work based on using diffuse neutron scattering measurements to find a magnetic interaction Hamiltonian for $Yb_2Ti_2O_7$. We propose a Hamiltonian based on all of the symmetry allowed interactions on the pyrochlore lattice, along with long-range dipolar interactions. Using the energies of the symmetry allowed nearest-neighbor exchange interactions as free parameters, we perform simulated annealing to minimize the difference between experimental neutron scattering and neutron scattering computed from our exchange Hamiltonian using the random phase approximation. I will present the results of this fitting, and discuss the predictions of the resulting model for the behaviour of $Yb_2Ti_2O_7$, including calculations of the local susceptibility.

Jordan Thompson
University of Waterloo

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