Abstract Submitted
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Single crystals of Yb2Ti2O7 grown by the Optical Floating Zone technique: naturally "stuffed" pyrochlores?[1] KATE ROSS[2], McMaster University, THOMAS PROFFEN, SNS, Oak Ridge National Laboratory, HANNA DABKOWSKA, McMaster University, JEFFERY QUILLIAM, Universit Paris-Sud, LUKE YARASKAVITCH, JAN KYCIA, University of Waterloo, BRUCE GAULIN, Brockhouse Institute for Materials Research, McMaster University — In the "quantum spin ice" pyrochlore material Yb2Ti2O7, Yb3+ ions are coupled to each other via Ising-like ferromagnetic exchange, creating a situation similar to the highly frustrated classical spin ice compounds, but with significant quantum fluctuations. The ground state of the model resides near two exotic and disordered "quantum spin liquid" phases. The experimentally observed ground state of Yb2Ti2O7 is, however, controversial in the literature. Most samples, except one crystal which orders ferromagnetically, show disordered states with varying properties. The controversy is likely to be related to the presence of structural defects of an unspecified type that are known to cause sample-dependence of the low temperature specific heat, particularly in the single crystal samples. Using neutron powder diffraction, we investigated one pulverized single crystal of Yb2Ti2O7 grown by the standard Optical Floating Zone method, and found evidence that 2.3% excess Yb3+ ions reside on the non-magnetic Ti4+ sites, despite perfect stoichiometry of the starting material. This type of defect lattice is known as a "stuffed" pyrochlore structure. The effect of the stuffed spins is an open question which can now be investigated in detail.

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