Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Disordered Quantum Spin Ice Ground State of $Tb_2Sn_{2-x}Ti_xO_7$
JIMIN ZHANG, McMaster University, B.D. GAULIN, McMaster University, Canada, M.L. DAHLBERG, M.J. MATTHEWS, Pennsylvania State University, USA, F. BERT, E. KERMARREC, Universite Paris-Sud 11, France, K. FRITSCH, McMaster University, G.E. GRANROTH, Oak Ridge National Laboratory, USA, P. JIRAMONGKOLCHAI, Princeton University, USA, A. AMATO, C. BAINES, Paul Scherrer Institut, Switzerland, R.J. CAVA, Princeton University, USA, P. MENDELS, Universite Paris-Sud 11, France, P. SCHIFFER, Pennsylvania State University, USA — Inelastic neutron scattering, AC magnetic susceptibility and μSR measurements have been performed on polycrystalline solid solutions of the pyrochlore magnet, $Tb_2Sn_{2-x}Ti_xO_7$ for seven samples with x between 0 and 2. These measurements probe the crystal field states, low energy spin dynamics and phase behavior to temperatures less than 0.1K. $Tb_2Ti_2O_7$ is proposed to display a quantum variant of the spin ice ground state, stabilized by virtual excitations between the Tb^{3+} crystal field ground state doublet and its low lying excited state doublet. Isostructural, $Tb_2Sn_2O_7$, displays "soft" spin ice order and its Tb^{3+} ground and excited crystal field states are known to be interchanged relative to those in $Tb_2Ti_2O_7$. These measurements of the solid solutions of $Tb_2Sn_{2-x}Ti_xO_7$ focus on crystal field excitations between 1meV and 50meV, and show greatly enhanced spin dynamics at low energies for samples with intermediate x. All magnetic order is absent for x>0.1, leaving behind a highly fluctuating, disordered spin ice ground state.

J. Zhang
McMaster University, Canada

Date submitted: 22 Jan 2013 Electronic form version 1.4