Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Quantum effects in a realistic model of spin ice NIC SHANNON, OIST, OLGA SIKORA, National Taiwan University, FRANK POLLMANN, MPI-PKS, Dresden, KARLO PENC, Research Institute for Solid State Physics and Optics, Budapest, PAUL MCCLARTY, ISIS, RODERICH MOESSNER, MPI-PKS, Dresden — The spin ice materials Ho2Ti2O7 and Dy2Ti2O7 offer a widely-studied example of a classical spin liquid, complete with magnetic monopole excitations. Here we use exact diagonalization and quantum Monte Carlo simulation and to explore how quantum tunnelling between different ice states changes the ground state of a realistic model of a spin ice. We find that the competition between long-range dipolar interactions and second-neighbour exchange interactions helps to stabilize a quantum spin liquid phase and, for large enough exchange, a ferromagnet ground state. We discuss the implications of these results for the spin ice Dy2Ti2O7.

Nic Shannon
OIST

Date submitted: 15 Nov 2013 Electronic form version 1.4