Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Finite-temperature phase transition to a quantum spin liquid in a 3D Kitaev model JOJI NASU, TOSHIYUKI KAJI, KEISUKE MATSUURA, MASAFUMI UDAGAWA, YUKITOSHI MOTOME, University of Tokyo — The Kitaev model has recently attracted considerable attention due to the spin-liquid ground states. This model is defined on a honeycomb lattice, and is exactly solvable due to the Ising conserved quantities associated with each hexagon. In this study, we investigate the thermodynamic properties of a three-dimensional (3D) generalization of the Kitaev model defined on a hyperhoneycomb lattice, which was introduced in Ref. [1]. Although this model has spin-liquid ground states similar to the 2D model, the excited states are contrasting as they are described by Ising conserved quantities forming a loop-like structure on the pyrochlore lattice. We analyze this model in the limit where one of the inequivalent bonds is stronger than the others, where a classical Monte Carlo simulation is applicable [2]. As a result, we find a phase transition at a finite temperature between the gapped quantum spin liquid and paramagnet. This phase transition is of second order and belongs to the 3D Ising universality class. We provide a topological characterization of the phase transition in terms of a flux density. We also calculate the temperature dependence of the magnetic susceptibility. [1] S. Mandal and N. Surendran, Phys. Rev. B **79**, 024426 (2009). [2] J. Nasu et al., arXiv:1309.3068.

Joji Nasu
University of Tokyo

Date submitted: 15 Nov 2013 Electronic form version 1.4