Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Finite-temperature phase transition to $m = 1/2$ plateau phase in a S=1/2 XXZ model on Shastry-Sutherland Lattices TAKAFUMI SUZUKI, Institute for Solid StatePhysics — We study the finite-temperature transition to the $m = 1/2$ magnetization plateau in a model of interacting $S = 1/2$ spins with longer range interactions and strong exchange anisotropy on the geometrically frustrated Shastry-Sutherland lattice. This model was shown to capture the qualitative features of the field-induced magnetization plateaus in the rare-earth tetraboride, TmB_4. Our results show that the transition to the plateau state occurs via two successive transitions with the two-dimensional Ising universality class, when the quantum exchange interactions are finite, whereas a single phase transition takes place in the purely Ising limit. To better understand these behaviors, we perform Monte Carlo simulations of the classical generalized four-state chiral clock model and compare the phase diagrams of the two models. The magnetic properties and critical behavior of the finite-temperature transition to the $m = 1/2$ plateau state are also discussed.

Takafumi Suzuki
Institute for Solid StatePhysics

Date submitted: 19 Nov 2010 Electronic form version 1.4