Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Nature of Possible Z_6 symmetry breaking magnetic phases in frustrated hyperkagome iridate RYUICHI SHINDOU, School of Physics, Peking University — To obtain a comprehensive understanding of classical magnetism possible in frustrated hyperkagome iridate $Na_4Ir_3O_8$ (Na-438), we postulated additional lattice symmetries other than an exact crystal symmetry, and introduced a relatively simpler effective spin model for Na-438. Using Monte Carlo simulation and Luttinger-Tisza analysis, we derived a classical magnetic phase diagram for Na-438. We show that a Z_6 symmetry breaking magnetic phase is stabilized by the thermal order by disorder. Our finite-size scaling analysis reveals that the criticality of the ordering temperature of the Z_6 phase is characterized by the 3D XY universality class, where the system acquires effectively a higher symmetry than high-T disorder phase (dubbed as emergent U(1) symmetry). For a finite size system, an intermediate temperature regime appears below the ordering temperature, where the spin anisotropy term becomes effectively irrelevant and spin ordering develops in the U(1) symmetric way. We showed that this crossover phenomena can be well accounted for in terms of the 3-d ferromagnetic Z_6 Potts model. Based on this crossover behavior, we introduced a possible phenomenology of low-temperature magnetic behaviors of polycrystalline Na-438. Reference: arXiv.1509.01002

Ryuichi Shindou
School of Physics, Peking University

Date submitted: 05 Nov 2015 Electronic form version 1.4