Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

The U(1) Spin Liquids in a Spin-Orbit-Coupled Triangular Lattice Mott Insulator: the Projective Symmetry Group Analysis and Spectroscopic Study[1] GANG CHEN, Fudan University, YUAN-MING LU, Ohio State University, YAO-DONG LI, Fudan University — Motivated by the recent progress on the spin-orbit-coupled triangular lattice spin liquid candidate material $YbMgGaO_4$, we carry out a systematic projective symmetry group analysis of the candidate spin liquid ground states. Due to the spin-orbit entanglement of the Yb^{3+} $4f$ local moments, the space group symmetry operation transforms the position and the orientation of the local moments simultaneously, and hence brings new ingredients to the symmetry fractionalization and the projective realization in the candidate spin liquid phases. Based on the early proposal of the spinon Fermi surface U(1) spin liquid for $YbMgGaO_4$, we classify the U(1) spin liquid using the fermionic parton construction. We find eight U(1) spin liquids with distinct symmetry fractionalization patterns for the $R\bar{3}m$ space group symmetry that is appropriate for $YbMgGaO_4$. The spectroscopic results are computed within the mean-field approximation for each U(1) spin liquid. The connection with the experiments in $YbMgGaO_4$ and the future directions are discussed.

[1]the Ministry of Science and Technology of People's Republic of China with the Grant No.2016YFA0301001

Gang Chen
Fudan University

Date submitted: 09 Nov 2016 Electronic form version 1.4