

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Projective symmetry group classification of Z_2 spin liquids in a pyrochlore lattice CHUNXIAO LIU, LEON BALENTS, Univ of California - Santa Barbara — The rare earth pyrochlore oxides $R_2M_2O_7$ are a class of compounds that supports frustrated magnetism, and some of them are predicted to host a spin liquid state in presence of strong quantum effects. Propelled by this theoretical idea and recent experimental observations, we give a complete classification of Z_2 spin liquid states in the pyrochlore lattice formed by the rare earth R ions within the projective symmetry group approach. A list of mean field states is given to match the classically ordered phases, and the transitions into spin liquid states are analyzed. The effects of strong spin-orbit coupling in the pyrochlore materials are also discussed. This study provides a clear map of phases of pyrochlore for future experiments and further variational Monte-Carlo study of the spin liquid states in pyrochlore materials.

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Date submitted: 11 Nov 2016

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