Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Exactly soluble 3D lattice models and the braiding statistics of their loop excitations CHIEN-HUNG LIN, MICHAEL LEVIN, University of Chicago — We construct two exactly soluble 3D lattice models that belong to distinct topological phases in the sense that they cannot be smoothly connected without an intervening phase transition. What is interesting is that the two models have very similar physical properties: both are gapped and both support particle-like and loop-like excitations with non-trivial mutual statistics similar to that of charges and vortex lines in a Z2 x Z2 gauge theory. The only difference between the two models lies in the braiding statistics of their loop excitations. As an application of these results, we construct two other closely related spin models with Z2 x Z2 global symmetry. We show that one of these spin models realizes a Z2 x Z2 symmetry protected phase with protected surface states while the other realizes a trivial phase without a protected surface.

Chien-Hung Lin
University of Chicago

Date submitted: 14 Nov 2014 Electronic form version 1.4