Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Exotic quantum criticality in triangular lattice anti-ferromagnets[1]

RIBHU KAUL, University of Kentucky — We introduce and study a generalized sign-problem free quantum anti-ferromagnet on the triangular lattice. Our Hamiltonian is shown to be a natural generalization of the popular bipartite SU(N) anti-ferromagnet to non-bipartite lattices. At $N = 2$ our model is unitarily equivalent to a model of an XY superfluid (SF). Consistent with a large-N mapping to a certain quantum dimer model, we find evidence for valence bond solid (VBS) order with a large $\sqrt{12} \times \sqrt{12}$ unit cell. We show that there is a direct transition between these two phases that takes place between $N = 11$ and $N = 12$. For $N = 10, 11$ we use a four spin coupling parameter to tune through a new exotic "deconfined" continuous transition between SF and VBS.

[1]This work was supported in part by NSF DMR-1056536.

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Date submitted: 10 Dec 2012 Electronic form version 1.4