Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Variational Monte Carlo study of quantum spin=1 liquid phases in the extended triangular-lattice Heisenberg model SAMUEL BIERI, MAKSYM SERBYN, TODADRI SENTHIL, PATRICK LEE, Massachusetts Institute of Technology — Recent experiments in the compound Ba3NiSb2O9 [PRL 107, 197204] indicated that quantum-spin liquid phases in a spin S=1 anti-ferromagnet may exist. Motivated by these experiments, we construct quantum spin=1 liquid states with three flavors of fermionic spinons. We use variational Monte Carlo calculations to investigate the phase diagram of a triangular-lattice quantum Heisenberg model with single-ion anisotropy, bi-quadratic, and ring-exchange terms. We compare the energies of the spin-liquid states with conventional magnetically ordered states. We find that in some parameter ranges, an exotic gapless U(1) spin liquid is stabilized. In other parameter ranges, a BCS pairing instability with unconventional symmetry gaps out some of the spinons. We discuss our findings in relation with present and future experiments.

Samuel Bieri
Massachusetts Institute of Technology

Date submitted: 11 Nov 2011 Electronic form version 1.4