Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Quadrupolar Correlations, Bond Order and Spin Freezing in S=1 Triangular Lattice Antiferromagnets[1] EDWIN MILES STOUDENMIRE, UC Santa Barbara, SIMON TREBST, Microsoft Research, Station Q, LEON BALENTS, Kavli Institute of Theoretical Physics — Motivated by experiments on the $S = 1$ triangular lattice antiferromagnet $NiGa_2S_4$ and theoretical predictions that it has a quadrupolar/spin-nematic ground state, we discuss how quadrupolar correlations may actually be more relevant at *finite* temperature, giving rise to an unusual two peak structure in the specific heat. Moreover, dominant third-neighbor Heisenberg exchange in the clean system can lead to a breaking of lattice rotational symmetry at finite temperature, although the sensitivity of the phase to arbitrarily weak non-magnetic disorder could explain the lack of long range order and the slow dynamics observed in experiment. To justify these predictions, we implemented a novel semiclassical approximation that allows $T > 0$ quantum effects to be simulated efficiently using classical Monte Carlo. Current efforts include treating quantum effects exactly, reproducing an experimentally observed even-odd spin impurity effect and providing other experimental signatures of the quadrupolar correlations.

[1]Supported by DOE Basic Energy Sciences Grant No. DE-FG02-08ER46524

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Date submitted: 19 Nov 2009 Electronic form version 1.4