Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Finite temperature phase diagram of the classical spatially anisotropic triangular antiferromagnet in magnetic field SHANE HEAD, University of Utah, CHRISTIAN GRISET, JASON ALICEA, California Institute of Technology, OLEG STARYKH, University of Utah — The spatially anisotropic triangular antiferromagnets Cs_2CuCl_4 and Cs_2CuBr_4 exhibit rich, and only partially understood, phase diagrams in applied magnetic fields. Motivated by such materials, we employ extensive Monte Carlo simulations to investigate the magnetic field vs. temperature phase diagram of the classical Heisenberg triangular antiferromagnet with anisotropic exchanges J' along weak diagonal bonds and J along horizontal bonds. We find an interesting interplay between spatial anisotropy and entropic (thermal) fluctuations, which favor different types of order and thus compete with one another. For a wide range of magnetic fields and J'/J, thermal fluctuations stabilize coplanar spin configurations–including 'up-up-down' order near 1/3 magnetization–at the expense of low-temperature non-coplanar 'umbrella' structures favored by the spatial anisotropy. The influence of Dzyaloshinskii-Moriya couplings relevant for the above materials will also be discussed.

Oleg Starykh
University of Utah

Date submitted: 19 Nov 2009 Electronic form version 1.4