Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Searching for Emergent Ferromagnetism in 2D systems with Random Easy Axis Anisotropy DONALD PRIOUR, Youngstown State University — Using large scale Monte Carlo calculations, we determine if random anisotropy in the interactions among neighboring magnetic moments may stabilize long-range ferromagnetic order at finite temperatures in the case of XY and Heisenberg models on a two dimensional lattice where low energy excitations (e.g. spin waves) would eliminate bulk ferromagnetism for $T > 0$. We include a magnetic anisotropy in the coupling among magnetic moments causing neighboring spins to preferentially align along a randomly directed axis with the extent of the preference specified by an anisotropy parameter γ. We determine the magnetic phase diagram with respect to γ, and we explore the possibility that intermediate anisotropy levels could support finite temperature ferromagnetism, which would be overwhelmed by thermally excited spin waves in the weak anisotropy regime ($\gamma \ll 1$) and revert to a non-ferromagnetic phase for strong anisotropy ($\gamma \gg 1$) where the disordering influence of the randomly directed easy axes prevents magnetic moments from orienting in the same direction. In addition to finite size scaling analyses to extract critical exponents for any finite temperature ferromagnetic phase, we calculate the energy spectrum and density of states for spin waves.

Donald Priour
Youngstown State University

Date submitted: 14 Nov 2014

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