

Abstract Submitted  
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**Phase Transitions in a spin-orbital model for the Iron Pnictides**

RYAN APPEGATE, RAJIV SINGH, UC Davis — We study the finite temperature phase transition of a spin-orbital Hamiltonian (arXiv:09034408) that could describe the striped magnetic order in the Iron Pnictide materials. The model consists of an Ising like orbital variable with a classical Heisenberg spin variable on a 2D square lattice. The exchange constants for the Heisenberg spins depend on the Ising variables and lead to a strong coupling between spins and orbitals. We use a Monte Carlo algorithm with feedback parallel tempering to study the phase transition. In the model, the orbital phase transition occurs at  $T_c = 0.447J$  with critical exponents  $\nu = 1.01 \pm .02$  and  $\gamma = 1.74 \pm .03$  consistent with the Ising universality<sup>[1]</sup>. We characterize the heat capacity and orbital susceptibility for the system and study magnetic properties of the system at  $\vec{q} = 0$  and at the ordering wave vector.

[1] C.-C. Chen et al. Phys Rev B 80, 180418 (R), (2009)

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