Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Proximity to Hidden Magnetic Order in Parent Compounds of Iron-Based High-Tc Superconductors[1] JOSE RODRIGUEZ, California State University at Los Angeles — Motivated by the low ordered magnetic moment observed in the spin-density-wave (SDW) state of undoped iron-pnictide systems, we study the low-energy spectrum of the J1-J2 model over a square lattice of iron atoms with either two or four spin-1/2 orbitals per site in the presence of Hund's-Rule coupling. This is achieved within the linear spin-wave approximation and by exact diagonalization of 32 spin-1/2 moments. In the case of spin-1 iron atoms, both methods find hidden magnetic order with either ferromagnetic or Neel order per orbital at strong enough off-diagonal frustration. We successfully fit the spin-wave spectrum obtained recently from inelastic neutron scattering data taken on CaFe2As2 to the linear spin-wave spectrum at the quantum phase transition out of hidden order, into SDW order, with a Hund's-Rule exchange coupling energy of 68 meV. The fit notably accounts for the absence of a dip in the spectrum at the wave number that corresponds to Neel order. In the case of spin-2 iron atoms, exact diagonalization of the above J1-J2 model over the tilted 8-site lattice also obtains a quantum phase transition where true magnetic order disappears, but at much weaker values of the Hund's-Rule coupling energy.

[1]This work is supported in part by the AFOSR.

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Date submitted: 20 Nov 2009 Electronic form version 1.4