Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

**Thermodynamics and Magnetism of the Fermi-Hubbard Hamiltonian 2D-3D Crossover** RICK MUKHERJEE, Rice University, THEREZA PAIVA, Instituto de Fisica, Universidade Federal do Rio de Janeiro, RICHARD T. SCALETTAR, University of California, Davis, RANDALL G. HULET, KADEN R. A. HAZZARD, Rice university — To observe antiferromagnetism with fermionic ultracold atoms in optical lattices is one of the major ongoing pursuits in cold atoms. Atoms in anisotropic lattices are an interesting place to explore anti-ferromagnetic (AF) order in ultracold systems. We investigate the possibility of enhancing magnetic order by using anisotropy, specifically in a cubic lattice with tunneling stronger along two directions than in the third, which interpolates between the 2D and isotropic 3D regimes. Using determinantal Quantum Monte Carlo methods, we calculate the real space spin-spin correlations and the corresponding magnetic structure factor as a function of temperature and anisotropy for the model at half filling. Similar to the 1D-3D crossover, we find enhanced magnetic structure due to anisotropy for some interaction strengths. Although the long-ranged magnetic order never exceeds that of the isotropic system at the optimal interaction strength, the correlations become anisotropic, which can lead to enhanced short-ranged correlations along certain directions.

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Date submitted: 31 Jan 2017 Electronic form version 1.4