Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Thermodynamics and Magnetism across the Hubbard Hamiltonian 2D-3D Crossover EDUARDO IBARRA GARCIA PADILLA, Rice University, RICK MUKHERJEE, Imperial College, RANDALL G HULET, KADEN R A HAZZARD, Rice University, THEREZA PAIVA, Universidade Federal do Rio de Janeiro, RICHARD T SCALETTAR, UC Davis — Understanding the mechanisms behind quantum magnetism in lattices of ultracold fermionic atoms, which are well described by the Fermi Hubbard Model (FHM), is a major objective of optical lattice emulation. A central question is the interplay between the lattice geometry and the appearance of magnetic correlations. A particularly important aspect of geometry to understand is dimensionality, as ground states fundamentally differ in different spatial dimension, and the crossover from 2D to 3D in an anisotropic lattice is relevant to the physics of layered high-temperature superconducting cuprates. We have studied an anisotropic FHM in which the interplane hopping amplitude $t_\perp$ is unequal to the intraplane hopping amplitude t. We find that the interaction strength U where nearest-neighbor correlations and structure factor are maximized depends non-trivially on $t_\perp$, but their maximum value is always largest for $t = t_\perp$.

Eduardo Ibarra Garcia Padilla
Rice University

Date submitted: 29 Jan 2020 Electronic form version 1.4