Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Detection of antiferromagnetic order by cooling atoms in an optical lattice[1] TSUNG-LIN YANG, RAFAEL TELES, KADEN HAZZARD, RANDALL HULET, Rice University, RICE UNIVERSITY COLLABORATION
— We have realized the Fermi-Hubbard model with fermionic ^{6}Li atoms in a three-dimensional compensated optical lattice. [2] The compensated optical lattice has provided low enough temperatures to produce short-range antiferromagnetic (AF) spin correlations, which we detect via Bragg scattering of light. Previously, we reached temperatures down to 1.4 times that of the AFM phase transition, more than a factor of 2 below temperatures obtained previously in 3D optical lattices with fermions. In order to further reduce the entropy in the compensated lattice, we implement an entropy conduit - which is a single blue detuned laser beam with a waist size smaller than the overall atomic sample size. This repulsive narrow potential provides a conductive metallic path between the low entropy core and the edges of the atomic sample where atoms may be evaporated. In addition, the entropy conduit may store entropy, thus further lowering the entropy in the core. We will report on the status of these efforts to further cool atoms in the optical lattice.

[1]Work supported by ARO MURI grant, NSF and The Welch Foundation.
[2]R. A. Hart, P. M. Duarte et al., Nature 519, 211-214 (2015).

Tsung-Lin Yang
Rice University

Date submitted: 29 Jan 2016 Electronic form version 1.4