Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Evaporative cooling in a compensated optical lattice[1] P.M. DUARTE, R. HART, T.L. YANG, X. LIU, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston TX — We present experimental results of evaporative cooling in a three-dimensional, red-detuned optical lattice. The lattice is compensated by the addition of three blue-detuned gaussian beams which overlap each of the lattice laser beams, but are not retro-reflected [2]. The intensity of the compensating beams can be used to control the difference between the chemical potential in the lattice and the threshold for evaporation. We start with a two spin component degenerate Fermi gas of ^{6}Li atoms at a temperature $< 0.05T_F$ in a dimple potential, which is obtained by rotating the polarization of the lattice retro beams to prevent the formation of standing waves. The temperature of the cloud is measured by releasing it from the dimple and fitting the momentum distribution to a Thomas-Fermi profile. We perform round-trip measurements into, and out of the lattice to study the adiabaticity of the loading as well as the effect of the compensating beams. Using the compensated lattice potential, we have reached temperatures low enough to produce antiferromagnetic spin correlations, which we detect via Bragg scattering of light.

[1]Supported by NSF, ONR, DARPA/ARO, and the Welch Foundation.
[2]C. J. M. Mathy, et al., "Enlarging and cooling the Néel state in an optical lattice," Phys. Rev. A **86,** 023606 (2012).

P. M. Duarte
Department of Physics and Astronomy and Rice Quantum Institute,
Rice University, Houston TX

Date submitted: 15 Nov 2013 Electronic form version 1.4