Abstract Submitted
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Long range magnetic ordering of ultracold fermions in an optical lattice[1] P.M. DUARTE, R.A. HART, T.-L. YANG, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — We present progress towards the observation of long range antiferromagnetic (AFM) ordering of fermionic ^{6}Li atoms in an optical lattice. We prepare a two spin state mixture of 10^6 atoms at $T/T_F = 0.1$ by evaporatively cooling in an optical dipole trap. The sample is then transferred to a dimple trap formed by three retroreflected laser beams at 1064 nm that propagate in orthogonal directions. The polarization of the retroreflected light is controlled using liquid crystal retarders, which allow us to adiabatically transform the dimple trap into a 3D lattice. Overlapped with each of the three dimple/lattice beams is a beam at 532 nm, which can cancel the harmonic confinement and flatten the band structure in the lattice. This setup offers the possibility of implementing proposed schemes[2] which enlarge the size of the AFM phase in the trap. As a probe for AFM we use Bragg scattering of light[3]. We have observed Bragg scattering off of the (100) lattice planes, and using an off-angle probe we can see the diffuse scattering from the sample which serves as background for the small signals expected before the onset of AFM ordering.

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[2]C. J. M. Mathy et al., Phys. Rev. A **86**, 023606 (2011)
[3]T. A. Corcovilos et al., Phys. Rev. A **81**, 013415 (2010)

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