

Abstract Submitted  
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**Experimental Probe of Antiferromagnetic Ordering in a 3D Optical Lattice of  ${}^6\text{Li}$** <sup>1</sup> JAMES M. HITCHCOCK, P.M. DUARTE, T.A. CORCOVILLOS, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — We have developed an apparatus to probe magnetic ordering in  ${}^6\text{Li}$  using a two spin mixture of magnetic sub-levels from the lowest hyperfine state. The degenerate Fermi gas is prepared all optically by loading and evaporative cooling in a high-power far-red detuned optical trap. Our primary goal is the observation of the antiferromagnetic (AFM) Néel phase predicted at very low temperatures for an equal spin mixture in a three dimensional lattice with one fermion per site. We present our progress toward the identification of the AFM phase and the investigation of the Fermi-Hubbard model in this system. We also discuss methods used to distinguish spatial and magnetic ordering within a simple cubic lattice. Specifically, we intend to identify the AFM phase using near resonant Bragg scattering from the  $(\frac{1}{2}\frac{1}{2}\frac{1}{2})$  lattice plane.

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