Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

A Fermi Gas Microscope with Lithium-6 MAXWELL PARSONS, SEBASTIAN BLATT, CHRISTIE CHIU, FLORIAN HUBER, ANTON MAZURENKO, MARKUS GREINER, Harvard University — We demonstrate atom-resolved imaging of fermionic lithium-6 in an optical lattice. Lithium, with its fast dynamics and tunable interactions, is an ideal species for studying quantum many-body physics with ultracold atoms. However, lithium's large recoil energy and its unresolved excited state hyperfine structure make sub-Doppler laser cooling challenging. To solve this challenge, we have extended the technique of Raman sideband cooling to lithium in a very deep optical lattice. We load atoms into a single layer of a three-dimensional optical lattice with 566 nm lattice spacing, approximately 10 μm below a super-polished substrate that forms the last element of an imaging system with 0.85 numerical aperture. The lattice is then ramped to a depth of approximately 3 mK, where trap frequencies are on the order of 1 MHz. In this deep lattice we perform an alternating sequence of imaging and Raman sideband cooling pulses to image the atoms while keeping them pinned to their lattice sites.

Maxwell Parsons
Harvard University

Date submitted: 30 Jan 2015 Electronic form version 1.4