Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Towards site-resolved imaging and control of ultracold fermions in optical lattices FLORIAN HUBER, WIDAGDO SETIAWAN, KATE WOOLEY-BROWN, MAXWELL PARSONS, SEBASTIAN BLATT, MARKUS GREINER, Harvard University — Recent successes in site-resolved imaging and control of bosonic Rb atoms trapped in optical lattices have enable many new possibilities to emulate simple condensed matter systems. Many of the open questions in condensed matter, however, stem from the fermionic nature of electrons. Extending the high degree of control available with ultracold quantum gases in optical lattices to fermionic atoms will allow us to address these questions. The light mass of fermionic 6-Li leads to system dynamics on fast timescales, making it an ideal candidate for such studies. We report progress towards a 6-Li quantum gas microscope and present improved imaging, cooling, and trapping techniques compatible with the light mass of 6-Li. A major challenge in the pursuit of single-site imaging with Lithium is cooling atoms during the imaging process. Single-site experiments with bosons benefit from the resolved hyperfine splitting in the excited state of 87-Rb, which allows the use of optical molasses. This method cannot be straightforwardly applied to 6-Li. We present our efforts to cool and image 6-Li using Raman sideband cooling.

Florian Huber
Harvard University

Date submitted: 27 Jan 2012 Electronic form version 1.4