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Progress Towards Single-site Imaging of Fermions in an Optical Lattice DYLAN JERVIS, University of Toronto, DAVID MCKAY, HAI JUN CHO, MICHAEL SPRAGUE, MATTHIAS SCHOLL, KARL PILCH, JASON MCKEEVER, JOSEPH H. THYWISSEN — We discuss progress towards in-situ imaging of a single plane of fermionic ^{40}K atoms in an optical lattice. Spin-sensitive in- situ imaging will allow for local measurements of occupation, spin ordering, and domain structure of interesting many-body phases, including band insulators, Mott insulators, Neel antiferromagnets, superfluid states, and striped or other structured ordering. We are currently testing a design that collects light from the 405 nm $4S \rightarrow 5P$ transition of ^{40}K through a thin (200 micron) vacuum window and have demonstrated a resolution of better than 550 nm. We have also used saturation spectroscopy to lock a laser to the $4S \rightarrow 5P$ transition, allowing for narrow-line Doppler cooling.

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