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Quantum Gas Microscope for Fermionic Atoms[1] MELIH OKAN, LAWRENCE CHEUK, MATTHEW NICHOLS, KATHERINE LAWRENCE, HAO ZHANG, MARTIN ZWIERLEIN, Massachusetts Inst of Tech-MIT — Strongly interacting fermions define the properties of complex matter throughout nature, from atomic nuclei and modern solid state materials to neutron stars. Ultracold atomic Fermi gases have emerged as a pristine platform for the study of many-fermion systems. In this poster we demonstrate the realization of a quantum gas microscope for fermionic ^{40}K atoms trapped in an optical lattice and the recent experiments which allows one to probe strongly correlated fermions at the single atom level. We combine 3D Raman sideband cooling with high- resolution optics to simultaneously cool and image individual atoms with single lattice site resolution at a detection fidelity above 95%. The imaging process leaves the atoms predominantly in the 3D motional ground state of their respective lattice sites, inviting the implementation of a Maxwell's demon to assemble low-entropy many-body states. Single-site resolved imaging of fermions enables the direct observation of magnetic order, time resolved measurements of the spread of particle correlations, and the detection of many-fermion entanglement.

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