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Progress towards a fermionic triangular lattice quantum gas microscope JIRAYU MONGKOLKIATTICHAI, LIYU LIU, JIN YANG, PETER SCHAUSS, University of Virginia — Ultracold atoms in triangular optical lattices are well-suited to study the phase diagram of the triangular-lattice Hubbard model. In particular, there are indications for a chiral spin-liquid phase between the superfluid (SF) and a Mott insulator (MI). Ultracold atoms feature unique tunability of atomic interaction via Feshbach resonances, density, and spin-imbalance allowing to study a wide parameter range in the phase diagram. Here, we report on how we implemented a projected triangular lattice for lithium-6 atoms and demonstrate that we reach a lattice depth that should allow for single-atom imaging via Raman sideband cooling. To evaluate our lattice structure, we perform Kapitsa-Dirac scattering and Raman sideband spectroscopy to calibrate the lattice depth. To confirm that we have a degenerate quantum gas, we measured the temperature of Fermi gases by in-situ absorption imaging. Once we obtain single-atom imaging, we plan to study quantum magnetism and investigate conductivity, diffusion, and compressibility in the triangular lattice.

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