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Fermi Gas Microscope with Full Density Readout THOMAS HARTKE, BOTOND OREG, NINGYUAN JIA, MARTIN ZWIERLEIN, Massachusetts Institute of Technology — Quantum gas microscopy has been proven to one of the most useful tools to understand quantum many-body physics ranging from high-temperature superconductivity to topological phase of matter. However, most of the experiments are using a parity projected measurement which prevents us from extracting the full information in the charge base. In this work, we demonstrate an imaging scheme for measuring the full density of a single-band Fermi-Hubbard model. By utilizing the Feshbach resonance, the atoms in doubly occupied lattice site will be coherently loaded into different layers of a vertical lattice. Due to the small lattice spacing, both layers could be in focus simultaneously and we can extract the occupation in a single image. With the high fidelity imaging technique, we measure the density fluctuation and further the temperature of the cloud using the fluctuation-dissipation theorem. Also, we measure the correlation of doulons and holons and show its correlation with the underlying spin ordering of Fermi-Hubbard model.

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