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Measuring correlations in attractive and repulsive Fermi-Hubbard systems with a lithium quantum gas microscope PETER SCHAUSS, PETER BROWN, DEBAYAN MITRA, ELMER GUARDADO-SANCHEZ, WASEEM BAKR, Princeton University — Quantum gas microscopes have taken the study of Hubbard physics in optical lattices to a new level, enabling site-resolved detection of strongly correlated states like Mott insulators and antiferromagnets. We present two experiments where we use a lithium-6 quantum gas microscope to study the Hubbard model in new regimes. In a first experiment we investigate the spin correlations of the repulsive Hubbard model in the presence of spin-imbalance. We observe short-range canted antiferromagnetism by measuring the anisotropy of spin correlations in two bases. In addition we find non-monotonic behavior of the spin polarization with doping resembling the behavior of the magnetic susceptibility in the cuprates. In another experiment, we observe charge density wave correlations in the attractive Hubbard model at half filling. These correlations provide a low-temperature thermometer for the attractive Hubbard model and allow indirect measurement of superfluid correlations in this system.

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