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Metastability and avalanche dynamics in strongly-correlated gases with long-range interactions LORENZ HRUBY, NISHANT DOGRA, KATRIN KROEGER, MANUELE LANDINI, TOBIAS DONNER, TILMAN ESSLINGER, ETHZ — We experimentally study metastable behavior of a Mott-insulator (MI) and a charge density wave (CDW) in an extended Bose-Hubbard model with global-range interactions. The model is realized by loading a degenerate 87Rb Bose gas into a three-dimensional optical lattice. The global-range interactions are mediated by photons off-resonantly scattered from a lattice beam - off the quantum gas - into an optical cavity mode. Initializing the system in an MI state, we rapidly increase the strength of global-range interactions - by changing the detuning from the cavity - to different final values. By monitoring the photon flux leaking from the cavity in real-time and extracting from it the amount of density modulation (imbalance), we observe that the system falls into either of two distinct final states. In additional experiments, we observe hysteresis between the two states and an avalanche tunneling dynamics.

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