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Effects of interactions on an Anderson insulator in a disordered lattice BENJAMIN DEISSLER, CHIARA D'ERRICO, MARCO FATTORI, GIACOMO ROATI, MATTEO ZACCANTI, MICHELE MODUGNO, GIOVANNI MODUGNO, MASSIMO INGUSCIO, LENS and Università di Firenze — Anderson localization of ultracold atoms in disordered optical lattices, i.e. the transition from extended to exponentially localized states, was recently demonstrated for non-interacting samples. With the addition of atomic interactions, the system becomes more complicated and more difficult to describe theoretically. The effects of the disorder are expected to be gradually suppressed, and the possibility of different quantum phases arises. In our system, we employ a ^{39}K Bose gas, where the interaction can be tuned from negligible to large values via a Feshbach resonance. We employ a one-dimensional incommensurate bichromatic optical lattice as a model of a controllable disordered system. In this talk, we present recent experimental results showing a transition from the Anderson-insulator phase to a superfluid phase.

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