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A Closer Look at Fermions in Optical Lattices DANIEL PERTOT, Universität Bonn, Germany, LUKE MILLER, EUGENIO COCCHI, University of Cambridge, United Kingdom & Universität Bonn, Germany, JOHANNA BOHN, University of Cambridge, United Kingdom, JAN DREWES, FERDINAND BRENNECKE, MARCO KOSCHORRECK, Universität Bonn, Germany, MICHAEL KÖHL, Universität Bonn, Germany & University of Cambridge, United Kingdom —
Quantum gases of interacting fermionic atoms in optical lattices promise to shed new light on the low-temperature phases of Hubbard-type models, such as spin-ordered phases or, in particular, on possible *d*-wave superconductivity. However, reaching the very low temperatures required necessitates the implementation of novel cooling schemes. As a first step towards this goal, we employ high-resolution imaging together with radio-frequency spectroscopy in order to spatially resolve the in-trap distributions of singly and doubly-occupied lattice sites after having loaded a quantum degenerate two-component Fermi gas of ^{40}K atoms into a three-dimensional optical lattice geometry. Here, I will report on our recent progress towards the observation and characterization of a fermionic Mott insulator, together with an outlook on future steps towards lowering the temperature in the lattice.

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