

Q 4 Gruppenbericht Stark korrelierte Systeme

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Gruppenbericht

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Strongly Correlated Fermionic Atoms in Optical Lattices —
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We report on the realization of a strongly interacting quantum degenerate gas of fermionic atoms in a three-dimensional optical lattice. We prepare a band-insulating state for a two-component Fermi gas with one atom per spin state per lattice site. Using a Feshbach resonance, we induce strong interactions between the atoms. When sweeping the magnetic field from the repulsive side towards the attractive side of the Feshbach resonance we induce a coupling between Bloch bands leading to a transfer of atoms from the lowest band into higher bands. Sweeping the magnetic field across the Feshbach resonance from the attractive towards the repulsive side leads to two-particle bound states and ultimately to the formation of deeply bound molecules. From the fraction of formed molecules we determine the temperature of the atoms in the lattice.