Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Strongly interacting ultracold quantum gases of fermionic ytterbium-173 MORITZ HÖFER, LUIS RIEGGER, CHRISITIAN HOFRICHTER, DIOGO RIO FERNANDES, SIMON FÖLLING, IMMANUEL BLOCH, Max-Planck-Institut für Quantenoptik —
In contrast to the more common alkali atoms, alkaline-earth-like ytterbium features a strong decoupling between the nuclear and the electronic spin degree of freedom and possesses a metastable excited state. The decoupling gives rise to an extended SU(N)-symmetry with $N \leq 6$ for ytterbium-173. This enables us to study the SU(N)-symmetric Fermi-Hubbard model in a three-dimensional optical lattice. We prepare a low-temperature SU(N)-symmetric Mott insulator and characterize the Mott crossover. High local resolution allows us to extract the equation of state for a large range of interactions. In a second experiment, we investigate the scattering properties between the $^1S_0$ ground state and $^3P_0$ metastable state, where the interactions cannot be tuned with standard magnetic Feshbach resonances as in alkalis. We report on the discovery of a new orbital interaction-induced Feshbach resonance in ytterbium-173, permitting tunable interactions between these two states.

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Date submitted: 04 Apr 2016 Electronic form version 1.4