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Towards Chemically Stable Fermionic Ground State Molecules with Strong Dipolar Interactions[1] SEBASTIAN WILL, JEE WOO PARK, CHENG-HSUN WU, JENNIFER SCHLOSS, MARTIN ZWIERLEIN, Massachusetts Institute of Technology — Quantum gases with dipolar interactions will open new avenues for the creation of novel quantum many-body systems with intriguing properties, ranging from crystalline over magnetic to topological phases. A promising route for the experimental realization of dipolar quantum gases is the formation of fermionic ground-state molecules with a large electric dipole moment, giving rise to long-range anisotropic interactions. With our experiment we work towards the realization of fermionic ground state molecules of ^{23}Na^{40}K. The NaK ground state molecule is chemically stable and possesses a large induced electric dipole moment of 2.72 Debye. In pioneering studies, we have created nearly degenerate samples of weakly bound ^{23}Na^{40}K Feshbach molecules. With a long lifetime and a significant admixture of the electronic spin singlet state, the Feshbach molecules are an ideal starting point to reach the singlet rovibrational ground state with a two-photon STIRAP transfer. Aiming for an efficient transfer path, we have performed spectroscopic studies on excited and ground state molecular potentials of ^{23}Na^{40}K and will report on our current progress.

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