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Towards Creating Fermionic Ground State Molecules of $^{23}Na^{40}K$ with Strong Dipolar Interactions JEE WOO PARK, CHENG-HSUN WU, JENNIFER SCHLOSS, QINGYANG WANG, SEBASTIAN WILL, MARTIN ZWIERLEIN, Massachusetts Institute of Technology — The realization of interesting interactions beyond the simple contact interaction introduces a new paradigm in the field of ultracold quantum gases. Fermionic ground state molecules with long-range and anisotropic dipolar interaction serve as an ideal system to explore the rich physics of dipolar quantum gases, opening new avenues for the creation of supersolid and novel topological phases. In our experiment, we work towards creating fermionic ground state molecules of $^{23}Na^{40}K$ that are chemically stable and have a large dipole moment of 2.72 Debye. In the quantum regime, these molecules can have dipolar interaction energy that is a substantial fraction of the Fermi energy. Building on our previous work [1, 2], we have demonstrated efficient transfer of loosely bound Feshbach molecules of $^{23}Na^{40}K$ into a deeper bound state (v=-2) of the ground triplet potential via STIRAP. In addition, our recent progress in exploring the triplet and singlet molecular ground state potentials is presented.

[1] J. W. Park et al., Phys. Rev. A 85, 051602(R) (2012)
[2] C.-H. Wu et al., Phys. Rev. Lett. 109, 085301 (2012)

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