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Coherent microwave control of ultracold ^{23}Na^{40}K molecules ZOE YAN, YIQI NI, JEE WOO PARK, SEBASTIAN WILL, HUANQIAN LOH, Massachusetts Institute of Technology, KANG KUEN NI, Harvard University, MARTIN ZWIERLEIN, Massachusetts Institute of Technology — Ultracold dipolar molecules provide new opportunities to investigate strongly-correlated systems and quantum information science. Previously, we have demonstrated the creation of a spin-polarized ensemble of fermionic ^{23}Na^{40}K molecules in their rovibronic and hyperfine ground state. One way to induce strong dipole moments is microwave dressing, which has also been proposed to allow shielding of inelastic collisions and the realization of topological superfluids. In contrast to static electric fields, microwave dressing allows for precise control over the orientation and strength of the molecular dipoles. We present recent work on microwave dressing of these molecules on the lowest rotational transition. The dressing induces an oscillatory dipole moment on the order of one Debye, which can prove useful in engineering interesting molecule-molecule interaction potentials. Further, we study the dependence of the molecule collision rate on the microwave-induced dipole moment, which may have implications on the microwave trapping of molecules.

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