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Enlarging the tool box of ultracold molecule manipulation ROMAN BAUSE, XINGYAN CHEN, Max Planck Institute of Quantum Optics, MING LI, Temple University, Philadelphia, MARCEL DUDA, Max Planck Institute of Quantum Optics, SVETLANA KOTOTCHIGOVA, Temple University, Philadelphia, IMMANUEL BLOCH, Max Planck Institute of Quantum Optics, Ludwig-Maximilians-Universtitt Mnchen, XINYU LUO, Max Planck Institute of Quantum Optics — We present our recent progress on preparing ultracold gases of dipolar fermionic ^{23}Na^{40}K molecules in 3D optical lattices and manipulating their rotational degrees of freedom. We have indentified a tune-out wavelength at which the polarizability of the first excited rotational state vanishes, while polarizability of the ground state remains finite. The tune-out wavelength is located close to the $X^1\Sigma^+, v = 0, J = 0 \rightarrow b^3\Pi, v = 0, J = 1, \Omega = 1$ transition at 866.14 nm. The small line width of this transition makes it a good candidate for rotation-dependent dipole traps and lattices. In combination with our recent work on increasing the filling of NaK molecules in a 3D lattice, this brings us closer to simulating lattice spin models with dipolar molecules.

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