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Towards quantum simulation with ^{23}Na^{40}K molecules in optical lattices XINYU LUO, FRAUKE SEEELBERG, ROMAN BAUSE, MARCEL DUDA, XINGYAN CHEN, Max-Planck-Institut fr Quantenoptik, 85748 Garching, Germany, MING LI, SVETLANA KOTOCHIGOVA, Department of Physics, Temple University, Philadelphia, USA, IMMANUEL BLOCH[1], CHRISTOPH GOHLE, Max-Planck-Institut fr Quantenoptik, 85748 Garching, Germany — We review recent progresses towards simulating quantum many-body physics with polar ^{23}Na^{40}K molecules in optical lattices. First, we extend the coherence time of rotational state by one order of magnitude to about 10 ms in a dilute gas using a spin-decoupled magic trap. We observe density-dependent coherence times, which can be explained by dipolar interactions in the bulk gas. Second, we demonstrate a rotation-dependent dipole trap by utilizing a rotational transition manifold $|X^1\Sigma^+, v = 0, J = 0, 1\rangle \rightarrow |b^3\Pi, v = 0, J = 0, 1, 2\rangle$. The configuration of the trap can be tuned between magic, tune-out, and anti-magic by changing the laser detuning in a few GHz. The photon scattering rate in the trap is negligible thanks to the narrow linewidth of the transition. Finally, we report the progress of preparing high filling ^{23}Na^{40}K molecules in a 3D optical lattice.

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