

# Ultracold Dipolar Fermi Gas of NaK Molecules

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Strongly interacting dipolar gases of molecules hold great promise for precision measurements, high-speed quantum simulation and the creation of novel many-body systems. I will describe the creation of an ultracold dipolar gas of fermionic NaK molecules in their absolute rovibrational and hyperfine ground state. The NaK molecule is chemically stable and features a large electric dipole moment of up to 2.7 Debye. We observe lifetimes exceeding four seconds, even in rotationally excited states of the molecule. We demonstrate coherent microwave control of rotational and hyperfine states and observe second-long nuclear spin coherence times even without spin-echo techniques. To induce large dipole moments, we explore microwave dressing of molecules, a technique that has been proposed for shielding of inelastic collisions and the realization of topological superfluids.

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