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A Fermi degenerate gas of polar molecules

JUN YE, JILA

Quantum gases of polar molecules provide powerful experimental platforms for the realization of novel many-body quantum phases. In earlier experiments we used a quantum synthesis approach to produce a low entropy gas of ground-state KRb polar molecules with μ per molecule of 2.2 kB. In the new Generation II JILA experiment, we have produced a bulk gas of 100,000 KRb molecules on a redesigned apparatus, with the bulk temperature already below the Fermi temperature. To realize a full control of the molecular rotational coherence and interactions, the apparatus contains in-vacuum electrodes for generating microwave fields and large (30 kV/cm) DC electric fields, including adjustable field gradients. We will present progress towards evaporation of molecules in a one-dimensional optical lattice.