Bose-Einstein condensate of ultracold sodium-rubidium molecules with tunable dipolar interactions

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Creating quantum degenerate samples of polar molecules is a long-standing challenge in ultracold physics and quantum science due to near-universal two-body collisional losses. Here, we report the production of a Bose-Einstein condensate of ground-state sodium-rubidium molecules via high efficiency evaporative cooling, with losses suppressed using a double microwave shielding technique. The ability to tune the dipolar interaction between these ultracold polar molecules is crucial for producing the condensate and enables exciting prospects for future applications. We explore different regimes of dipolar interactions, realizing both the gas phase and the quantum droplet phase of the molecular condensate. This work opens new avenues for investigating quantum matter with strong dipolar interactions and for quantum simulation of long-range many-body systems.

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