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Magneto-electrostatic trapping of Stark decelerated OH[1] BRIAN SAWYER, BENJAMIN LEV, ERIC HUDSON, BENJAMIN STUHL, MANUEL LARA, JOHN BOHN, JUN YE, JILA/NIST/Univ. of Colorado — Cold molecules promise to impact research on precision measurement, quantum physics, and controlled chemistry. To accomplish this goal, our research employs a Stark decelerator to slow a supersonic expansion of OH in its rovibronic ground state. At the decelerator's terminus, a <50 mK OH packet of density 10^4 cm^{-3} is caught and confined in a magnetic quadrupole trap. An adjustable electric field of sufficient magnitude to completely polarize the OH is superimposed on the trap in either a quadrupole or homogenous field geometry. The trap dynamics deviate from that governed by simple addition of the fields' forces on OH's magnetic and electric dipoles. Rather, the OH is confined by potentials modified by molecular state mixing induced by the crossed electric and magnetic fields, which we model via an effective molecular Hamiltonian that includes Stark and Zeeman terms. Confinement of cold polar molecules in a magnetic trap, leaving large, adjustable electric fields for control, is an important step towards the study of low energy dipole-dipole collisions.

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