Abstract Submitted
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Improved magneto-optical trapping of a diatomic molecule[1] ERIC NORRGARD, DANIEL MCCARRON, MATTHEW STEINECKER, DAVID DEMILLE, Yale University — The magneto-optical trap (MOT) is the workhorse technique for atomic physics in the ultracold regime, serving as the starting point in applications from optical clocks to quantum-degenerate gases. Recently, our group demonstrated the first magneto-optical trap for a molecule, strontium monofluoride (SrF). Here, we present experimental results of two variant trapping schemes which improve upon the original work. In the first [1], recent insights into the origin of the restoring force in Type-II MOTs [2] (rarely used for atoms but requisite for SrF and other candidate molecules) led to a simple change in polarization scheme for the MOT lasers. In the second, states dark to the restoring MOT beams are diabatically transferred to bright states by synchronously reversing the magnetic field gradient and the laser polarization at RF frequencies. Although magneto-optical trapping of diatomic molecules is in its infancy, our results indicate that access to the ultracold regime may be possible for several molecular species, with potential applications from quantum simulation to tests of fundamental symmetries to ultracold chemistry.

[1] McCarron D J, Norrgard E N, Steinecker M H and DeMille D, N J Phys 2015 (ArXiv prepint 1412.8220)
[2] Tarbutt M R, N J Phys 2015 (ArXiv prepint 1409.0244)

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