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Magneto-optical trapping of a diatomic molecule DANIEL MCCARRON, JOHN BARRY, ERIC NORRGARD, MATTHEW STEINECKER, DAVID DEMILLE, Yale University — Laser cooling and trapping are central within modern atomic physics. The common workhorse within this field is the magneto-optical trap (MOT) which combines the power of laser cooling with a restoring force from radiation pressure. This robust technique can produce large samples of a variety of atomic species at ultracold temperatures; providing an ideal starting point for the study of a wide range of phenomena from optical clocks to quantum degeneracy. A MOT for molecules would provide a similarly powerful starting point for the study and manipulation of ultracold molecules. Possible applications range from quantum information and simulation to precision measurements to access to the world of ultracold chemistry. We will present data demonstrating the three-dimensional magneto-optical trapping of a diatomic molecule. Our experiment uses a bright and slow cryogenic molecular beam of strontium monofluoride (SrF). Molecules in the beam are laser-slowed via radiation pressure to enable loading of the MOT. MOT properties are diagnosed from images of laser induced fluorescence in the trapping region. Details of our molecular MOT will be presented including number, temperature and density.

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