

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Deep Cooling of SrF Molecules¹ THOMAS LANGIN, MATTHEW STEINECKER, YUQI ZHU, VARUN JORAPUR, DAVID DEMILLE, Yale University — A Bose-Einstein condensate (BEC) of polar molecules would allow for the creation of strongly correlated quantum states, such as dipolar crystals, which are not well understood and have not yet been studied in the lab. To create a BEC, molecular gases must be cooled further than has previously been achieved. We are currently pursuing two techniques for deeper cooling of SrF. First, we report on our progress in implementing gray-molasses cooling schemes, which simulations indicate should cool SrF to $\sim 1\mu\text{K}$. We also report on progress towards co-trapping of SrF and Rb for the purpose of sympathetically cooling SrF using evaporatively-cooled Rb as a refrigerant. For this to be effective, elastic collisions must dominate over inelastic ones. Whether this is the case for SrF-Rb is currently unknown; sympathetic cooling will provide an opportunity to study atom-molecule collisions in a largely unexplored temperature regime. In addition, methods for both enhancing the elastic rate and suppressing the inelastic rate of molecule-molecule collisions in the quantum regime have been proposed in recent years, and we plan to test these ideas upon reaching sub μK temperatures.

¹The authors acknowledge support from ARO, ARO (MURI) and ONR.

Thomas Langin
Yale University

Date submitted: 01 Feb 2019

Electronic form version 1.4