Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Doppler and Sisyphus Laser Cooling of the Polyatomic Molecule SrOH[1] IVAN KOZYRYEV, LOUIS BAUM, KYLE MATSUDA, BENJAMIN AUGENBRAUN, LOIC ANDEREGG, ALEXANDER SEDLACK, JOHN DOYLE, Harvard-MIT Center for Ultracold Atoms and Department of Physics, Harvard University — Ultracold polyatomic molecules hold promise for many applications in physics and chemistry due to their complex internal structures and strong interactions. While the triatomic free radical SrOH has a linear geometry in the vibronic ground state, it serves as a useful test candidate for the feasibility of laser cooling complex, nonlinear isoelectronic species like strontium monoalkoxides, where hydrogen is replaced by a more complex group (e.g. CH_3). We perform Doppler and Sisyphus laser cooling of SrOH in a cryogenic buffer-gas beam. The transverse temperature of the molecular beam is reduced in one dimension from 50 mK to 700 μK, leading to an order of magnitude increase in phase-space density [1]. Our results open a path towards creating a variety of ultracold polyatomic molecules [2]; we will outline our approach to laser cooling of a symmetric-top radical, $SrOCH_3$. [1] I. Kozyryev, L. Baum, K. Matsuda, B. L. Augenbraun, L. Anderegg, A. Sedlack, and J. M. Doyle, arXiv:1609.02254 (2016). [2] I. Kozyryev, L. Baum, K. Matsuda, and J. M. Doyle, ChemPhysChem 17, 3641 (2016).

[1]This work was supported by the AFOSR.

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Date submitted: 06 Feb 2017 Electronic form version 1.4