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**Toward Magneto-Optical Trapping of Polyatomic Molecules**
LOUIS BAUM, IVAN KOZYRYEV, ZOE ZHU, PHELAN YU, JOHN M. DOYLE, Harvard University — Three dimensional confinement of atoms inside a magneto-optical trap (MOT) revolutionized atomic physics and along with evaporative cooling led to the development of ultracold atomic gases in the quantum degenerate regime. Recently, groundbreaking experimental and theoretical work in molecular physics culminated with the creation of MOTs for diatomic molecules trapped below 1 mK [1-3]. Building on these achievements and our previous work on laser cooling of polyatomic molecules [4], we will present our progress towards creating a RF MOT of a triatomic radical, CaOH. Our experimental and theoretical results indicate that laser cooling can also be extended to hexatomic symmetric top molecules, e.g. $CaOCH_3$. Non-zero vibrational angular momentum of linear triatomics and finite projection of rotational angular momentum onto the body frame of symmetric top molecules result in linear Stark shifts, enabling novel quantum science applications. [1] Norrgard et al., PRL 116, 063004 (2016). [2] Truppe et al., Nat. Phys. 13, 1173 (2017). [3] Anderegg et al., PRL 119, 103201 (2017). [4] Kozyryev et al., PRL 118, 173201 (2017).

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