Abstract Submitted
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New Approaches for Producing Quantum Degenerate Gases of Strontium[1] ROGER DING, GERMANO WOEHL JR., FRANCISCO CAMARGO, JOSEPH WHALEN, F. BARRY DUNNING, THOMAS KILLIAN, Rice University — We investigate two novel methods for laser cooling strontium to quantum degeneracy. The first takes advantage of the isotope shifts and the narrow $^1S_0$-$^3P_1$ intercombination line (7.5 kHz at 689 nm) to produce an isotope selective optical dipole trap (ODT). We demonstrate this technique by sympathetically cooling ^{88}Sr or ^{87}Sr using ^{86}Sr to produce quantum degenerate gases. The second uses an acousto-optic modulator driven with multiple RF frequencies to dynamically shape a far-off resonance ODT. This is easy to implement in existing traps and allows for optimized loading and evaporation tailored for each isotope. The simple setup has been applied in various atomic physics experiments [1, 2], and we describe its application in strontium.

[1] D. Trypogeorgos, T. Harte, A. Bonnin, and C. Foot, "Precise shaping of laser light by an acousto-optic deflector," Opt. Express 21, 24837-24846 (2013).
[2] K. Roberts, T. McKellar, J. Fekete, A. Rakonjac, A. Deb, and N. Kjærgaard, "Steerable optical tweezers for ultracold atom studies," Opt. Lett. 39, 2012-2015 (2014).

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Roger Ding
Rice Univ

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