Abstract Submitted
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Adiabatic transfer cooling and trapping using narrow-line optical and Raman transitions[1] JUAN A. MUNIZ, BAOCHEN WU, JULIA R. K. CLINE, GRAHAM P. GREVE, MATTHEW A. NORCIA, JOHN P. BARTOLOTTA, MURRAY J. HOLLAND, JAMES K. THOMPSON, JILA, University of Colorado at Boulder — A novel cooling mechanism on narrow-linewidth optical transitions has been recently demonstrated. A set of counter-propagating laser beams are swept in frequency in a sawtooth manner to cause adiabatic Landau-Zener transfers between an atoms ground and excited state, while Doppler shifts provide a time-ordering that ensures the associated photon recoils oppose the atom's motion. We report progress on using this technique to cool strontium and create a 10 μK 3D MOT for both bosonic and fermionic isotopes. We also demonstrate sub-Doppler cooling in rubidium using artificially-narrow Raman transitions, and we provide a model for extending the technique to other systems without narrow linewidths. Both the experiments and theoretical modeling may find potential applications in cooling molecules or other systems without well-defined cycling transitions or for systems with large inhomogeneous broadening.

[1]DARPA QuASAR, ARO, NSF PFC, NIST

Juan A. Muniz
JILA, University of Colorado at Boulder

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