

Abstract Submitted
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Sawtooth Wave Adiabatic Passage in a Magneto-Optical Trap¹

MURRAY HOLLAND, JOHN BARTOLOTTA, JILA and University of Colorado, Boulder — We investigate theoretically the application of Sawtooth Wave Adiabatic Passage (SWAP) within a 1D magneto-optical trap (MOT). As opposed to related methods that have been previously discussed, our approach utilizes repeated cycles of stimulated absorption and emission processes to achieve both trapping and cooling, thereby reducing the adverse effects that arise from photon scattering. Specifically, we demonstrate this method's ability to cool, slow, and trap particles with fewer spontaneously emitted photons, higher forces and in less time when compared to a traditional MOT scheme that utilizes the same narrow linewidth transition. We calculate the phase space compression that is achievable and characterize the resulting system equilibrium cloud size and temperature.

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