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Narrow Linewidth Laser Cooling via Adiabatic Transfer JOHN BARTOLOTTA, MURRAY HOLLAND, MATTHEW NORCIA, JAMES THOMPSON, JULIA CLINE, Department of Physics and JILA, University of Colorado, Boulder — We simulate and provide a theoretical framework for a new cooling method applicable to particles with narrow-linewidth optical transitions. The particles are adiabatically transferred to lower momentum states upon interaction with counter-propagating laser beams that are repeatedly swept over the transition frequency. A reduced reliance on spontaneous emission (compared to Doppler cooling) allows for larger slowing forces. Cooling via a 7.6 kHz dipole forbidden transition in Strontium-88 is simulated using one-dimensional quantum jump and c-number Langevin equation methods. This "sweep cooling" mechanism also shows promise for application to systems lacking closed cycling transitions, such as molecules.

John Bartolotta
Univ of Colorado - Boulder

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