Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Cooling Atoms with a Moving One-Way Barrier ELIZABETH SCHOENE, University of Oregon, JEREMY THORN, DANIEL STECK — We demonstrate the use of a moving optical one-way barrier for cooling a collection of atoms. In our experiment, rubidium atoms begin in a far-detuned dipole trap consisting of a single focused Gaussian beam. Two laser beams transversely cross the trap; one provides a repulsive (attractive) potential for atoms in the upper (lower) ground state, and the other pumps atoms into the upper ground state on one side of the first beam, forming a one-way barrier. The optical one-way barrier is adiabatically swept along the longitudinal axis of the trap. At each point, the barrier traps atoms near their turning point, where they have less kinetic energy. As the barrier sweeps, the atoms do not regain their kinetic energy, and are eventually left at the trap focus with less kinetic energy than before. We experimentally study the effectiveness of barrier-cooling, focusing on how experimental limitations affect the cooling limit.

Elizabeth Schoene
University of Oregon

Date submitted: 22 Jan 2010 Electronic form version 1.4