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A Rubidium Atom Magneto-Optic Trap EVAN CARLSON, DANIEL ROBERSON, SHANNON MAYER, University of Portland — We present the theory and experimental apparatus for a magneto-optic trap for rubidium atoms. Laser cooling and magneto-optic trapping of atoms is a relatively simple but effective tool for producing high-density, low-temperature atomic samples. Operation of the MOT relies on radiation pressure from three orthogonal pair of counterpropagating laser beams to exert a force on the atom. By tuning the laser slightly below the atoms' resonance frequency, a moving atom will be Doppler shifted closer to resonance with one of the opposing laser beams and farther from resonance from the other. The resulting imbalance in absorption probability provides a velocity-dependent force to damp the atoms' velocity. Atoms are "trapped" with the addition of a spatially dependent confining force provided by a weak, inhomogeneous magnetic field. The apparatus for our experiment consists of an ultrahigh vacuum system, two tunable grating-feedback diode lasers, and the associated optics and electronics. A simple, current-adjustable rubidium oven provides for rapid control of the rubidium pressure in the vacuum system. CCD camera images show rubidium fluorescence in the trap region.

Shannon Mayer
University of Portland

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