

Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Spin Relaxation in Dark Optical Traps¹ SPENCER OLSON, MATTHEW TERRACIANO, MARK BASHKANSKY, FREDRIK FATEMI, Naval Research Laboratory — Blue-detuned, dark, optical traps confine atoms to regions of low intensity. This enables measurements to be done in near field-free conditions and provides for longer state purity in ensembles of atoms. We explore spontaneous-scattering-induced spin relaxation in blue-detuned traps and investigate the effects of trap tightness and wavelengths on state lifetime. Because hotter atoms in blue detuned traps are exposed to more intense light, they tend to scatter more photons. Hence, most atoms that undergo a state-changing photon exchange are from the outlying regions of the trap. By quickly removing these atoms, state purity is maintained in the remaining ensemble. Simulations show that this method of retaining state purity can be combined with evaporative cooling to obtain a very cold and very pure-state sample of atoms.

¹Funding for this work is from ONR and DARPA.

Spencer Olson
Naval Research Laboratory

Date submitted: 01 Feb 2008

Electronic form version 1.4