Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Magnetometry With High Spatial Resolution Using Cold Atoms in Dark Optical Tweezers[1] FREDRIK FATEMI, MARK BASHKANSKY, Naval Research Laboratory — We use Faraday spectroscopy of atoms confined to a movable crossed hollow beam trap to measure the magnetic field in a 200-micron-diameter spot over 5 mm in a single trap loading cycle. We have used blue-detuned, high-charge number hollow beams to create a box-like potential for cold Rb87 atoms. The trap and probe laser beams are scanned dynamically using acousto-optic deflection, and the magneto-optic polarization rotation of the probe is monitored by a polarimeter. The dark trap allows deep optical potentials with low photon scattering rate using near resonant ($\Delta = +100$ GHz) light so that multiple magnetic field measurements can be made in a single loading cycle. We demonstrate the technique by mapping quadrupole magnetic fields with 10 μG field sensitivity.

[1]Supported by ONR and DARPA

Fredrik Fatemi
Naval Research Laboratory

Date submitted: 23 Jan 2009 Electronic form version 1.4