Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Towards Trapping and Coupling to Atoms with a Magnetic Cantilever MATTHEW EARDLEY, YING-JU WANG, ANDREW GERACI, JOHN MORELAND, LEO HOLLBERG, JOHN KITCHING, National Institute of Standards and Technology, 325 S. Broadway St, Boulder, CO 80305 — Our previous results [see Y. Wang et. al, Phys. Rev. Lett. 97, 227602 (2006)] show that a microfabricated mechanical resonator (cantilever) supporting a small magnetic particle can resonantly couple to atomic spins in a mm-scale vapor cell. We now consider such an interaction in a sample of laser-cooled atoms. The same magnetized cantilever should be able to create a trap for these atoms. A magnetic quadrupole trap is created by adding a bias field to the dipole-like field of the magnetic cantilever tip. We propose to study the coupling of the motional excitation of the cantilever to the trapped atoms by inducing Zeeman transitions, which would cause an observable loss of atoms from the trap. The resonant vibration of the magnetic cantilever tip creates the necessary oscillatory field at the Zeeman frequency. We also report on progress in custom fabricating cantilevers with the appropriate parameters, and on transferring cold atoms from a magneto-optical trap to the cantilever trap. Implementing this setup could make possible a variety of experiments in which microfabricated resonators interact resonantly with cold atom spins.

Matthew Eardley
National Institute of Standards and Technology,
325 S. Broadway St, Boulder, CO 80305

Date submitted: 02 Feb 2008 Electronic form version 1.4