Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Measurement of the effects of the Casimir-Polder force using dipole oscillations of a magnetically trapped Bose-Einstein condensate JOHN OBRECHT, DAVID HARBER, JILA - NIST/University of Colorado, JEFFREY MCGUIRK, Simon Fraser University, ERIC CORNELL, JILA - NIST/University of Colorado — In this experiment a Rb-87 Bose-Einstein condensate is used to measure the effects of the Casimir-Polder force in a region 1-5 microns from a dielectric surface. A nearly pure condensate (>80% number fraction) placed at a fixed distance from the surface is given a small excitation resulting in a mechanical dipole oscillation. Effects from the Casimir-Polder force manifest themselves as small deviations to the natural dipole oscillation frequency (∼10ˆ-4 fractional change). Measurements have been made showing an unambiguous distinction between the Casimir-Polder force and the van der Waals force, showing good agreement with recent theory [1]. Future work includes making similar measurements in a high-temperature environment to demonstrate the predicted thermal dependence of the Casimir-Polder force. [1] Antezza M., Pitaevskii L.P., Stringari S., Phys. Rev. A 70, 053619 (2004).

John Obrecht
JILA - NIST/University of Colorado

Date submitted: 11 Mar 2005 Electronic form version 1.4