Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Inertially sensitive light pulse atom interferometry at short interrogation times DAVID BUTTS, KRISH KOTRU, Massachusetts Institute of Technology, JOSEPH KINAST, BRIAN TIMMONS, RICHARD STONER, C.S. Draper Laboratory, Inc. — The use of cold atoms in any sensor operating in a dynamic environment requires that the measurement cycle be conducted before the atom cloud escapes the interaction region. Under multiple-g accelerations, it is desirable to complete measurements in millisecond time scales, especially when laser beams are used to interrogate the atoms. We demonstrate high-contrast atom interferometry in a small vapor cell using stimulated Raman transitions at millisecond interrogation times. Laser-cooled cesium atoms are interrogated with a sequence of three Raman pulses and the interferometer phase is read out in the same region in which the atoms are trapped. Our system achieved over 70% contrast with a Doppler insensitive interferometer and over 40% contrast with a Doppler sensitive interferometer, in an environment normally considered adverse to high-contrast atom interferometry (e.g., no retroreflector stabilization and no magnetic shielding). We also report evidence of a potential inertial sensor error mechanism and present a method for inertial sensor scalefactor enhancement at short interrogation times.

David Butts
Massachusetts Institute of Technology

Date submitted: 04 Feb 2011 Electronic form version 1.4