Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Analysis of a free oscillation atom interferometer RUDRA KAFLE, Worcester Polytechnic Institute, DANA ANDERSON, JILA, NIST, and University of Colorado, Boulder, ALEX ZOZULYA, Worcester Polytechnic Institute — We analyze a Bose-Einstein condensate (BEC) - based free oscillation atom Michelson interferometer in a weakly confining harmonic magnetic trap. A BEC at the center of the trap is split into two harmonics by a laser standing wave. The harmonics move in opposite directions with equal speeds and return under the influence of the trapping potential at their classical turning points. The harmonics are allowed to pass through each other and a recombination pulse is applied when they overlap at the end of a cycle after their return at the second time. We derive an expression for the contrast of the interferometric fringes and obtain the fundamental limit of performance of the interferometer in the parameter space. The results are also compared and contrasted with the results of our previous work on a single- and double reflection atom Michelson interferometers.

Rudra Kafle
Worcester Polytechnic Institute

Date submitted: 18 Nov 2010 Electronic form version 1.4