Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Theoretical analysis of a free oscillation atom interferometer in a weakly confining magnetic trap RUDRA KAFLE, Worcester Polytechnic Institute, DANA ANDERSON, JILA, NIST, Univ. of Colorado, ALEX ZOZULYA, Worcester Polytechnic Institute — We analyze a Bose-Einstein Condensate (BEC)-based free oscillation atom Michelson interferometer in a weakly confining magnetic trap. A BEC at the center of a weakly confining magnetic trap is split into two harmonics by a laser standing wave. The harmonics move in opposite directions with equal speed and return under the influence of a harmonic trapping potential. They pass each other and return again, and they are recombined at the end of an interferometric cycle by a recombination pulse, which is identical to the splitting pulse. The visibility of the interferometer fringes is calculated by considering the change of the size of each harmonic. Our results show that the coherence time in the interferometer is improved in comparison to that of a double reflection interferometer, but the coherence time is degraded due to the change in size of the clouds.

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Date submitted: 22 Jan 2010 Electronic form version 1.4