Abstract Submitted
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On-chip Bose-Einstein condensate interferometer with 0.5 mm arm length[1] STEPHEN R. SEGAL, QUENTIN DIOT, ERIC A. CORNELL, JILA, NIST, and University of Colorado, MARA PRENTISS, Harvard University, ALEX A. ZOZULYA, Worcester Polytechnic Institute, DANA Z. ANDERSON, JILA, NIST, and University of Colorado — We demonstrate a chip-based Michelson interferometer for Bose-Einstein condensates in which a harmonic trap reflects the atoms. The condensate is split by diffraction from momentary exposure to an off-resonant standing light field. The two clouds propagate in opposite directions along a waveguide having a weak (6 Hz) harmonic axial confinement. The condensates reflect from the axial potential at classical turning points separated by about 0.5 mm. Upon returning to the trap center, the two clouds are recombined by a second exposure to the standing light field. The resulting three clouds are allowed to remain in the guide for a brief time. The atoms are then released from the guide and imaged after 15 ms of ballistic expansion. The total propagation time can be set to 80 or 160 ms. We use principal component analysis of a series of many images to study the coherence of the recombined atoms.

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