Abstract Submitted
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Light scattering to determine the relative phase of two Bose-Einstein Condensates M. SABA, T.A. PASQUINI, C. SANNER, Y. SHIN, G. JO, W. KETTERLE, D.E. PRITCHARD, MIT, MIT-HARVARD CENTER FOR ULTRACOLD ATOMS TEAM — We demonstrate an experimental technique to continuously sample the relative phase of two spatially separated Bose-Einstein condensates of atoms. The technique is based on stimulated Bragg scattering of light and can measure the phase of two condensates that have never been in contact [1]. The phase measurement process itself created a relative phase between two condensates with no initial phase relation, read out the phase, and monitored the phase evolution. This technique has applications for the study of weakly coupled condensates, Josephson oscillations, coherent manipulation and control of atomic wavefunctions. We demonstrate its potential realizing a novel atom interferometer between two trapped Bose-Einstein condensates without need for splitting or recombining the atom cloud. [1] M. Saba, T. A. Pasquini, C. Sanner, Y. Shin, W. Ketterle, and D. E. Pritchard, Light scattering to determine the relative phase of two BoseEinstein Condensates, Science, in press (2005).

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