Abstract Submitted
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Dynamics and Relative Phase of Fragmenting BECs[1] DOUGLAS K. FAUST, WILLIAM P. REINHARDT, University of Washington, Seattle — Recent BEC experiments[2,3] have shown that an initially coherent condensate, when spatially fragmented, can exhibit phase-driven phenomena such as the Josephson effect and controllable interference patterns analogous to those of a Mach-Zehnder interferometer. A theoretical treatment of the dynamics of such systems is difficult as two models are appropriate in different regimes: Mean-field theory for the initial unfragmented state and a Hubbard model for the particle number dynamics as localized lobes of the cloud form. We present a method which correctly describes dynamics of both spatial and Fock-space variables for a fragmenting condensate. This method shows the effect of non-adiabaticity on interference patterns, stability of Josephson oscillations and the degree of number squeezing in specific trap geometries. Further, this technique yields the order parameter (nor rigorously defined in mean-field theory) and gives a context in which to discuss phase uncertainty - the ultimate limit on the quality of interferometry schemes.

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[2]Y. Shin et al. PRL 93, 050405 (2004)
[3]M. Albeiz et al. PRL 95, 010402 (2005)

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