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Condensate Fraction in a BEC Dimer DAVID CAMPBELL, Boston University, HOLGER HENNIG, Harvard University, DIRK WITTHAUT, Max Planck Institute for Dynamics and Self-Organization, Goettingen — Recent experiments studying a Bose Einstein Condensate (BEC) in a two-mode system, equivalent to a "dimer," have shown that many qualitative dynamical features of the BEC can be understood from motions in the underlying classical (two-dimensional) phase space (phi, z). Using a Bose-Hubbard model for the dimer, we focus on quantum deviations from motions in the classical phase space. We introduce a "quantum" phase space (QPS), which we define as the minimum condensate fraction c(tau;phi,z) of initial coherent states (phi,z) in the time interval [0,tau]. We find that lines of equal condensate fraction in the QPS do mimic the classical trajectories of constant energy in many respects, such that the QPS clearly reflects Josephson oscillations and self-trapping. However, novel quantum features beyond the classical description appear at finite time tau. These include symmetry breaking and enhanced c(tau; phi, z) near the classical hyperbolic fixed point and along a ridge near the classical separatrix. These features of the QPS can be readily studied in current experiments.

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