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**Structures forming out of quantum seeds in Bose condensates with time-dependent tunnel coupling** FLORIAN MARQUARDT, CLEMENS NEUENHAHN, University of Erlangen-Nuremberg, Germany, ANATOLI POLKOVNIKOV, Boston University — Quantum fluctuations can be amplified into macroscopic structures in the course of time. This can happen in quench scenarious, where some parameter is time-dependent, and it has wide-ranging implications, from condensed matter physics to cosmology. Here, we investigate the behaviour of a model system of two 1D clouds of bosonic atoms. Specifically, we track the time-evolution of the quantum field that describes the relative phase between the quasi-condensates as a function of position. When suddenly switching on the tunnel-coupling, the subsequent dynamics is first governed by parametric amplification of the initial quantum fluctuations. At a later stage, nonlinear dynamics takes over, and localized phase structures form. These structures, which we term 'quasi-breathers', then stochastically form and decay, and we characterize their features using numerical simulations of the underlying sine-Gordon equation based on the truncated Wigner approximation. We then turn to a scenario where the tunnel coupling is changed smoothly over time. It turns out this can be mapped to the evolution of the quantum sine-Gordon field in an expanding 1+1 dimensional toy universe, giving insight into nonlinear structure formation in cosmology.

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