

Abstract Submitted  
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**Interaction Quench Induced Multimode Dynamics of Finite Atomic Ensembles**<sup>1</sup> SIMEON MISTAKIDIS, LUSHUAI CAO, PETER SCHMELCHER, Zentrum für Optische Quantentechnologien, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany — The correlated non-equilibrium dynamics of few-boson systems in one-dimensional finite lattices is investigated. Starting from weak interactions we perform a sudden interaction quench and employ the numerically exact Multi-Layer Multi-Configuration time-dependent Hartree method for bosons to obtain the resulting quantum dynamics. Focusing on the low-lying modes of the finite lattice we observe the emergence of density-wave tunneling, breathing and cradle-like processes. In particular, the tunneling induced by the quench leads to a “global” density-wave oscillation. The resulting breathing and cradle modes are inherent to the local intrawell dynamics and connected to excited-band states [1]. Moreover, the interaction quenches couple the density-wave and the cradle modes allowing for resonance phenomena. These are associated with an avoided-crossing in the respective frequency spectrum and lead to a beating dynamics for the cradle.

[1] S. I. Mistakidis, L. Cao, and P. Schmelcher, J. Phys. B: At. Mol. Opt. Phys. 47 225303 (2014).

<sup>1</sup>Hamburgisches Gesetz zur Förderung des wissenschaftlichen und künstlerischen Nachwuchses (HmbNFG)

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