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Interaction Quench dynamics of few-boson ensembles in optical lattices with spatially modulated interactions[1] SIMEON MISTAKIDIS, THIES PLASSMAN, PETER SCHMELCHER , Univ Hamburg, GROUP OF FUNDAMENTAL PROCESSES IN QUANTUM PHYSICS TEAM — The nonequilibrium quantum dynamics of few boson ensembles which experience a spatially modulated interaction strength and are confined in finite optical lattices is investigated. Performing quenches either on the wavevector or the phase of the interaction pattern an enhanced imbalance of the interatomic repulsion between distinct spatial regions is induced. Following both quench protocols triggers various tunneling channels and a rich excitation dynamics consisting of a breathing and a cradle mode. All modes are shown to be amplified for increasing inhomogeneity amplitude. Especially the phase quench induces a directional transport enabling us to discern energetically, otherwise, degenerate tunneling pathways. Moreover, a periodic (consecutive) population transfer between (to higher) lattice momenta for quenches of increasing wavevector (phase) is observed. Finally, regions of partial coherence are revealed between the predominantly occupied wells during the evolution.

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