Abstract Submitted
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Quench-induced resonant tunneling mechanisms of bosons in an optical lattice with harmonic confinement[1] SIMEON MISTAKIDIS, GEORGIOS KOUTENTAKIS, PETER SCHMELCHER, Center for Optical Quantum Technologies, University of Hamburg, THEORY GROUP OF FUNDAMENTAL PROCESSES IN QUANTUM PHYSICS TEAM — The non-equilibrium dynamics of small boson ensembles in one-dimensional optical lattices is explored upon a sudden quench of an additional harmonic trap from strong to weak confinement. We find that the competition between the initial localization and the repulsive interaction leads to a resonant response of the system for intermediate quench amplitudes, corresponding to avoided crossings in the many-body eigenspectrum with varying final trap frequency. In particular, we show that these avoided crossings can be utilized to prepare the system in a desired state. The dynamical response is shown to depend on both the interaction strength as well as the number of atoms manifesting the many-body nature of the tunneling dynamics.

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