Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Interaction quenched ultracold few-boson ensembles in periodically driven lattices[1] SIMEON MISTAKIDIS, PETER SCHMELCHER, Center for Optical Quantum Technologies, University of Hamburg, THEORY GROUP OF FUNDAMENTAL PROCESSES IN QUANTUM PHYSICS TEAM — The out-of-equilibrium dynamics of interaction quenched finite ultracold bosonic ensembles in periodically driven one-dimensional optical lattices is investigated. It is shown that periodic driving enforces the bosons in the outer wells of the finite lattice to exhibit out-of-phase dipole-like modes, while in the central well the atomic cloud experiences a local breathing mode. The dynamical behavior is investigated with varying driving frequency, revealing a resonant-like behavior of the intra-well dynamics. An interaction quench in the periodically driven lattice gives rise to admixtures of different excitations in the outer wells, an enhanced breathing in the center and an amplification of the tunneling dynamics. We observe then multiple resonances between the inter- and intra-well dynamics at different quench amplitudes, with the position of the resonances being tunable via the driving frequency. Our results pave the way for future investigations on the use of combined driving protocols in order to excite different inter- and intra-well modes and to subsequently control them.

[1]Deutsche Forschungsgemeinschaft (DFG) in the framework of the SFB 925 "Light induced dynamics and control of correlated quantum systems"

Simeon Mistakidis
Center for Optical Quantum Technologies, University of Hamburg

Date submitted: 27 Jan 2017 Electronic form version 1.4