

Abstract Submitted  
for the DAMOP16 Meeting of  
The American Physical Society

**Control dynamics of interaction quenched ultracold bosons in periodically driven lattices**<sup>1</sup> SIMEON MISTAKIDIS, PETER SCHMELCHER, Univ Hamburg, GROUP OF FUNDAMENTAL PROCESSES IN QUANTUM PHYSICS TEAM — The out-of-equilibrium dynamics of ultracold bosons following an interaction quench upon a periodically driven optical lattice is investigated. It is shown that an interaction quench triggers the inter-well tunneling dynamics, while for the intra-well dynamics breathing and cradle-like processes can be generated. In particular, the occurrence of a resonance between the cradle and tunneling modes is revealed. On the other hand, the employed periodic driving enforces the bosons in the mirror wells to oscillate out-of-phase and to exhibit a dipole mode, while in the central well the cloud experiences a breathing mode. The dynamical behaviour of the system is investigated with respect to the driving frequency revealing a resonant behaviour of the intra-well dynamics. To drive the system in a highly non-equilibrium state an interaction quench upon the driving is performed giving rise to admixtures of excitations in the outer wells, an enhanced breathing in the center and an amplification of the tunneling dynamics. As a result of the quench the system experiences multiple resonances between the inter- and intra-well dynamics at different quench amplitudes.

<sup>1</sup>Deutsche Forschungsgemeinschaft, SFB 925 "Light induced dynamics and control of correlated quantum systems"

Simeon Mistakidis  
Univ Hamburg

Date submitted: 10 Jan 2016

Electronic form version 1.4