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Mode-coupling of interaction quenched ultracold bosons in periodically driven lattices[1] SIMEON MISTAKIDIS, PETER SCHMELCHER , Univ Hamburg — The out-of-equilibrium dynamics of interaction quenched finite ultracold bosonic ensembles in periodically driven one-dimensional optical lattices is investigated. As a first attempt a brief analysis of the dynamics caused exclusively by the periodically driven lattice is presented and the induced low-lying modes are introduced. It is shown that the periodic driving enforces the bosons in the outer wells to exhibit out-of-phase dipole-like modes, while in the central well the cloud experiences a local-breathing mode. The dynamical behavior of the system is investigated with respect to the driving frequency, revealing a resonant-like behavior of the intra-well dynamics. Subsequently, we drive the system to a highly non-equilibrium state by performing an interaction quench upon the periodically driven lattice. This protocol gives 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. Finally, our study reveals that the position of the resonances can be adjusted e.g. via the driving frequency or the atom number manifesting their many-body nature.

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