

Abstract Submitted  
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**Non-Equilibrium Resonant Dynamics of Ultra-Cold Bosons in the Strongly Correlated Regime** CHESTER RUBBO, University of Colorado/JILA, SALVATORE MANMANA, JILA, ANA REY, REY GROUP TEAM — We study the static and dynamical properties of strongly interacting ultra-cold bosonic atoms loaded into a 1-D optical lattice with an external linear potential in light of recent experiments performed by the Greiner group at Harvard. Onsite strong interactions generally suppress motion, but when the external field is tuned resonantly with the interaction parameter, nearest neighbor tunneling is restored. The dynamics can be explained by mapping the system to states of dipole configurations. We obtain an exact understanding of the dynamics in few-body systems and use it to describe the many-body dynamics at low fillings. We test the validity of our model by comparisons to DMRG calculations. We also propose a controllable scheme to enhance mass transport. Finally, we extend the same study to systems exhibiting longer-range interactions.

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