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Non-equilibrium dynamics and magnetic correlations with atomic chains in optical lattices ANTON BUYSKIKH, Univ of Pittsburgh, ANDREW DALEY, Univ of Pittsburgh, Univ of Strathclyde, STEPHAN LANGER, Univ of Pittsburgh — We study the non-equilibrium dynamics of one dimensional chains of ultracold atoms in an optical lattice. By using tilted lattices or excitations to Rydberg levels, it is possible to generate effective spin models, which can produce interesting ordered states either in coherent dynamics or through dissipative driving. In the case of a tilted lattice, the spin models are based on the location of the atoms relative to an initial Mott Insulator state for Bosons, and interactions are induced by tunnelling. Using analytical techniques and time-dependent density matrix renormalization group methods, we study the dynamics of these systems in 1D, both when the tilt is varied adiabatically, and after a sudden quench. We especially consider how magnetic correlations and buildup of entanglement change as we manipulate the system with extra elements, including phonon- and photon-dressed Bloch Bands.

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