Abstract Submitted
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Steady-state bistability and long-range order in optically driven Rydberg gases in the anti-blockade regime FABIAN LETSCHER, DOMINIK LINZNER, MICHAEL FLEISCHHAUER, Department of Physics and Research Center OPTIMAS, University of Kaiserslautern — Motivated by recent experiments, we study spatial and temporal correlations of Rydberg excitations of optically driven ultra-cold atoms in the anti-blockade regime. In particular, we discuss the influence of dissipation on the excitation dynamics of a linear chain of atoms, described by the dissipative, transverse-field Ising model. Using t-DMRG simulations of the density matrix we identify parameter regimes with diverging correlation lengths in the coherent regime of weak dissipation. Correlation lengths remain short-ranged in the incoherent regime of strong dissipation, where classical rate equations can be employed. We discuss the different physical mechanisms determining the many-body dynamics in the two regimes and compare theoretical predictions with recent experimental results. In particular we discuss the formation of excitation cluster in the incoherent regime and explain the observed slow-down of the relaxation process due to cluster formation.

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