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Exactly solvable many-body driven-dissipative systems MOHAMMAD F. MAGHREBI, Univ of Maryland-College Park, MICHAEL FOSS-FEIG, United States Army Research Laboratory, JEREMY T. YOUNG, Univ of Maryland-College Park, VICTOR V. ALBERT, Yale University, ALEXEY V. GORSHKOV, National Institute of Standards and Technology — Non-equilibrium driven-dissipative systems are characterized by a fast external drive as well as a coupling to a dissipative bath. The vast range of experimental platforms capable of realizing such systems, specifically experiments with ultracold matter, has brought many open questions about the nature of their steady states and dynamics into the spotlight. In this talk, I identify a general class of many-body driven-dissipative systems with dissipation that does not commute with the Hamiltonian, but which nevertheless admit an exact solution. I show that the evolution of the reduced density matrix in any subspace of the system will only depend on the subsystem and its neighboring sites; however, the dynamics is not reducible to that of smaller subsystems. Under generic assumptions, I also argue that the dissipative gap remains finite, thereby preventing a dissipative phase transition in this class of models.

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