Correlated Exciton Transport in Rydberg-Dressed-Atom Spin Chains

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Author(s):
H. Schempp, G. Günter, S. Wüster, M. Weidemüller and S. Whitlock

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http://link.aps.org/doi/10.1103/PhysRevLett.115.093002 [2]

We investigate the transport of excitations through a chain of atoms with nonlocal dissipation introduced through coupling to additional short-lived states. The system is described by an effective spin-1/2 model where the ratio of the exchange interaction strength to the reservoir coupling strength determines the type of transport, including coherent exciton motion, incoherent hopping, and a regime in which an emergent length scale leads to a preferred hopping distance far beyond nearest neighbors. For multiple impurities, the dissipation gives rise to strong nearest-neighbor correlations and entanglement. These results highlight the importance of nontrivial dissipation, correlations, and many-body effects in recent experiments on the dipole-mediated transport of Rydberg excitations.

- 12.10.+i Simulations of many-body interactions [3]
- H2020 [4]
- RySQ [5]
- Result [6]
- 18.80.+d Quantum dissipative systems [7]
- 15.10.Ry Rydberg atoms [8]

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