Energy transport in bosonic ladders: interplay between interactions, gauge field and geometry of system-bath coupling

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Quantum systems in contact with an environment display a rich physics emerging from the interplay between dissipative and Hamiltonian terms. Here we consider a dissipative boundary driven ladder in presence of a gauge field which can be implemented with ion microtraps arrays. We focus on the interplay between the gauge field and the position of the coupling between the system and the baths. First we analyze the non-interacting case. We show that, depending on the geometry, the gauge field can drive two non-equilibrium phase transitions. In the different phases both the magnitude of the current and its spatial distribution are significantly different. Strong interactions significantly suppress the dependence of the current with the magnetic field and they result also in negative differential conductivity.

[1] C. Guo, D. Poletti, Phys. Rev. A **94**, 033610 (2016).

[2] C. Guo, D. Poletti, *manuscript in preparation* (2017).