

Stochastic thermodynamics for quantum maps with and without equilibrium and some consequences for the thermodynamics of systems with Lindblad dynamics.

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We develop stochastic thermodynamic [1] for CPTP maps with special attention to the case that the system of interest is driven by the coupling with the bath, i.e., a time dependent coupling (and not a time-dependent Hamiltonian for the system of interest). This will allow us to discuss the stochastic thermodynamics of open quantum systems described by boundary driven Lindblad equations [2]. We study in detail the case of CPTP maps that admit an equilibrium state. If this equilibrium state is not the Gibbs state some interesting observations are made. We can show that, in this case, the thermodynamic quantities can be evaluated with the knowledge of the state of the system without the need of the full system-bath state [3]. Finally, a comparison is made between the thermodynamics of driven systems in the repeated interaction scheme [4] and autonomous system of scattering type [5].

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