
Adiabatic and Non-adiabatic entropy production in quantum evolutions

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Abstract

Entropy production, or the positive change in entropy in a system due to its irreversible evolution, can be split into two positive contributions with different meanings. This splitting has been introduced some years ago for classical systems in the context of stochastic thermodynamics, leading to a great unification of concepts coming from non-equilibrium steady state thermodynamics, such as the so-called house-keeping heat or the excess entropy [1]. We extend this decomposition to quantum evolutions described in terms of quantum CPTP maps and operations, showing the existence of fluctuation theorems for both of them and the necessary and sufficient conditions to hold [2]. Finally we give some examples illustrating the meaning of both terms in simple situations.

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