Landauer's Principle for Trajectories of Repeated Interaction Systems

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Abstract: We study Landauer's principle for repeated interaction systems consisting of a reference quantum system S in contact with an environment E consisting of a chain of independent quantum probes.

The system S interacts with each probe sequentially and the Landauer principle relates the energy variation of E and the decrease of entropy of S by the entropy production of the dynamical process. We address the adiabatic regime where the environment, consisting of $T \gg 1$ probes, displays variations of order $1/T$ between the successive probes. We analyze Landauer's bound and its refinements at the level of the full statistics associated to a two-time measurement protocol of, essentially, the energy of E.

This is joint work with E. Hanson, Y. Pautrat, and R. Raquépas.