ENTROPIC FLUCTUATIONS IN QUANTUM STATISTICAL MECHANICS

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I shall discuss how the entropy production observable can be defined for any quantum (or classical) dynamical system as a derivative of the Radon-Nikodym cocycle. For the so-called open systems, which describe the interaction of several thermal reservoirs, this definition coincides with the standard thermodynamical definition in terms of the fluxes (heat, charge, mass...) across the system. After reviewing some basic properties of the entropy production observable and non-equilibrium steady states, I shall describe the large deviation theory of the entropy production observable. The main topic will be certain symmetries (Evans-Searls and Gallavotti-Cohen) of the moment generating functionals which can be interpreted as an extension of the Green-Kubo linear response formula to far from equilibrium steady states. The emphasis of the talk will be on the mathematical structure of the theory. One novelty of the results is that the classical and quantum case can be treated in parallel.

Keywords: Non-equilibrium quantum statistical mechanics, entropy production, fluctuations