Quantum Physics

Irreversibility in quantum maps with decoherence

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The Bolztmann echo (BE) is a measure of irreversibility and sensitivity to perturbations for non-isolated systems. Recently, different regimes of this quantity were described for chaotic systems. There is a perturbative regime where the BE decays with a rate given by the sum of a term depending on the accuracy with which the system is time-reversed and a term depending on the coupling between the system and the environment. In addition, a parameter independent regime, characterised by the classical Lyapunov exponent, is expected. In this paper we study the behaviour of the BE in hyperbolic maps that are in contact with different environments. We analyse the emergence of the different regimes and show that the behaviour of the decay rate of the BE is strongly dependent on the type of environment.

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