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Fluctuation-dissipation relations in isolated quantum systems after a quench[1]

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In recent years, there has been increasing interest in understanding under which conditions observables in isolated quantum systems far from equilibrium relax to the predictions of traditional statistical ensembles. Despite being guided by unitary dynamics, this has been shown to occur in nonintegrable systems [1,2] and has been understood within the eigenstate thermalization hypothesis [1-4]. In integrable systems, on the other hand, observables have been found to relax to nonthermal values, which instead can be described by generalized Gibbs ensembles (GGEs) [5]. In this talk, we review some of the early results on this topic and examine whether standard fluctuation dissipation relations apply after relaxation following a quantum quench. We focus on the dynamics of trapped hard-core bosons in one-dimensional lattices with dipolar interactions, as realized in recent experiments with ultracold gases in optical lattices, whose strength is changed during the quench. We consider both nonintegrable and integrable regimes and discuss how, at integrability, the results after relaxation depend on the properties of the initial state selected [6].

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