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Title: Correlation functions in GGEs: from the XX chain to the sine-Gordon model

Abstract: Space-time correlation functions of many-body interacting systems in finite-temperature states can be obtained from hydrodynamic principles. The simplest principle is that of hydrodynamic projections: observables are projected onto the hydrodynamic modes and their ballistic propagation gives rise to the leading power-law decay. In integrable systems, this works also in generalised Gibbs ensembles (GGE), and takes a universal form based on generalised hydrodynamics (GHD). But some observables do not couple to hydrodynamic modes: an exponential decay is found throughout space-time. For some of these, a different set of hydrodynamic principles are at play, based on connecting the correlation function with the large deviations of appropriate fluctuating quantities. Combined with GHD, this reproduces the exponentially decay first found by Its, Izergin, Korepin and Slavnov (1993) for thermal spin-spin correlations in the XX chain. It also gives the first solution to the long-standing problem of the exponential decay of thermal vertex operator correlation functions in the sine-Gordon model. It can be seen as a wide extension of Sachdev's original idea (1997, 2005) of counting semi-classical trajectories. Our method fully accounts for quantum coherences and distributions and holds in all GGEs and at all coupling strengths. Numerics in the classical limit shows excellent agreement. I will discuss all these ideas.