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Analytical methods for studying quantum quenches in integrable models

FABIAN ESSLER, Oxford University

I consider the non-equilibrium time evolution in integrable models after a quantum quench. For the case of a magnetic field quench in the transverse field Ising chain I present detailed results for the time evolution of local observables, which are shown to relax to a generalised Gibbs ensemble (GGE) [2] at late times. More generally, the reduced density matrix of a subsystem is shown to relax to a GGE in a power-law fashion in time. Dynamical response functions are studied as a function of the time after the quench and are shown to approach values given by the GGE as well. Finally generalizations to the sine-Gordon model [3] are discussed.

[1] P. Calabrese, F.H.L. Essler and M. Fagotti, Phys. Rev. Lett. 106, 227203 (2011); J. Stat. Mech. P07016 (2012); J. Stat. Mech. P07022 (2012);
[2] M. Rigol, V. Dunjko, V. Yurovsky, and M. Olshanii, Phys. Rev. Lett. 98, 50405 (2007); M. Rigol, V. Dunjko, and M. Olshanii, Nature 452, 854 (2008).
[3] D. Schuricht and F.H.L. Essler, in preparation.