Undephasing the generalized Gibbs ensemble

STEFAN KEHREIN, Goettingen University

Understanding the long time limit of closed quantum many-body systems prepared in some initial non-equilibrium pure state has attracted a lot of interest in recent years. One central question is whether such a system will thermalize or not. In integrable systems the long time limit leads generically to a generalized Gibbs ensemble (GGE) description [1]. For example for the one dimensional transverse field Ising model one can prove that asymptotically all local observables can be calculated in the GGE [2]. In my talk I will show how one can approximately reverse the time arrow of this dynamics using a spin echo-like local Hamiltonian. In this sense the time evolved system never forgets that it is in a pure state and remembers the initial values of local observables like the longitudinal and transverse magnetization. The time evolution can be thought of as dephasing leading to a GGE, which can be undone with this spin echo-like setup. This and related kinds of echo dynamics will be demonstrated for the transverse field Ising model and other integrable models.

[1] M. Rigol, V. Dunjko, V. Yurovsky, and M. Olshanii, Phys. Rev. Lett. 98, 050405 (2007).
[2] M. Fagotti and F. Essler, Phys. Rev. B 87, 245107 (2013).