Condensed Matter Theory Center Seminar

Tuesday, July 21
11:00 am – 12:00 pm
2205 Toll Physics Building

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"Correlations after quantum quenches in the XXZ spin chain: Failure of the Generalized Gibbs Ensemble"

The topic of thermalization of isolated quantum systems has enjoyed a lot of attention lately, partially due to the fast evolving experimental techniques in cold atom systems. Until recently, it was generally accepted that even completely isolated many-body systems self-thermalize to a certain extent: their evolution from a non-equilibrium initial state leads to a local thermal equilibrium (Gibbs ensemble) or to the Generalized Gibbs Ensemble (GGE) for integrable systems that have extra conserved quantities.

We studied the non-equilibrium time evolution of the integrable spin-1/2 anisotropic Heisenberg (XXZ) spin chain, and we found that various short-ranged spin correlators in the long-time limit deviate significantly from predictions based on the GGE hypothesis. By computing the asymptotic spin correlators within the recently proposed quench action formalism, however, we find excellent agreement with the numerical data. We therefore conclude that the GGE cannot give a complete description even of local observables. This surprising result reopens the quest for the correct statistical description of the equilibrium state of integrable systems. [Ref.: Phys. Rev. Lett. 113, 117203 (2014).]

Host: Jed Pixley

Web: http://www.physics.umd.edu/cmtc/seminars.html