SFB/TRR 21 - Seminar

7. September 2010, Stuttgart

Marcos Rigol

(Georgetown University, Washington)

Generalized Thermalization in Integrable Systems

Once only of theoretical interest, integrable models of one-dimensional quantum many-body systems can now be realized with ultracold atoms. In general, isolated integrable quantum systems that are initially far from equilibrium cannot undergo thermal relaxation in the usual way, because they are constrained by the non-trivial constants of the motion that make them integrable. Relaxation to a nonthermal state has recently been observed in an approximately integrable cold-atom system. It is natural to describe the observables after relaxation by an updated statistical mechanical ensemble: the generalized Gibbs ensemble (GGE), which is constructed by maximizing the entropy subject to the integrability constraints. In recent studies, the GGE has been found to accurately describe various observables after relaxation, but a microscopic understanding of its origin and applicability remains elusive. I will review some of the early results on this topic and then discuss the justification of the GGE based on a generalized view of the eigenstate thermalization hypothesis, which was introduced to explain thermalization in the nonintegrable case.

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Universität Stuttgart, NWZII, Raum 5.331
Pfaffenwaldring 57, 70569 Stuttgart

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