Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

IRTG-Seminar

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"Thermalization and quantum chaos in many-body interacting systems"

The problem of thermalization in an isolated quantum many-body system is discussed in the frame of recent experiments and theoretical results. Starting from a very paradigmatic model of N interacting bosons we willdemonstrate analytically and numerically that the number of states participating in the evolution after a quench increases exponentially in time, provided the eigenstates are chaotic and delocalized in the energy shell. The rate of the exponential growth is defined by the width Γ of the local density of states (LDOS) and is associated with the Kolmogorov-Sinai entropy for systems with a well defined classical limit. In finite systems, the exponential growth eventually saturates due to the finite volume of the energy shell. We estimate the time scale for the thermalization and show that it is N times larger than the characteristic Heisenberg time $\hbar/\Gamma$.

Last but not least we address the question of the relevance of thermalization to the increase of correlations. Specifically, we study how, in the process of thermalization, the correlations between occupation numbers increase in time resulting in the emergence of the Bose-Einstein distribution.

Tuesday, November 13, 2018; 1:00 p.m., HS II
Physics high rise, Hermann-Herder-Str. 3

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