Carl von Ossietzky
Universität
Oldenburg
Institut für PHYSIK

Theoriekolloquium

Am **14. Juli 2022** um **14.15 Uhr** im Raum **W2 1-143** hält

Herr Dr. Marco Tarzia (Paris)

einen Vortrag mit dem Titel

"Glassy" properties of the Many-Body Localization transition

Isolated quantum systems of interacting particles subject to sufficiently strong disorder may fail to come to thermal equilibrium even though prepared with extensive amounts of energy above their ground states. This phenomenon, commonly referred to as Many-Body Localization (MBL), was originally predicted by Anderson, but more firmly established only during the last 15 years, after the famous breakthrough of Basko, Aleiner, and Althsuler, and corresponds to a novel dynamical out-of-equilibrium quantum phase transition due to the interplay of disorder, interactions, and quantum fluctuations.
The MBL phase features many unusual and remarkable properties, such as the absence of dc transport, the violation of the eigenstate thermalization hypothesis, Poisson statistics, and the area-law entanglement of eigenstates.
A paradigmatic route which gives a very intuitive picture of MBL is obtained by recasting the many-body quantum dynamics in terms of a single-particle tight-binding problem in the Hilbert space. Within this mapping many-body configurations are seen as site orbitals on a given graph (with strongly correlated disorder) and the interactions play the role of an effective hopping connecting them.
The aim of this talk is to present a new perspective to analyze the MBL transition as a freezing glass transition of the paths leading to decorrelation from a random initial configuration in the Hilbert space:
By exploiting an analogy with directed polymers in random media, we perform a statistical analysis of the amplitudes of the propagators between distant configurations. By using the exactly solvable case of the Anderson model on the Cailey tree as a benchmark, we highlight the presence of several distinct regimes. In particular we discuss the emergence of a broad disordered range where typical samples appear as localized but few rare resonances still exist. We also show that the genuine MBL transition seems to occur at much stronger disorder that has been suggested in previous studies.

Interessierte sind herzlich eingeladen.

gez. Prof. Dr. Alexander Hartmann