PHYSIK

THEORETISCH PHYSIKALISCHES KOLLOQUIUM

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Breakdown of thermalization in closed quantum systems: Many-Body Localization

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Disorder in quantum systems can drastically change the physics compared to the clean case. A well-known example is the phenomenon of Anderson localization that can occur in a system of non-interacting electrons when the on-site potential is sufficiently strongly disordered. An important and challenging question is whether this Anderson insulator remains stable to the presence of interactions between the electrons and, if it does, what the characterizing properties of the resulting many-body localized (MBL) phase are.

The existence of such an MBL phase in a closed quantum system was only recently settled via a series of perturbative arguments. An intense effort followed, uncovering a surprising richness of this "dynamical" phase of matter and new theoretical frameworks had to be developed to understand its physics. Contrary to typical closed quantum many-body systems, satisfying the so-called eigenstate thermalization hypothesis (ETH), the MBL phase fails to thermalize.

In my talk, I will review some of the theoretical progress in understanding the physics of the MBL phase and discuss recent experiments with ultra-cold atoms.

Gäste sind herzlich willkommen.

Die Dozenten der Theoretischen Physik

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