LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

ARNOLD SOMMERFELD CENTER FOR THEORETICAL PHYSICS

Sommerfeld Theory Colloquium

Prof. Ehud Altman

Weizmann Institute

Ergodicity, Entanglement and Many-Body Localization in Quantum Dynamics

Do quantum many-body systems necessarily come to thermal equilibrium after a long enough time evolution? The conventional wisdom has long been that they do and that, in the process, any quantum information encoded in the initial state is lost irretrievably. Thus the dynamics of many-interacting particles becomes effectively classical. But these ingrained notions of thermalization and ergodicity have recently been called into question. In this talk I will discuss how ergodicity can break down in disordered quantum systems through the phenomenon of many-body localization. In contrast to thermalizing fluids, quantum correlations can persist through time evolution of the localized state even at high energy densities. Thus, investigating the many-body localization transition offers a concrete route to address fundamental unsolved questions concerning the boundary between classical and quantum physics in the macroscopic world. I will emphasize the important role that quantum entanglement plays in current attempts to understand this fascinating dynamical phase transition. Finally I will present recent progress in confronting the emerging theoretical understanding of many-body localization with experimental tests using systems of ultra-cold atoms.

Wednesday, 21 October 2015, 16:15h, Room A348, Theresienstr. 37/III

Prof. J. von Delft, Prof. M. Punk