

Many-body localization and periodically driven systems

mardi 14 juin 2016 10:15 (45 minutes)

Periodic driving provides an efficient way of quantum control. In particular, in recent experiments driving was used to realize topological Bloch bands in optical lattices. In this talk, I will present several rigorous results regarding periodically driven many-body systems. First, I will derive strong bounds on the heating rates of generic many-body systems. I will introduce a new approach based on a series of local unitary transformations, and will use it to show that, at times shorter than the (parametrically long) heating time scale, system's dynamics is well described by a time-independent effective Hamiltonian. Our approach can be extended to analyze the effects of coupling to a heat bath and slow turn-on of the drive. Second, I will show that strong disorder can induce many-body localization (MBL) in periodically driven systems. This phase, realized at high driving frequency, is characterized by the absence of heating and emergence of a complete set of local integrals of motion. I will argue that at low driving frequency delocalization is inevitable. Therefore, there is an MBL-delocalization transition as a function of driving frequency. I will close by discussing experimental implications.

Orateur: ABANIN, Dimitry (University of Geneva)

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