

Chez Pierre

Presents ...

Monday, March 28, 2016

12:00pm Noon

MIT Room 4-331



Chez Pierre Seminar

Dmitry Abanin - Université de Genève

” Many-body localization and periodically driven systems“

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 [1]. 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 H . [1]. 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 [2]. 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.

[1] D. A. Abanin, W. De Roeck, F. Huveneers, Phys. Rev. Lett. 115, 256803 (2015); D.A. Abanin, W. De Roeck, W. Ho, arXiv:1510.03405.

[2] P. Ponte, Z. Papić, F. Huveneers, D. A. Abanin, Phys. Rev. Lett. 114, 140401 (2015); D. A. Abanin, W. De Roeck, F. Huveneers, arXiv:1412.4752.