Disorder and Interactions in Quantum Systems

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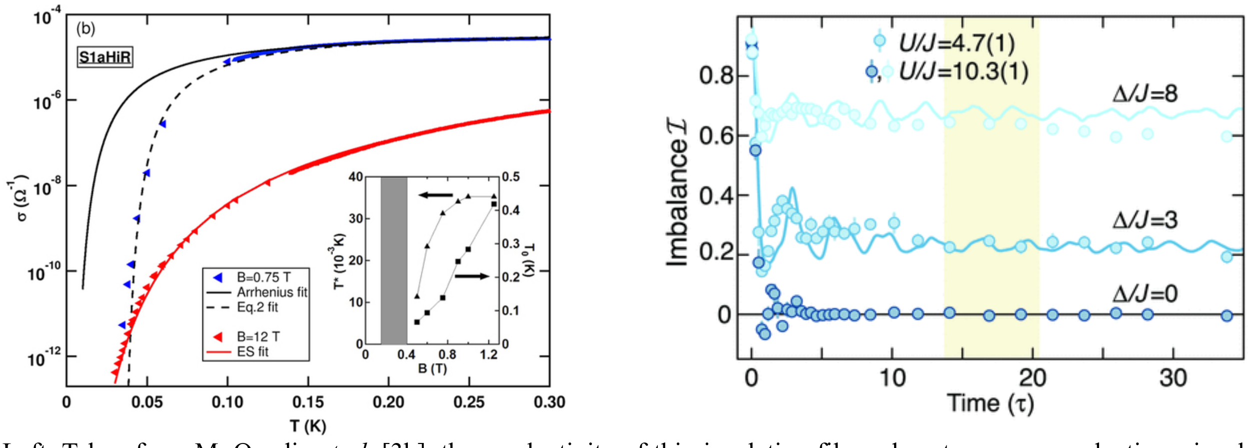
Understanding disorder effects in interacting quantum systems is one of the major challenges of modern condensed matter physics. It is now well recognized that the seminal work of Anderson in 1958 has opened a new field, which nowadays experiences an new boost of activity, with an enormous focus on the "many-body localization" phenomenon [1]. Several theoretical (analytical and numerical) developments [2], but also experimental signatures [3] (see Figure below) of a new kind of quantum insulating states are clearly raising very fundamental questions regarding the basis of quantum statistical physics, in particular the concept of thermalization [4].

In addition, high inhomogeneity at strong disorder and its link with glassy physics is a key question [5,6]. This aspect is particularly interesting as it appears in many different systems (from disordered superconductors to cold atoms) in the vicinity of transitions governed by disorder such as Anderson, many-body localization or superfluid-insulator transitions.

In this session, we aim at gathering theorists and experimentalists interested in disordered quantum interacting systems in order to share and discuss the numerous recent advances in this very active field. The intrinsic pluridisciplinary character of this topic, involving various communities, *i.e.* condensed matter physics, strongly correlated systems, statistical physics, quantum chaos, cold atoms, advanced numerical simulations, offers a very exciting landscape for this session.



Left: Taken form M. Ovadia *et al.* [3b], the conductivity of thin insulating films close to a superconducting - insulator transition (blue symbols) displays an anomalous behavior at low temperature, signaling a new kind of localized system. Right: Taken for Schreiber *et al.* [3a], the memory of an initial charge density wave remains at intermediate time after a quench, signaling many-body localization for the Aubry-André model realized with cold interacting fermions.

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