Seminar/Talk

Strongly subdiffusive dynamics in disorder-free quantum many-body systems

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Quantum many-body systems can exhibit a dynamical phase transition to a non-ergodic phase nowadays known as many-body localization (MBL). MBL systems feature vanishing conductivity and a logarithmic spreading of information, unlike typical many-body systems where conductivity is finite and information spreads ballistically. An MBL system can be understood as the analogue of Anderson insulator in the presence of interactions, thus its existence is tied to the presence of disorder in the system. An active area of research is understanding whether disorder is an essential ingredient for localization, or whether an interaction-induced MBL phase is possible. We identify a family of strongly subdiffusive, translation-invariant systems [1] by studying the spreading of information following a global quench. For the experimentally accessible timescales we show that these systems are indistinguishable from MBL systems. Furthermore, we develop a time-dependent degenerate perturbation theory (tDPT) to explain the decay of inhomogeneity in the system's initial condition. We identify a finite order in tDPT where the dynamics induced by the perturbed Hamiltonian is enough to delocalize the system. This method provides new insights into the long-time behaviour and the mechanisms of delocalisation in short-range interacting systems.[1] Alexios A. Michailidis et al., arXiv: 1706.05026 (2017)

Tuesday, October 3, 2017 11:00am - 12:30pm

Big Seminar room Ground floor / Office Bldg West (I21.EG.101)

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