Abstract

In this talk I will discuss how one can detect quantum chaos in generic interacting models using adiabatic transformations, specifically the fidelity susceptibility. In particular, I will show that it exhibits a very sharp crossover behavior from the algebraic to the exponential scaling form with the system size in the presence of a small integrability breaking parameter. This sensitivity allows one to identify tiny integrability breaking perturbations, not detectable by conventional methods. I will also discuss that generically integrable and chaotic regimes are separated by a universal regime of “maximal chaos” where the fidelity susceptibility saturates its upper bound and the system exhibits exponentially slow, glassy dynamics. I will illustrate how this probe works using several examples of both clean and disordered systems and, in particular, will argue that numerical results indicate absence of a continuous many-body localization transition in the thermodynamic limit.