

Coherent dynamics across quantum critical points

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The developments in the field of cold-atom experimentation has now made it possible to produce very isolated quantum systems in the laboratory. Several issues related to the statics and dynamics of these systems have thus become amenable to experimental inquiry. One particularly important issue in this regard is the thermalization in such isolated systems. In this context, fundamental differences are believed to exist between integrable and non-integrable systems. The possibility of producing nearly integrable systems in cold atomic systems has provided an opportunity to investigate these differences experimentally. In this talk, I will focus on theoretical issue related to coherent dynamics of isolated quantum systems that are swept across quantum critical points. It has been shown that power laws in the sweep rate occur in averaged quantities like the defect density. I will show that there are several other phenomena that are not captured by looking only at that these averaged quantities. In this context, I will focus on quantities such as the entanglement entropy and the "Loschmidt echo", which display power law, rather than exponential relaxation after the sweep. The time evolution of these quantities also highlights difference between integrable and non-integrable systems.