

ICTS Colloquium

Title : Solvable model for a dynamical quantum phase transition from fast to slow scrambling

Speaker : Sumilan Banerjee, Weizmann Institute of Science, Israel

Date : Monday, January 16, 2017

Time : 3:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : Alexei Kitaev has recently given a new interpretation to a solvable model of interacting fermions, now known as Sachdev-Ye-Kitaev (SYK) model, connecting it to thermalization, quantum chaos and information scrambling in black holes. The correlations that diagnose quantum chaos has been computed in this model leading to a scrambling rate with a universal value $2\pi k_B T/\hbar$ at temperature T . The SYK model is now understood as a fixed point for a certain class of quantum chaotic behavior. We propose a generalized model that extends this classification. In the generalized model, we couple N sites forming the SYK model to another set of M sites, connected to each other only via quadratic coupling. In the solvable limit of large N, M we find a quantum phase transition tuned by the ratio $p=M/N$ from a non Fermi liquid SYK like phase to a Fermi liquid. We show that the entire SYK-like phase shows scrambling at the universal rate $2\pi k_B T/\hbar$ at low temperature whereas the Fermi-liquid like phase shows much slower scrambling, proportional to T^2 .