ICTS Seminar

Title : Many-body quantum chaos in correlated metals

Speaker : Aavishkar Patel, Harvard University, USA

Date : Tuesday, May 1, 2018

Time : 4:00 PM

Venue : Madhava Lecture Hall, ICTS Campus, Bangalore

Abstract : I will describe computations of parameters characterizing many-body quantum chaos in two different examples of interacting quantum metals. These parameters describe "scrambling", i.e. the spread of quantum information across all of the degrees of freedom in a system leading to a loss of memory of the initial state, a process that is essential for thermalization. The first example consists of a metal with a Fermi surface coupled to a dynamical U(1) gauge field in two spatial dimensions. This is a strongly interacting state of quantum matter without quasiparticles, and is consequently a fast scrambler. The thermal diffusivity of this metal is universally related to the parameters describing scrambling. The second example consists of a weakly interacting electron liquid subject to random potential disorder. Even though the electrons naturally exhibit diffusive motion in this system, quantum information about inelastic electron collisions spreads ballistically with a temperature-dependent velocity. In two spatial dimensions, the Lyapunov exponent parameterizing the rate of scrambling is universally related at weak coupling to the sheet resistivity of this metal.

References: PNAS 114 (8), 1844-1849 (2017), Physical Review X 7 (3), 031047 (2017).