IACS Seminar on 12th December, 2017

Speaker: Dr. Anamitra Mukherjee, Asst Prof from NISER, Bhubaneswar

Venue: C V Raman Hall
Date & Time: 12th December; 4:00 PM

Title: Disorder driven non-Fermi liquid states in a Mott insulator.

Abstract:
The half filled Hubbard model describes interacting electrons with one electron on average per site. On a two dimensional square lattice, the half filled Hubbard model supports a Mott insulating state where electrons are predominantly site localized. A very different kind of insulating state, the Anderson insulator, occurs when non interacting electrons hop in presence of static potential disorder, again on a 2D square lattice. Curiously enough, if we have interacting electrons hopping in presence of potential disorder, the two insulating agencies conspire to give rise to a metal at zero temperature.
In this talk, I will discuss the nature and fate of the ensuing metal at finite temperatures. For this we will study the Anderson-Hubbard model using a recently developed technique called the 'Mean-Field-Monte Carlo' (MF-MC) approach [1, 2], that allows studying interacting electron problems at arbitrary interaction strengths and temperature. I will briefly discuss some benchmarks of the MF-MC method and then discuss our results for the Anderson-Hubbard model [3]. I will show that the disorder induced metal is generically a non-Fermi liquid whose characteristics can be tuned continuously by changing interaction and disorder strengths. All metallic states obtained in this fashion show clear deviation from Fermi liquid prediction of T^2 dependence of resistivity on temperature and exhibit logarithmic divergence of the specific heat over wide temperature ranges. I will end by discussing the reason for the non Fermi liquid behavior, its tunability and relevance to strongly correlated materials.

References:
[1] A. Mukherjee, *et. al.*, Phys. Rev. B 90, 205133 (2014).
[2] A. Mukherjee, *et. al.*,Phys. Rev. E 91, 063303 (2015).
[3] N. D. Patel, *et. al.* "Phys. Rev. Lett. 119, 086601 (2017).

All are cordially invited to attend the Seminar.