INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

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School of Physical Sciences

Title:	**Fermi liquid to non-Fermi liquid crossover in the next nearest neighbour Hubbard model**
Speaker:	**Anamitra Mukherjee,National Institute of Science Education and Research**
Date:	**January 24, 2019 (Thursday)**
Time:	**4:00 p.m.**
Venue:	**Physics Seminar Room - C406,3rd Floor, Centenary Building, IACS**
Abstract:	The Hubbard model with nearest (t) and next nearest hopping (t') on a square lattice is the quintessential model for strong correlation studies. It is believed to contain the physics of correlated metals, high T_c superconductors and non Fermi liquids among others. In this talk we will discuss the study of this model using a recently developed Mean-Field Monte Carlo (MF-MC) approach. This technique allows investigation of correlated systems on large lattices from very low to high temperature and for any value of correlation strength (U) at half filling. After a brief introduction, we will discuss the method and present benchmarks against Determinantal Quantum Monte Carlo for the nearest neighbour Hubbard model at finite temperature. For the $t - t'$ model, we will begin by showing that all previously reported $T = 0$ phases are captured within the MF-MC approach and then present results at finite temperature. We will establish that the metal to Mott transition at finite t' , goes through a non Fermi liquid (nFL) metallic state. We will show that the nFL state is characterized by pseudogapped density of states, diffuse spectral weight at the chemical potential, non Drude optical response and systematic deviation of the temperature exponent of resistivity from the Fermi liquid (FL) value of 2. We find that the nFL resistivity, depending on parameters, can either have a minima at $T = 0$ or at a finite temperature. We will show how correlation driven or t' driven spectral weight transfer stabilizes the nFL state through enhanced spin fluctuations and establish a smooth crossover of the FL to nFL by varying t' and U. In closing, we will discuss hints of C_4symmetry breaking in this model and ways to extend the MF-MC approach to situations away from half filling.

All are cordially invited to attend the seminar