ICTS Seminar

Title : Finite-Range Coulomb Gas Models and Their Applications: A Random Matrix Study

Speaker : Avanish Kumar, Jawaharlal Nehru University, New Delhi

Date : Monday, July 29, 2019

Time : 11:00 AM

Venue : Chern Lecture Hall, ICTS Campus, Bangalore

Abstract : Dyson introduced the Coulomb gas models via a Brownian matrix process for the eigenvalues of a random matrix. Dyson showed that joint probability distributions (jpd) of the classical ensembles are equilibrium states of the Brownian motion model of N Coulombic particles interacting with each other. The positions of the Brownian particles were identified as the eigenvalues of the random matrix problem. In the Dyson model the particles had full range or infinite-range interaction. Coulomb gas models were thus shown to follow the classical random matrix-universality classes. In this talk I will discuss the finite-range Coulomb gas (FRCG) models where the range of eigenvalue interaction d is finite. It can be shown that as the range of interaction increases from (d=0) to (d=N-1), there is a transition from Poisson to Wigner-Dyson classical random matrix statistics. FRCG models yield new universality classes for each d, and provide a theoretical framework for the study of banded random matrices (BRMs), and the dynamical systems (such as quantum kicked rotors (QKRs)) whose matrix representation can be written in the form of banded natrices.