

## **ICTS Statistical Physics Journal Club Seminar**

**Title** : Spectral properties of random perturbations of non-self-adjoint operators

**Speaker** : Anirban Basak (ICTS – TIFR, Bengaluru)

**Date** : Thursday, 23<sup>rd</sup> June 2022

**Time** : 03:00 pm (IST)

**Abstract** : Understanding spectral properties of non-self-adjoint operators are of significant importance as they arise in many problems such as scattering systems, open or damped quantum systems, and the analysis of the stability of solutions to nonlinear PDEs. Absence of suitable methods (e.g. variational methods) renders the study of the spectrum of such operators to be difficult. On the other hand, its high sensitivity to small perturbations leads to serious numerical errors. Motivated by problems in different fields such as numerical analysis, semiclassical analysis, fluid dynamics, and mathematical physics, during the last fifteen years there have been several works in understanding the spectral properties of random perturbations of non-self-adjoint operators. In this talk, we will focus on random perturbations of large dimensional non-self-adjoint Toeplitz matrices, and discuss (i) Weyl type law for the empirical measure of its eigenvalues, (ii) limiting eigenvalue density inside the zone of spectral 'instability' (i.e. limit law for outlier eigenvalues), and (iii) localization/delocalization of its eigenvectors, and the universality and non-universality of these features. I will also present some fun pictures and simulations. No background will be assumed. Based on joint works with Elliot Paquette, Martin Vogel, and Ofer Zeitouni.

**Venue** : *Hybrid Mode*

Offline: Emmy Noether Seminar Room

Online: Please click on the below link to join the seminar

<https://icts-res-in.zoom.us/j/82769082291?pwd=Z0hqbzFTNjBoK1NORUFJUHIUeXJRZz09>

Meeting ID: 827 6908 2291

Passcode: 232322