



## ICTS Condensed Matter Seminar

**Title** : Symmetry, exceptional points, and phase transitions

**Speaker** : Ipsita Mandal [The Henryk Niewodniczanski Institute of Nuclear Physics (IFJ PAN)]

**Date** : Thursday, 08 December 2022

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

**Abstract** : Exceptional points (EPs), at which two or more eigenvalues and eigenvectors coalesce, are ubiquitous and unique features of non-Hermitian systems. Second-order EPs are by far the most studied due to their abundance, requiring only the tuning of two real parameters, which is less than the three parameters needed to generically find ordinary Hermitian eigenvalue degeneracies. Higher-order EPs generically require more fine-tuning, and are thus assumed to play a much less prominent role. However, I will show that physically relevant symmetries make higher-order EPs dramatically more abundant and conceptually richer. In the presence of sublattice symmetries, I will discuss the emergence of unexpected odd-order EPs, which exhibit enhanced sensitivity in the behaviour of the eigenvector collapse in their neighbourhood, depending on how we approach the singular point.

As an example of the application of the concept of EPs to physical systems, I will consider the Hamiltonian describing a topological superconductor with a chiral symmetry. When the momentum is continued to complex values, one can find EPs (for the complexified Hamiltonian) appearing at topological phase transitions. These EPs are thus associated with the appearance / disappearance of chiral Majorana zero modes bound to defects / edges.

**Venue** : **Hybrid Mode**

**Offline:** Chern Lecture Hall

**Online:** Please click on the below link to join the meeting

<https://icts-res-in.zoom.us/j/85867113812?pwd=SFpkQ0kzZkhPZkNqUzdGV3NBZ3hmdz09>

Meeting ID: 858 6711 3812

Passcode: 080822