



**S N BOSE NATIONAL CENTRE  
FOR BASIC SCIENCES**

*Block JD, Sector III, Salt Lake, Kolkata 700 106*

## **DEPARTMENTAL SEMINAR**

# **Condensed Matter and Materials Physics**

**31<sup>st</sup> August, 2023**

**4.00 PM**

**ONLINE/ FERMION**

### **SPEAKER**

**Prof. Aveck Bid**

Department of Physics

Indian Institute of Science

Bangalore, India

### **TITLE OF THE TALK**

**TUNING TOPOLOGICAL BANDS IN GRAPHENE**

### **ABSTRACT**

Recently, there has been a surge of interest in the topological phases of matter, both experimentally and theoretically. The interest in this field stems from the fact that these phases are robust against perturbations, with the caveat that these perturbations reserve certain symmetries. Current efforts have focused on investigating the properties of discovered topological phases and the experimental realization of theoretically predicted but undiscovered phases. A few examples of topological phases being studied are the topological insulator, topological superconductor, Quantum anomalous Hall insulator (QAHI), Quantum Spin Hall insulator, and Quantum Valley Hall phases. At the phase transition, new topological phases exist, such as Dirac or Weyl semimetal, depending on the system's symmetries. Topological phases can also be introduced by breaking the symmetries of the system with external perturbations like electric and magnetic fields. Proximity-induced effects introduced by stacking with other materials are another approach that can be used for a similar outcome.

We are interested in the ability to induce transitions between topologically non-trivial and trivial states in graphene. This is best achieved by experimentally tuning the band structure of graphene. I will discuss two approaches we have taken in our research group to achieve this – (1) proximitizing graphene with materials possessing desirable properties and (2) modulating the graphene lattice itself. I will provide examples of each approach and discuss the (possible) future directions this research will take.

### **HOST FACULTY**

**Prof. Priya Mahadevan, Senior Professor**

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