



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

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

DEPARTMENTAL SEMINAR

Condensed Matter Physics and Material Sciences

4th May'2022

4.00 PM

ONLINE

SPEAKER



Dr. Amit Kumar Agarwal,
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TITLE OF THE TALK

**TOPOLOGICAL PHASE TRANSITIONS, NONLINEAR TRANSPORT,
AND PLASMONS IN MOIRE SUPERLATTICES**

ABSTRACT

Topological aspects of the electron wave-function play a crucial role in determining the physical properties of materials. For example, the Berry curvature and Chern number are used to define the topological structure of electronic bands. The Berry curvature also plays an important role in generating novel Hall effects in the linear and in the non-linear transport. The Berry connection is tied to the optical matrix element and it influences the optical conductivity and plasmon modes in quantum materials. Moire superlattices with small twist angles, offer an interesting platform for exploring these phenomena experimentally. Here, I discuss some of our recent work exploring on i) topological phase transitions, ii) their detection via a non-linear anomalous Hall transport measurements (in absence of magnetic field), and iii) novel undamped flat plasmon modes in these systems. Specifically, we will discuss this physics in twisted double bilayer graphene, where the topological phase transitions and plasmons can be tuned via electrostatic gating which controls the vertical electric field, and electronic doping.

HOST FACULTY

Dr. Thirupathaiah Setti

Assistant Professor & Seminar Coordinator, CONDENSED MATTER PHYSICS AND MATERIAL SCIENCES
