



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

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

# **DEPARTMENTAL SEMINAR**

## **Condensed Matter and Materials Physics**

**06<sup>th</sup> January, 2023**

**4.00PM**

**ONLINE/ FERMION**

### **SPEAKER**

**Dr. Ashish Arora,**  
Assistant Professor of Physics,  
Indian Institute of Science Education and Research (IISER), Pune

### **TITLE OF THE TALK**

**MAGNETIC FIELDS AND LIGHT FOR 2D INVESTIGATIONS**

### **ABSTRACT**

Experimental physics is challenging and fun. Scientific and technological progress in the modern world could not be imagined without careful experiments on semiconductors in the last 7 - 8 decades. As a result, semiconductors form the hearts and brains of modern computation, optoelectronic and lightwave technologies. In this talk, I will describe experiments on semiconductors using light and strong magnetic fields which have provided vital tests to the theories of quantum mechanics. Classic textbook quantum phenomena such as 'particle in a box' and confinement effects, quantum mechanics of artificial hydrogen atoms etc. are routinely studied in the laboratory through such experiments. We will discuss the strongest magnetic fields which have been created in a laboratory. Alongside, recent progress in the area of research will be described, where every year, many fascinating discoveries are taking place setting up foundations of future quantum computation and communication technologies [1].

Towards the end, I will also describe our newly invented Faraday rotation spectroscopy technique for performing high-precision magneto-optical spectroscopy on 2D materials [2]. Using our method, we measure giant Verdet constants (Faraday rotation per unit thickness per unit magnetic field) around exciton energies in the monolayers of 2D semiconductors WSe<sub>2</sub> and MoSe<sub>2</sub> [3]. Such huge Verdet constants are observed for the first time in any material so far.

References.

[1] Review of the field at: A. Arora, J. Appl. Phys. 129, 120902 (2021)

[2] Carey et al., Small Methods (2022)

[3] Carey et al., to be submitted

### **HOST FACULTY**

**Dr. Atindra Nath Pal, Associate Professor**

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