



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

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

## **DEPARTMENTAL SEMINAR**

# **Physics of Complex Systems**

**16<sup>th</sup> April, 2026**

**2.30 PM**

**ONLINE / FERMION**

### **SPEAKER**



**Dr. Saroj Kumar Nandi, Associate Professor  
Tata Institute of Fundamental Research, Hyderabad**

### **TITLE OF THE TALK**

## **Theory for discontinuous shear thickening of epithelial tissue rheology**

### **ABSTRACT**

The ability of epithelial tissues to withstand large-scale mechanical deformation while preserving essential functions is crucial to many biological processes, such as embryogenesis, wound healing, and collective cell migration. However, a comprehensive understanding of the underlying rheological properties and their driving mechanisms remains elusive. Tissues exhibit a diverse range of mechanical behaviors, encompassing both Newtonian and non-Newtonian responses. Among these, discontinuous shear thickening (DST), a striking rheological phenomenon well established in dense particle suspensions and recently identified in epithelial tissue models, manifests as a sudden and pronounced increase in viscosity at a critical shear rate or shear stress. In this talk, I will show our simulation results from the thermal vertex model that establish DST as an inherent property of the tissue. I will then introduce a constitutive model of DST in these systems and present the model's predictions. I will show that the underlying mechanism leading to DST fundamentally differs from that in dense particulate suspensions.

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### **HOST FACULTY**

**Prof. Punyabrata Pradhan**  
**DEPT. OF PHYSICS OF COMPLEX SYSTEMS**

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