S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Physics of Complex Systems

17th October, 2024 **4.00 PM** **ONLINE / FERMION**

SPEAKER

Prof. Dibyendu Roy,
Associate Professor, Theoretical Physics,
Raman Research Institute

TITLE OF THE TALK

Nonreciprocal transport in linear systems with balanced gain and loss in the bulk

ABSTRACT

The Boltzmann transport equation provides possible routes to achieve irreversible macroscopic description emerging from reversible microscopic description. I shall discuss nonreciprocal particle and energy transport in linear systems with balanced gain and loss of particle or energy in the bulk. The role of balanced gain and loss of particles or energies has been extensively investigated in recent years in the context of an effective parity-time symmetry in classical and quantum systems. First, I shall point out severe issues with existing theoretical modeling for the time evolution of such systems. Next, I shall present our studies of these systems within a classical master equation and an open-quantum system description. These descriptions surprisingly lead to nonreciprocal transport in linear systems, even without magnetic fields. Previous studies have found nonreciprocity in such models only due to nonlinearity or magnetic fields.

References:

1. Nonreciprocal electrical transport in linear systems with balanced gain and loss in the bulk, Rupak Bag and Dibyendu Roy, arXiv: 2409.12510 (2024)

2. Quantum noise induced nonreciprocity for single photon transport in parity-time symmetric systems, Dibyendu Roy and G. S. Agarwal, arXiv: 2407.00758 (2024)

HOST FACULTY

Prof. Punyabrata Pradhan,
Professor, Dept. of Physics of Complex Systems

****