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

DEPARTMENTAL SEMINAR

Physics of Complex Systems

01st November,2023 **12.00 Noon** **ONLINE / FERMION**

SPEAKER

Dr. Sudip Mukherjee,
Assistant Professor,
Post-Graduate Physics Department,
Barasat Government College

TITLE OF THE TALK

Nonequilibrium steady states in coupled asymmetric and symmetric exclusion processes

ABSTRACT

Asymmetric (TASEP) and symmetric (SEP) exclusion processes are paradigmatic nonequilibrium and equilibrium models respectively in one dimension. Both isolated TASEP and SEP with open boundaries are extensively studied and the stationary densities calculated. Little is known about the resulting nonequilibrium steady states, when TASEP and SEP are coupled, a situation relevant in cell biological transport. We show that when an open TASEP and SEP are coupled via a lane exchange mechanism in the bulk, the diffusivity D in the SEP channel appears as a control parameter that allows us to tune the TASEP stationary densities in a continuous manner. While in the extreme limits of diverging and vanishing D, the coupled model reduces to the well-known TASEP with particle nonconserving Langmuir kinetics and pure open TASEP respectively, analysing the model for finite D values is challenging. By employing mean-field theories and Monte-Carlo simulations, we show that for finite D both the TASEP and SEP densities acquire nontrivial space dependence. We also elucidate a delocalisation transition in the TASEP lane as D is gradually reduced.

Ref.: arXiv:2306.14651 (accepted in Physical Review E, in press)

HOST FACULTY

Prof. Sakuntala Chatterjee, Professor
DEPT. OF PHYSICS OF COMPLEX SYSTEMS

****