ICTS Statistical Physics Journal Club Seminar

Title	:	Hydrodynamics, "superfluidity", and giant number fluctuations in a model of self-propelled particles
Speaker	:	Punyabrata Pradhan (S. N. Bose National Centre for Basic Sciences, Kolkata)
Date	:	Thursday, 3rd December 2020
Time	:	03:00 pm (IST)

Abstract : We study hydrodynamics of a prototypical one-dimensional model, having variable-range hopping, which mimics passive diffusion and ballistic motion of active, or self-propelled, particles. The model has two main ingredients— the hardcore interaction and the competing mechanisms of short- and long-range hopping. We calculate two density-dependent transport coefficients— the bulk-diffusion coefficient and the conductivity, the ratio of which, despite violation of detailed balance, is connected to particle-number fluctuation by an Einstein relation. In the limit of infinite-range hopping, the model exhibits, upon tuning density ρ (or activity), a "superfluid-like" transition from a finitely conducting fluid phase to an infinitely conducting "superfluid" phase, characterized by a divergence in conductivity $\chi(\rho) \sim 1/(\rho - \rho c)$ with ρ_c being the critical density. The diverging conductivity greatly enhances particle mobility and thus induces "giant" number fluctuations in the system.

Online Seminar	:	Please click on the below link to join the meeting
		https://zoom.us/j/92573989778?pwd=dFBkVmVIQ3NBRWZ4QlVIdnlDOG5LZz09
		Meeting ID: 925 7398 9778
		Passcode: 967715