

Overview about hydrodynamics, fluctuations, and universality of interacting particle systems.

Patricia Gonçalves¹

¹ IST

In the seventies, F. Spitzer introduced stochastic interacting particle systems as toy models describing interesting phenomena. The dynamics of these systems conserve one or more quantities of interest. The goal in the hydrodynamic limit, consists in deducing, by a scaling limit procedure, the macroscopic equations (PDEs) that rule the space-time evolution of those conserved quantities from the underlying random motion of the microscopic system of particles. This result can be seen as a law of large numbers for the conserved quantity of the system. The description of the fluctuations around the hydrodynamic limit is given in terms of a solution to a stochastic PDE. From these results, many equations (either PDEs or SPDE) can be obtained and they are universal in the sense that they do not depend on specific features of the discrete models. In this talk, I will focus on the latest advances around the derivation of these problems for some well-known models, and I will discuss how different universal laws can be obtained and how they can be linked.