UNIVERSITÄT BIELEFELD

Faculty of Physics

SFB 1283

Seminar

Mathematical Physics

Costatino di Bello

Many-particles diffusing with resetting: study of the large-deviation properties of the flux distribution

In this paper we studied a model of noninteracting particles moving on a line following a common dynamics. In particular we considered either a diffusive motion with Poissonian resetting, and a run-and-tumble motion with Poissonian resetting. We were interested in studying the distribution of the random variable Q_t defined as the flux of particles through origin up to time t. We used the notation $P(Q,t)$ to identify the probability $\mathbb{P}\{Q_t = Q\}$. We considered particles initially located on the negative half line with a fixed density ρ. In fully analogy with disordered systems, we studied both the annealed and the quenched case for initial conditions. In the former case we found that, independently from the specific dynamics, $P_{\text{an}}(Q,t)$ has a Poissonian shape; while in the latter case, for what concerns the diffusive dynamics with resetting, the large deviation form of the quenched distribution reads $P_{\text{qu}}(Q,t) \sim \exp\left[-r^2t^2\Psi_{\text{diff}}\left(\frac{Q}{\rho t}\right)\right]$ with the large deviation function $\Psi_{\text{diff}}(x)$ exhibiting a discontinuity in the third derivative, hence aiming, despite the simplicity of the model, at the exhistence of a dynamical phase transition. The quenched distribution for the run-and-tumble dynamics, instead, does not exhibit any kind of phase transition. Importance sampling Monte Carlo simulations were performed to prove the analytical results.

Thursday, May 5, 2022, 4:00 p.m.

D5-153 and via zoom

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for details regarding access