Probabilistic methods in statistical physics for extreme statistics and rare events

Workshop 1 of the general program: Advanced asymptotics of PDEs, modeling and extreme statistics and their applications to data analysis in cell biology

<u>**Dates**</u> (working days):   17-21 September
<u>**Organizers:**</u> G. Schehr**,** D. Holcman,

Aim: In this first introductory workshop, we will present recent advances in analysis, probability of rare events, search processes, Brownian motion and random walk used in physics description of biological system at a molecular level. Topics of interest are functionals of the Brownian motion, probability density functions of many joint processes and diffusion processes with application to Mean First Passage Times and Narrow Escape Times asymptotics in different bounded domains. Analytical methods to be discussed are analytical and exact solutions of statistical physics models, homogenization procedures and analysis of jump and search processes.

Program:
45mins/talk (40mins + 5mins questions)

Monday

09:00-09:30 – Registration

09:30-10:15 – Majumdar, *Universal Statistics of Records*
10:15-11: 00– Krug, *Fitness landscapes, adaptive walks and extreme value theory*

11:00-11:30 – Coffee break

11:30-12:15 – Godrèche, *Condensation and extreme under constraint*
12:15-13:00 – Holcman, *Statistical redundancies in cellular biology*

13:00-15:30 – Lunch/break

15:30-16:15 – Schwartz, *Large Fluctuations and Rare Events in Complex Networks*
16:15-17:00 – Erban, *Multiscale Methods for Rare Events*

17:00-17:30 – Break

17:30-18:15 – Franosch, *Time-dependent active microrheology in dilute colloidal suspensions*

Tuesday

09:30-10:15 – Barkai, *The single big jump principle: rare events for fat tailed processes*
10:15-11: 00– Agranov, *Narrow Escape of Interacting Diffusing Particles*

11:00-11:30 – Coffee break

11:30-12:15 – Giuggioli, *Exact time-dependent propagator of discrete random walks in confined lattices in any dimension*
12:15-13:00 – Bénichou, *First-passage times of Markovian and non-Markovian random walks*

13:00-15:30 – Lunch break

15:30-16:15 – Evans, *Non-Markovian Stochastic Resetting*
16:15-17:00 – Sabhapandit, *Dynamics of stochastic resetting: with and without memory*

17:00-17:30 Coffee Break

17:30-18:15 – Boyer, *Anderson-like localization of adaptive random*

Wednesday

09:30-10:15 – Mukamel, *Extreme statistics in mixed order phase transitions*
10:15-11: 00– Oshanin, *Spectral content of a single trajectory*

11:00-11:30 – Coffee break

11:30-12:15 – Grebenkov, *First-passage times in dynamic heterogeneous media*
12:15-13:00 – Metzler, *Non-ergodicity and ageing in single particle trajectories*

13:00-15:30 – Lunch break

Free Afternoon

Thursday

09:30-10:15 – Kafri, *Long-range forces between bodies in active matter*
10:15-11: 00– Basu, *Active Brownian motion in two dimensions*

11:00-11:30 – Coffee break

11:30-12:15 – Illien, *Driven transport in dense environments: exact results and decoupling approximation*

12:15-13:00 – Dykman, *Rare events and time-symmetry breaking in Floquet systems*

13:00-15:30 – Lunch break

15:30-16:15 – Rosso, *Large deviations and rare excitations of directed polymers in random media*
16:15-17:00 – Chétrite, *Large deviations and uncertainty relations in periodically forced Markov process*

17:00-17:30 Coffee Break

17:30-18:15 Sokolov, *Random search with resetting: A unified renewal approach*

Friday

Non-equilibrium systems

09:30-10:15 – Wattis, *Coagulation-fragmentation kinetics*
10:15-11: 00– Dhar, *Energy current fluctuations for one-dimensional equilibrium systems in ring geometries*

11:00-11:30 – Coffee break

11:30-12:15 – Mejia-Monasterio, *On a universality class in anomalous diffusion*
12:15-13:00 – Kundu, *Exact extremal statistics in the classical 1d Coulomb gas*

Free afternoon