**Ralf METZLER – University of Potsdam, Germany**

Stochastic dynamics in complex systems

Stochasticity is an everyday phenomenon present in molecular diffusion and gene regulation in living biological cells, over financial market dynamics, to the spreading of diseases or the fluctuations in plasmas. Historically stochastic frameworks following Brown's original observation of particle diffusion were used to unveil the atomistic nature of matter or were one of the keys to the understanding of the behaviour of neutrons in chain reactions in the Manhattan project. The talk will present a brief introduction to stochastic processes and modern challenges of diffusion in complex systems such as biological cells or in geophysics. Apart from theoretical analyses of processes and related observables, the presented approaches rely on computational methods such as Langevin and Molecular Dynamics. Moreover, data analysis methods such as Bayesian maximum likelihood and machine learning will be addressed.