Institute of Mathematics

Research seminar in Probability

Winter term 2022-2023, Mondays 13:00-14:00 (Online & sur place)

Zoom: https://uni-potsdam.zoom.us/j/69067420670 (Kenncode: 49220780)

24.10.22 **Willem van Zuijlen** (Weierstraß Inst., Berlin)

Weakly self-avoiding walk in a random potential

We investigate a model of simple-random walk paths in a random environment that has two competing features: an attractive one towards the highest values of a random potential, and a self-repellent one in the spirit of the well-known weakly self-avoiding random walk. We tune the strength of the second effect such that they both contribute on the same scale as the time variable tends to infinity. In this talk I will discuss our results on the identification of (1) the logarithmic asymptotics of the partition function, and (2) of the path behaviour that gives the overwhelming contribution to the partition function. This is joint work with Wolfgang König, Nicolas Pétrélis and Renato Soares dos Santos.

07.11.22 **Martha Nansubuga** (Humboldt Universität zu Berlin)

On Stochastic Differential Equations with Jumps of Marcus-Type

We study stochastic differential equations (SDEs) driven by semimartingales with jumps, where the jumps of the solution are obtained as small relaxation time limits of fast curvilinear motions along the solution of a non-linear ODE, and between the jumps, the solution to the SDE moves along the (coefficient) vector field in the sense of Marcus [Stochastics,´81]. For stochastic integrals driven by a continuous process, stochastic integrals in the Marcus sense coincide with stochastic integrals in the Stratonovich sense and satisfy a chain rule for drivers with jumps. We study SDEs with time-dependent coefficients, which are compared with the work of Kurz, Pardoux, Protter, [An. IHP, ´95]. I will give an outlook on my ongoing research where such SDE are to be applied.

14.11.22 **Suren Poghosyan** (Nat. Acad. of Sciences of Armenia, Erevan)

Penrose-stable Interactions in Classical Statistical Mechanics

For a pair potential Φ in a general space X we define by means of the Ursell kernel the correlation function r of a unique process Q, the limiting Gibbs process for Φ with empty boundary conditions. This process is indeed a Gibbs process in the sense of Dobrushin, Lanford and Ruelle for a class of pair potentials, which contains classical stable (in particular positive) and hard-core potentials. We show uniqueness results using the method of Kirkwood-Salsburg equations. (Joint work with Hans Zessin.)

21.11.22 **Peter Nejjar** (Bonn Uni./Potsdam Uni.)

1/3 scaling exponent and non-gaussian limit laws

The standard CLT is characterized by a fluctuation exponent of one half and a gaussian limit distribution. We will discuss several examples, e.g. of random growth models and interacting paticle systems , where the fluctuation exponent is one third rather than one half, and the limit law is a so-called Tracy-Widom distribution, which, surprisingly, has first appared in the study of random matrices.

28.11.22 **Antonio Ocello** (Sorbonne-univ., Paris)

Relaxed formulation for the control of branching diffusions: Existence of an optimal control and HJB equation

We study the existence of optimal control for branching diffusion processes. The considered problem use rewards that can be nonlinear in the final payoff and linear in the running payout. We give a relaxed formulation, showing its equivalence with the strong problem and proving the existence of optimal controls. Using the dynamic programming principle, we prove that the maximizer can be found in the class of Markovian controls. Finally, we characterize the value function as a viscosity solution of an HJB equation in the space of measures.

16.01.23 **Andrey Pilipenko** (Inst. of Mathematics, Nat. Acad. of Sciences & Nat. TU of Ukraine, Kyiv)

Reflected diffusions in cones

Let X be a diffusion in a cone with oblique reflection at the boundary. We study the question whether X reaches a vertex of the cone in a finite time with positive probability. A new probabilistic method of investigation connected with the long time behavior of a diffusion reflected in a cylinder is proposed.

17.01.23 **Oleksandra Antoniouk** (Inst. of Mathematics, NAS of Ukraine, Kyiv Academic University)

Nonlinear pseudo-differential operators and stochastic equations on p-adic fields.

The talk gives a brief overview of the results related to the theory of pseudo-differential equa- tions in the spaces of test and generalized functions on the field of p-adic numbers. Results related to the modern nonlinear theory of such equations and their solvability, as well as con- nections with stochastic differential equations over locally compact groups will be considered.

23.01.23 **Angelo Valleriani** (Max-Planck-Inst. of Colloids and Interfaces, Dept of Biomaterials, Potsdam)

Early stages of the malaria parasite inside the mosquito

The malaria parasite Plasmodium falciparum is ingested by the mosquito of the species Anophele, when the mosquito gets a blood meal from an infected host. Inside the mosquito, the parasite's first 24 hours show a set of genetic and morphological transformations in order to escape the deadly environment of the mosquito gut during blood digestion. The group of E. Levashina at the MPI for Infection Biology in Berlin has produced fascinating, quantitative experimental data of this process, which seems to be one of the weakest points of the parasite's life cycle. In this talk I will describe this process, show the data and discuss some of their peculiar features in terms of statistics modeling. Furthermore, I will discuss a mathematical model that recapitulates this process, served as guideline for further experimental observations and produces the time distributions involved in the process. These distributions are the first quantitative estimate of this process and will serve as a ruler to make comparative experiments under various environmental and biological conditions.

30.01.23 **14:00** **Olga Aryasova** (Inst. of Geophysics, Nat. Acad. of Sciences of Ukraine & Friedrich–Schiller–Univ. Jena)

Homogenisation of a multivariate diffusion with semipermeable reflecting interfaces

We study the homogenization problem for a multivariate stochastic differential equations with local times that determine semipermeable reflecting hyperplane interfaces. We show that this system has a unique weak solution and determine its weak limit as the distances between the interfaces converge to zero. In the limit, the local times terms give rise to an additional drift term.

06.02.23 **Sara Mazzonetto** (Univ. de Lorraine, Nancy)

Local time approximation in parameter estimation for skew-sticky diffusions

In this seminar we first describe a class of real Markov processes with continuous sample paths which shows singular behavior at a point, let us say barrier. The barrier is semi-permeable or sticky. Starting from an observation of a trajctory, it is natural to try to detect these behaviors, which are encoded in some parameters. The approximation of the local time allows us to construct estimators for the parameters and to show asymptotic mixed normality properties.This talk is partially based on a joint work with A. Anagnostakis.

Interessenten sind herzlich eingeladen! Anyone interested is welcome!
Prof. Dr. Sylvie Roelly