TECHNISCHE UNIVERSITÄT DARMSTADT
FB Mathematik
F. Aurzada, V. Betz

JOHANNES GUTENBERG UNIVERSITÄT MAINZ
FB Physik, Mathematik und Informatik
Institut für Mathematik
M. Birkner, L. Hartung, A. Klenke

GOETHE UNIVERSITÄT FRANKFURT AM MAIN
FB Informatik und Mathematik
Institut für Mathematik
Schwerpunkt Stochastik
G. Kersting, N. Kistler, Ch. Kühn, R. Neininger, G. Schneider, A. Wakolbinger

Rhein-Main-Kolloquium Stochastik

TU Darmstadt, Goethe-Universität Frankfurt und Gutenberg-Universität Mainz

Liebe Kolleginnen und Kollegen,
liebe Freunde des Rhein-Main-Kolloquiums Stochastik,

wir möchten Sie nochmals herzlich zu unserem festlichen Rhein-Main-Kolloquium Stochastik am

Freitag, 22. Juli 2022

im Institut für Mathematik der Universität Mainz einladen. Nicht zuletzt wollen wir dabei gemeinsam mit Reinhard Höpfner seinen Übertritt in eine neue, von offiziellen Pflichten befreite Lebensphase feiern.

Falls Sie noch kurzfristig teilnehmen möchten, teilen Sie dies Frau Muth bitte schnellstmöglich unter stochastik@uni-mainz.de mit.

Programm:

14:30 Simon Holbach (JGU Mainz):
(Self-)interacting diffusions and sampling algorithms for rare event systems

Abstract: The classical overdamped Langevin-equation d X_t = -U'(X_t) d t + d W_t describes the inertia-free motion of a particle in a potential $U\colon\R\to\R$. If there are multiple metastable states (i.e. local minima of U) that are separated by high barriers such that transitions between these states are rare, then exploring the potential landscape from the point of view of the particle becomes very slow. This is problematic in view of sampling algorithms that are relevant for computational physics and chemistry, so we need methods that modify the dynamics in order to speed up transitions between metastable states while still allowing to reconstruct the original potential in the end. One of these methods is known as Metadynamics, where an adaptively constructed bias potential inhibits a particle from going into space regions that it has already explored. Another approach is to use multiple particles at once and kill or clone them in order to distribute the exploring particles more efficiently in space. Mathematically, these methods translate into questions about the long-time behaviour of self-interacting diffusions, or interacting particle systems respectively. This talk will give an overview about recent advances in rigorous mathematical justifications of these methods. It is based on joint work with Lisa Hartung, Omar Valsson and Benjamin Pampel.

15:15 Matthias Hammer (TU Berlin):
The asymptotic speed of the maximal particle in on/off-Branching Brownian Motion

Abstract: We introduce a system of “on/off”-branching Brownian motions where particles may switch between “active” and “dormant” states. While in the active state, particles move and branch as in a classical branching Brownian motion, whereas in the dormant state they neither move nor branch. We discuss the asymptotic speed of the maximal particle of this process and quantify how much it is slowed down compared to the case of a classical branching Brownian motion. By “duality”, this speed is closely connected with the existence of traveling wave solutions for a two-dimensional equation of F-KPP type (with dormancy), which can be considered as a model for the spread of a beneficial allele in a spatial population where individuals may switch between active and dormant states.

16:00 Kaffeepause

16:30 Eva Löcherbach (Université Paris 1): On conditional propagation of chaos for interacting systems of neurons in a diffusive regime

Abstract: We consider a system of N neurons, each spiking randomly with rate depending on its membrane potential. At its spiking time, the potential of the spiking neuron is reset to 0 and all other neurons receive the same additional amount of potential W(N). In between successive spikes, each neuron's potential follows a deterministic flow. The aim of the talk is to provide an overview of the possible large population limits of this system, that is, of its behavior as N tends to infinity. I first review and explain the classical propagation of chaos property in the case where W(N) is of order 1/N. In a second part of the talk I then discuss the diffusive regime in which W(N) is a centered random variable, scaled in 1/ \sqrt{N}. In this frame, the classical propagation of chaos property does no longer hold true. As the size of the system tends to infinity, the neurons are only conditionally independent, when one conditions with respect to the Brownian motion that is created at the limit by the central limit theorem. I will explain how the notion of infinite exchangeable systems helps understanding the structure of the limit non linear SDE. In a second part I will discuss two types of convergence to the limit system. The first is weak convergence, proven by means of a new martingale problem. Then I will discuss strong convergence based on a particular coupling going back to Komlos, Major and Tusnady. This coupling provides a joint construction of a centered compound Poisson process together with Brownian motion and enables us to obtain an explicit rate of convergence.This is a joint work with Xavier Erny and Dasha Loukianova.

17:30 Empfang

Im Anschluss gemeinsames Abendessen, Buffet im Institut für Mathematik.

Weitere Informationen unter https://www.stochastik.mathematik.uni-mainz.de/rhein-main-kolloquium-stochastik/

Wir hoffen, möglichst viele von Ihnen am 22.7. zu sehen.

gez. Matthias Birkner