# Institute of Mathematics, Chair of Probability
## (Online & sur place) **Research seminar**

**Summer term 2022, mondays 13:00-14:00**

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

**25.04.22** **Julian Kern** (ENS Lyon, U Potsdam):
### *Hydrodynamic limits of particle systems*
The Symmetric Simple Exclusion Process (SSEP) is a very important toy model in particle systems. I will use it and related processes to showcase some ideas from the theory of hydrodynamic limits which is concerned with the description of the mean behaviour of particle systems with a large number of particles.

**09.05.22** **Anne Flöge** (U Potsdam, WIAS Berlin)
### *Order of the phase transition of a free Bose Gas*
We investigate the order of the phase transition in the free Bose gas and start with a criterion of a phase transition of order 2 for general $q_k$. Then we continue the analysis under a gamma approximation assumption. Observing a pattern in the approximations of the third till sixth left-derivatives of the free energy leads to the final conjecture of an interval of r for a phase transition of order larger or equal to 4.

**16.05.22** **Alexander Zass** (WIAS Berlin):
### *Bose-Einstein condensation: introduction and open problems*
In this talk we present the open problem of Bose--Einstein condensation. In the first part, we provide a historical background and some physical heuristics for this state of matter that was first conjectured by S. Bose and A. Einstein in 1924. In the second part, we introduce the framework of point processes that is used to mathematically describe the Bose gas, and present the question of how to obtain a rigorous proof of the condensation phase transition.

**23.05.22** **Marta Dai Pra** (HU Berlin)
### *Population models with seed bank: construction, duality and tree properties*

This talk focuses on the study of population models with a seed bank, in particular presenting their construction from classical models, some duality results and tree properties.The first part is an introduction to the Wright-Fisher model and the Kingman's coalescent. In the second part we present a way to build seed-bank models from these classical objects and how dormancy affects the population behavior. In particular, we observe some properties of the coalescent processes as the "coming down from infinity" and the time to the most recent common ancestor of a sample.

**30.05.22** **Jens Fischer** (Toulouse, Potsdam, Zürich)
### *Random Dynamics in Collective Behaviour - Consensus, Clustering & Extinction of Populations*
Social network models are a common tool to further the understanding of relation based interactions in societies. Nonetheless, a complete mathematical understanding is lacking due to the complexity of the problem. In this talk, I will present a subset of the results and techniques I developed during my PhD. The approach is based on a combination of intersection graph theory, generalized exclusion processes on finite graphs and adapted methods used originally for evolutionary algorithms. Our focus will be on the links between the three fields and the quantitative results they provide.

**31.05.22** **Tuesday, 12:30** **Gioele Gallo** (Köln)

*Percolation of the level set of the Gaussian Free Field on a Galton-Watson tree*

The study of Gaussian free field level sets on supercritical Galton-Watson trees has been initiated by Abächerli and Sznitman. We continue this investigation by means of different tools in order to generalize their main result on the positivity of the critical parameter h* for the percolation of level sets to the setting of arbitrary supercritical offspring distribution and random conductances.

**13.06.22** **Andrey Pilipenko** (Kyiv)

*Convergence of Random Walks towards Skew Brownian motion*

We consider the random motion of a particle, whose jumps outside of a bounded set (membrane) are mean-zero i.i.d. with a finite second moment. Jumps from the membrane have other finite mean distributions which may be different at different points ; they are also mutually independent and independent of the jumps outside the membrane.

We prove that Donsker's scaling limit of this random walk is a skew Brownian motion, i.e., a diffusion with a unit diffusion coefficient and a degenerate drift equal to a $\delta\_0$, where $|a| \leq 1$.

**21.06.22** **Tuesday, 13:00** **Laetitia Colombani** (Toulouse)

*Introduction to Hawkes Processes*

Hawkes processes were introduced by Hawkes in 1971, and are widely used in many applications (earthquakes, neurons, social network, finance, etc.) They are random point processes on the real line, and their intensity depends on the past. "Self-exciting" Hawkes processes have been particularly studied and some asymptotic results are well-known. Here, I will describe Hawkes process, their construction and my work on "self-inhibiting" Hawkes process, with a law of large numbers.

**30.06.22** **Thursday, 10:00** **Jens Fischer** (Toulouse) *PhD Defense*

For the specific zoom-access please contact S. Roelly

**Interessenten sind herzlich eingeladen !**

**Prof. Dr. Sylvie Roelly**