FB Mathematik

FB Physik, Mathematik und Informatik
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Schwerpunkt Stochastik

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## Rhein-Main-Kolloquium Stochastik

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

## Friday, 23.05.2025

**3:15 pm: [Martin Slowik (Universität Mannheim)](#)**
**Title:** Scaling limit of the harmonic crystal with random conductances

Abstract: In this talk we consider discrete Gaussian free fields with ergodic random conductances on $\mathbb{Z}^d$, $d \geq 2$, subject to Dirichlet boundary conditions, where the conductances are possibly unbounded but satisfy an integrability condition. As our main result, we prove that, for almost all realisation of the environment, the rescaled field converges in law towards a continuous Gaussian field. We also present a scaling limit for both the covariances of the field and the variance of the Wick-renormalised square of the field. To obtain the latter, we establish a quenched local limit theorem for the Green's function of the associated random walk among random conductances with Dirichlet boundary conditions. This talk is based on a joint work with Sebastian Andres and Anna-Lisa Sokol.

**4:15 pm:** Coffee break

**4:45 pm: [Alessandra Cipriani (University College London)](#)**
**Title: The spectrum of dense kernel-based random graphs**

Abstract: Kernel-based random graphs (KBRGs) are a class of random graph models that account for inhomogeneity among vertices. We consider KBRGs on a discrete d-dimensional torus. Conditionally on an i.i.d. sequence of Pareto weights, we connect any two points independently with a probability that increases in the points' weights and decreases in the distance between the points. We focus on the adjacency matrix of this graph and study its empirical spectral distribution. In the dense regime we show that a limiting distribution with non-trivial second moment exists as the size of the torus goes to infinity, and that the corresponding measure is absolutely continuous with respect to the Lebesgue measure. We also derive a fixed-point equation for its Stieltjes transform in an appropriate Banach space. In the case corresponding to so-called scale-free percolation we can explicitly describe the limiting measure and study its tail. Joint work with R. S. Hazra, N. Malhotra and M. Salvi.

https://www.stochastik.mathematik.uni-mainz.de/rhein-main-kolloquium-stochastik/
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Any interested parties are welcome.                                        Yours, Noemi Kurt