Interactions and Random Media

Conference Abstracts

GUE Fluctuations Near the Origin in One-Sided Ballistic Deposition

Pablo Groisman
Universidad de Buenos Aires

We will introduce a variation of the ballistic deposition model in which vertically falling blocks can only stick to the top or the upper right corner of growing columns. For this model, we will establish that the fluctuations of the height function at points near the origin are given by the GUE ensemble and its correspondent Tracy-Widom limiting distribution. The talk is based on joint work with Alejandro Ramírez, Santiago Saglietti and Sebastian Zaninovich.

Self-repellent branching random walks

Anton Bovier
Universität Bonn

We consider a system of particles performing a discrete-time binary branching random walk with independent standard normal increments subject to a penalty β for every pair of particles that get within distance ε of each other at every time. We study the optimal configurations that minimise the sum of the spread out cost and the repulsion cost up to a given time horizon N. We show that at time N particles are spread out over a distance of order $(\beta\varepsilon)^{1/3}\, 2^{2N/3}$. We also show that the total cost of the optimal configurations up to time N is of order $(\beta\varepsilon)^{2/3}\, 2^{4N/3}$. This is joint work with Frank den Hollander and Lisa Hartung.

Long time behaviour of PAM on hyperbolic space

Weijun Xu
Beijing International Center for Mathematics Research

We consider the quenched long time behaviour of the parabolic Anderson model on the standard hyperbolic space H^d. The random potential is a smooth, stationary and time-independent Gaussian field. We show that the first order logarithmic asymptotics is different from its Euclidean counterpart, both in the growth exponent and in the determination of the constant. In trying to understand the mechanisms behind, some interesting questions for future investigation also arise. Joint work with Xi Geng and Sheng Wang, both from Melbourne.

Scaling limits for self-interacting random walks via joint Ray-Knight theorems

Elena Kosygina
CUNY

For several classes of self-interacting random walks on the integers, B. Tóth proved generalized Ray-Knight theorems (gRKT) and used them to study the limiting behavior of these walks. A natural question is whether these theorems uniquely identify the limiting process. In a joint paper with T. Mountford and J. Peterson, we showed that this need not be the case. Subsequently, with J. Peterson, we used the joint gRKT to prove convergence of "true" self-avoiding walks to the "true" self-repelling motion constructed by B. Tóth and W. Werner in 1998. This resolved a long-standing conjecture and showed that the joint gRKT might be the right tool.

In our current work (with L. Marêché, T. Mountford, and J. Peterson), we show that, under mild conditions, the joint gRKT can be "inverted" to establish functional limit theorems, thereby constructing a unique limiting process. We apply our general results to "true" self-avoiding walks and polynomially self-repelling walks. The latter application gives rise to a new class of non-Markovian processes - polynomially self-repelling motions.

Random Hadamard matrices

Stanislav Molchanov
University of North Carolina Charlotte

The talk will present a review of the recent results on the determinants of the random Hadamard matrices

$$H_n(\omega) = (\varepsilon_{ij},\ 1 \le i,j \le n).$$

Here ε_{ij} are independent Bernoulli random variables,

$$P(\varepsilon_{ij} = 1) = P(\varepsilon_{ij} = -1) = 1/2.$$

The classical (and still unsolved) problem by Hadamard is to prove that

$$\max_{\varepsilon_{ij}} |\det H_n| = n^{n/2}, \quad \text{for } n \equiv 0 \pmod 4,$$

which generated many related problems. M. Kac proposed an approach to studying the large deviations for

$$M_n = |\det H_n|$$

based on the analysis of the statistical moments of M_n, $n \to \infty$. The central points of the talk are the asymptotic formulas for the moments of M_n, $n \to \infty$, and applications of the Hadamard matrices $H_n(\omega)$ (for small n) to the testing of random number generators (RHGs).