Institute for Applied Mathematics, Bonn University

Oberseminar Stochastik

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Lipschitz-Saal (LWK 1.016)

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Laws of fractional logarithm in the KPZ universality class

Weak convergence of the centered and scaled sequences of largest eigenvalues of $n \times n$ GUE matrices, and of the lengths of the longest increasing subsequences of uniformly random permutations of length n, to the GUE Tracy-Widom distribution, are two primary examples of the KPZ fluctuations. In this talk we address a question posed by Kalai: what is the analogue of classical law of iterated logarithm for these sequences? In particular, we show that after a further scaling of $(\log n)^{2/3}$ (resp. $(\log n)^{1/3}$), the lim sup (resp. lim inf) of the centered and scaled sequences almost surely converge to some non-zero and finite constants, which we explicitly determine. This answers a question left open by Paquette and Zeitouni. One key ingredient in solving these problems was understanding the scale at which decorrelation occurs in these sequences. For this we use the connection with the Brownian and Poissonan last passage percolation models and use the geometric inputs from these models.
This is based on a joint work with Baslingker, Basu, and Krishnapur (arXiv:2410.11836).