



Theoretical Statistics and Mathematics Unit, Kolkata
INDIAN STATISTICAL INSTITUTE

SEMINAR

Date: April 17, 2025
Time: 04:15 PM

VENUE:

L-infinity

(5th Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

TITLE:

Sharp Tail Estimates in β -Ensembles and Applications

SPEAKER:

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ABSTRACT:

For a real parameter $\beta > 0$ Hermite and Laguerre β -ensembles are well studied point processes with special cases $\beta = 1, 2, 4$ corresponding to eigenvalues of classical random matrix ensembles. In 2002 Dumitriu and Edelman introduced tridiagonal random matrix models for general β in both the Hermite and Laguerre case. Subsequently Ramirez, Rider and Virag showed the weak convergence of the largest eigenvalues of these tridiagonal matrices under appropriate centering and scaling and they obtained sharp tail estimates for the limiting Tracy-Widom β distribution. While tail estimates with correct exponents in the pre-limiting models were known for general β , sharp tail estimates with matching constants were missing --- except for some exactly solvable cases. We complete this picture by establishing sharp tail estimates with matching constants for all $\beta > 0$ in both settings.

We illustrate the usefulness of the sharp estimates by establishing a law of iterated and a law of fractional logarithm in the Brownian last passage percolation, where the last passage time has the same distribution as the largest eigenvalue in the Hermite $\beta = 2$ ensemble. Owing to a connection between the GUE minor process and the Brownian LPP, this also settles a conjecture due to Paquette and Zeitouni.

The talk is based on two joint works with Baslingker, Basu, Krishnapur (arXiv:2405.12215, arXiv:2410.11836).

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