Mini-workshop on Random Matrices

Time: June 4th, 2026

Venue: Room 1801, Guanghua Eastern Main Tower,
Fudan University (Handan Campus)

Invited speakers: Jiahe Shen (Columbia University)
Jiaming Xu (The Ohio State University)

Organizers: Junwen Liu, Taiyang Xu, and Lun Zhang

June 4th, 2026	
9:00–10:00	Quantitative universality for cokernels of matrices with symmetries (Jiahe Shen)
10:00–10:15	Break
10:15–11:15	CLT of Beta ensembles in fixed and high temperature (Jiaming Xu)
11:15–13:30	Lunch
13:30–17:30	Free Discussion

Talk: Quantitative universality for cokernels of matrices with symmetries

Speaker: Jiahe Shen (Columbia University)

Time: June 4th, 2026, 9:00–10:00

Venue: Room 1801, Guanghua Eastern Main Tower

Abstract: We prove universality for cokernels of random integral matrices with symmetries via an approach different from the classical surjection moment method introduced by Wood (arXiv:1402.5149). In the symmetric case, we reprove Hodges' universality theorem (arXiv:2311.07078), i.e. the version incorporating the canonical pairing from Wood's setting, and in the alternating case we reprove the local universality theorem of Nguyen-Wood (arXiv:2210.08526). A key advantage of our method is that it is quantitative: we obtain explicit error bounds, which are exponentially small in most regimes, thereby addressing Wood's question on effective convergence rates. Our argument is inspired by Maples' exposure-process and coupling viewpoint (arXiv:1301.1239) and uses a generalized form of Fourier-analytic estimates in the exponentially sharp style of Ferber-Jain-Sah-Sawhney (arXiv:2106.04049).

About the speaker: Jiahe Shen is a fourth-year Ph.D. student at Columbia University. His main work, joint with Roger Van Peski, concerns p-adic random matrices and their connections with number theory and other fields. He also studies problems in discrete probability and Fourier analysis.

Talk: CLT of Beta ensembles in fixed and high temperature

Speaker: Jiaming Xu (The Ohio State University)

Time: June 4th, 2026, 10:15–11:15

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Abstract: It is a classical result that the global fluctuation of a large class of Beta ensembles (a.k.a log gases) is given by Gaussian vectors, for any fixed $\beta > 0$. Moreover, such a result can be extended to the so-called high temperature regime, i.e., when β goes to 0 as the number of particles tends to infinity. We give an if and only if condition of the LLN and CLT of an arbitrary sequence of N-particle systems on the real line, in both fixed and high temperature regime, so that it can be applied to the ensembles beyond log gases. Our conditions and toolbox are in terms of certain symmetric functions and differential operators, and using such conditions, we manage to prove the global CLT for β additions and β corners processes. As a by-product, we introduce a class of second order free cumulants which linearize high temperature β additions, and extend the results in Colins-Mingo-Sniady-Speicher and Benaych Georges-Cuenca-Gorin.

About the speaker: Jiaming Xu is currently a Visiting Assistant Professor at The Ohio State University. He was a postdoctoral researcher at the Royal Institute of Technology in 2024–2025. He received his Ph.D. in Mathematics from the University of Wisconsin–Madison in 2024, advised by Vadim Gorin and Benedek Valko, and his B.S. in Statistics from the Chinese University of Hong Kong, Shenzhen in 2019. His research interests include integrable probability and random matrices.