ITAM

INSTITUTO TECNOLÓGICO AUTÓNOMO DE MÉXICO

Seminario Departamento Académico de Matemáticas

Intermediate deviation regime for the full eigenvalue statistics in the complex Ginibre ensemble

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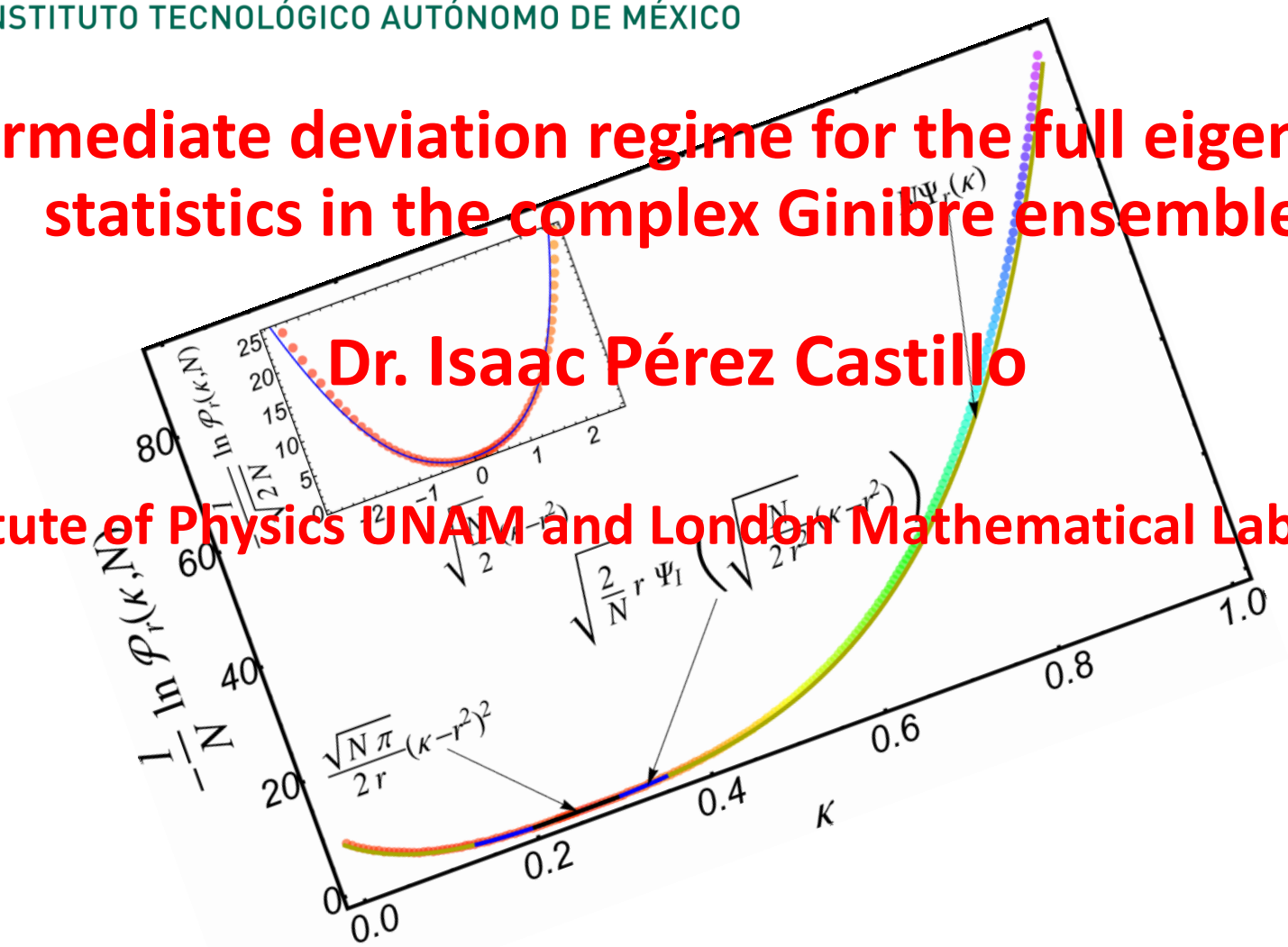

We study the Ginibre ensemble of N×N complex random matrices and compute exactly, for any finite N, the full distribution as well as all the cumulants of the number N_r of eigenvalues within a disk of radius r centered at the origin. In the limit of large N, when the average density of eigenvalues becomes uniform over the unit disk, we show that for $0 < r < 1$ the fluctuations of N_r around its mean value $\langle N_r \rangle \approx Nr^2$ display three different regimes: (i) a typical Gaussian regime where the fluctuations are of order $O(N^{1/4})$, (ii) an intermediate regime where $N_r - \langle N_r \rangle = O(N^{1/2})$, and (iii) a large deviation regime where $N_r - \langle N_r \rangle = O(N)$. This intermediate behavior (ii) had been overlooked in previous studies and we show here that it ensures a smooth matching between the typical and the large deviation regimes. In addition, we demonstrate that this intermediate regime controls all the (centered) cumulants of N_r, which are all of order O(N). We show that the intermediate deviation function that describes these intermediate fluctuations can be computed explicitly and we demonstrate that it is universal, i.e., it holds for a large class of complex random matrices. Our analytical results are corroborated by precise "importance sampling" Monte Carlo simulations.

Fondo: Gráfica -ln Pr(κ,N)/N vs. κ, simulaciones Monte Carlo (círculos sóilidos) y expresiones analíticas exactas del régimen típico

Viernes 20 de Septiembre 2019

13:00-14:00 hrs., salón B2