Disk Counting Statistics for the Real and Symplectic Ginibre Ensemble

Abstract:

A common tool used to characterize random point processes is the full counting statistics (FCS): If we denote the full system of points by S and a sub-system by A, then the FCS addresses the fluctuations of the total number of points N_A inside the region A. For example, in the Poisson point process, we have E[N_A] = Var(N_A), indicating that the fluctuations are large. In contrast, in many relevant systems in mathematics and physics, the corresponding point processes satisfy Var(N_A) / E(N_A) -> 0 as the size of A goes to infinity (and such systems are usually called hyperuniform). Clouds of non-interacting fermions in a trap are of particular interest because Var(N_A) is proportional to the (experimentally hard to measure) entanglement entropy between A and its complement in S. In recent years, there has been extensive research on the FCS of the complex Ginibre ensemble because its eigenvalues can be mapped to such fermionic systems.

In this talk I will present some new results on the full counting statistics for the real and symplectic Ginibre ensemble. I will show how to compute the expected value, the variance and (for the symplectic ensemble) the higher order cumulants and explain how they relate to the complex Ginibre ensemble. Based on joint work with Gernot Akemann, Sung-Soo Byun and Grégory Schehr.