

Eigenvalue Distribution of Large Random Matrices

Graduate Talk

Basic ensembles, results and applications: an overview

We present an overview of recent asymptotic studies of eigenvalues of $n \times n$ real symmetric and hermitian random matrices as $n \rightarrow \infty$. This will include basic classes of random matrix ensembles (matrix measures), most widely studied problems and asymptotic regimes, a collection of typical results, and their applications in and links with adjacent branches of sciences.

Colloquium

Random matrices with weakly dependent entries

We consider two widely studied ensembles of random matrices with independent (modulo the symmetry conditions) and weakly dependent entries, known as the Wigner Ensembles and Sample Covariance Matrices. By using the archetype Gaussian versions of these ensembles, we find the limiting form as $n \rightarrow \infty$ of linear statistics of eigenvalue (in particular, the limiting eigenvalue counting measures) and establish the central limit theorem for linear statistics, corresponding to C^1 test functions. These are typical results, concerning the global and the intermediate regimes of the random matrix theory.

Colloquium

Matrix models and orthogonal polynomial

We consider a class of random matrix ensembles that are invariant with respect to orthogonal (the real symmetric case) and unitary (hermitian case) transformations. The method of their asymptotic analysis, based on orthogonal polynomials will be introduced and will be used to study the local regime both in the bulk of the support of the limiting normalized counting measure and in a neighborhood of endpoints of the support. The universality property of the local regime of the random matrix theory will be discussed.