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Large deviations for traces of Wigner matrices

Abstract:

Many features of the asymptotics of the spectral statistics of Wigner matrices are known to be universal: the local law of the eigenvalues, gap distributions, and correlation functions for instance. In contrast, the large deviation behavior of the spectrum, for example of the empirical distribution of the eigenvalues, is non-universal and the dependence with respect to the distribution of the entries is yet not understood. Particularly challenging is to understand the large deviations of the spectrum of Wigner matrices with Rademacher entries. Motivated by this question, we will address in this talk the problem of the large deviations of the traces of powers of Wigner matrices with bounded entries. This question lead us to bring some improvement to the emerging theory of nonlinear large deviations, introduced by Chatterjee and Dembo, which we will describe. As a consequence, we will see that one can identify a class of Wigner matrices for which the large deviations of the traces are universal, thus complementing a result of Guionnet and Husson on the large deviations of the largest eigenvalue.