## On the CLT for Spectral Statistics of Wigner and Sample Covariance Random Matrices

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We are interested in the limiting distributions of various spectral statistics of random matrices  $M_n$  as their size n tends to infinity. The first two steps in the asymptotic analysis of spectra of random matrices are: 1) to find the limit of the normalized linear eigenvalue statistic  $n^{-1}\text{Tr} \varphi(M_n)$ , corresponding to a test-function  $\varphi$ , and 2) to investigate fluctuations around this limit. These two questions correspond to the Law of Large Numbers and the Central Limit Theorem in classical probability. It appears that for many ensembles of random matrices the limiting probability law of fluctuations of linear eigenvalue statistics is Gaussian. We demonstrate this phenomenon in the case of Wigner and sample covariance random matrices. We also give an example of a spectral statistic for which surprisingly the limiting distribution of the corresponding fluctuations is not Gaussian.