- **Beta-ensembles of random matrices: dualities, perturbations, and phase transitions**
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  Random matrices have been applied to a wide variety of topics in theoretical and mathematical physics: quantum chaos, topological string theory, low energy QCD, topological insulators, etc. In the last two decades, general matrix models unifying different symmetry classes of random matrices have been developed; they are called the beta-ensembles. In this talk, I will briefly introduce these ensembles, relate them to remarkable special functions in many variables (such as Jack polynomials), and review recent advances. The presentation will focus on matrix models that are perturbed by an external field (nonrandom matrix). By using duality properties, I will show that in the limit where the size of the matrices tends to infinity, the variation of the strength of the perturbation can modify drastically the statistical distribution of the eigenvalues.