

Random Matrix Thermodynamics

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Dyson and Mehta constructed a statistical mechanics of correlated spectra by considering levels as the positions of unidimensional charges. For the first time, we have considered this approach for points on a line. For this linear case we have applied the theory to the eigenvalues of the Gaussian ensembles. We also have measured frequencies of the acoustic resonances of aluminum plates cut in the shape of chaotic billiards. The results (for example for the internal energy) agree with theoretical predictions. Since the standard measures such as the delta statistics that are used to analyze experimental spectra are extremely sensitive to missing or spurious levels, we are evaluating the robustness of the “energy” as an alternative statistic to determine the degree of chaoticity/regularity of spectra.