



Mathematisches Kolloquium

Finite Size Effects -

Random Matrices, Quantum Chaos and Riemann Zeros

Sprecher: Prof. Dr. Folkmar Bornemann

Eingeladen von Prof. Dr. Stefan Funken

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Since the legendary 1972 encounter of H. Montgomery and F. Dyson at tea time in Princeton, a statistical correspondence of the non-trivial zeros of the Riemann Zeta function with eigenvalues of high-dimensional random matrices has emerged. Surrounded by many deep conjectures, there is a striking analogy to the energy levels of a quantum billiard system with chaotic dynamics. Thanks to extensive calculation of Riemann zeros by A. Odlyzko, overwhelming numerical evidence has been found for the quantum analogy. The statistical accuracy provided by an enormous dataset of more than one billion zeros reveals distinctive finite size effects. Using the physical analogy, a precise prediction of these effects was recently accomplished through the numerical evaluation of operator determinants and their perturbation series (joint work with P. Forrester and A. Mays, Melbourne).