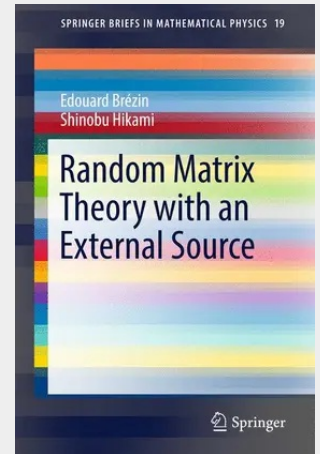


Random Matrix Theory with an External Source

This is a first book to show that the theory of the Gaussian random matrix is essential to understand the universal correlations with random fluctuations and to demonstrate that it is useful to evaluate topological universal quantities. We consider Gaussian random matrix models in the presence of a deterministic matrix source. In such models the correlation functions are known exactly for an arbitrary source and for any size of the matrices. The freedom given by the external source allows for various tunings to different classes of universality. The main interest is to use this freedom to compute various topological invariants for surfaces such as the intersection numbers for curves drawn on a surface of given genus with marked points, Euler characteristics, and the Gromov–Witten invariants. A remarkable duality for the average of characteristic polynomials is essential for obtaining such topological invariants. The analysis is extended to nonorientable surfaces and to surfaces with boundaries.

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