

Novaes, Marcel

Energy-dependent correlations in the S -matrix of chaotic systems. (English) Zbl 1417.37060
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Summary: The M -dimensional unitary matrix $S(E)$, which describes scattering of waves, is a strongly fluctuating function of the energy for complex systems such as ballistic cavities, whose geometry induces chaotic ray dynamics. Its statistical behaviour can be expressed by means of correlation functions of the kind $\langle S_{ij}(E + \epsilon) S_{pq}^\dagger(E - \epsilon) \rangle$, which have been much studied within the random matrix approach. In this work, we consider correlations involving an arbitrary number of matrix elements and express them as infinite series in $1/M$, whose coefficients are rational functions of ϵ . From a mathematical point of view, this may be seen as a generalization of the Weingarten functions of circular ensembles.

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MSC:

- 37A50 Dynamical systems and their relations with probability theory and stochastic processes
- 37D45 Strange attractors, chaotic dynamics of systems with hyperbolic behavior
- 37D50 Hyperbolic systems with singularities (billiards, etc.) (MSC2010)
- 60B20 Random matrices (probabilistic aspects)
- 81U20 S -matrix theory, etc. in quantum theory
- 62H20 Measures of association (correlation, canonical correlation, etc.)

Keywords:

ballistic cavities; unitary matrix; Weingarten functions

Full Text: [DOI](#) [arXiv](#)

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