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# Periodic-orbit theory of universal spectral statistics

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## **Abstract**

According to the Bohigas–Giannoni–Schmit conjecture the quantum spectra of classically chaotic systems display universal fluctuations. We explain this universality using periodic-orbit theory. We show that the interference between the contributions of these orbits gives rise to universal spectral correlations, agreeing with the predictions of random-matrix theory. In contrast to previous work the present approach yields both the non-oscillatory and the oscillatory parts of the spectral correlator, and explains why the energy levels repel each other. The relationship between the two parts of the spectral correlator can be understood within a semi-classical resummation formalism that explicitly preserves the unitarity of the quantum time evolution.

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