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**Origin of the  $1/f^\alpha$ -Spectral-Noise in Chaotic and Regular Quantum Systems** LEONARDO A. PACHON, Instituto de Fisica, Universidad de Antioquia. Department of Chemistry and Chemical Biology, Harvard University., ARMANDO RELAÑO, Departamento de Fisica Aplicada I and GISC, Universidad Complutense de Madrid, Spain., BORJA PEROPADRE, ALAN ASPURU-GUZI, Department of Chemistry and Chemical Biology, Harvard University. — Based on the recent connection between the spectral form factor and the probability to return [Phys. Rev. Lett. 102, 150401 (2009)], the origin of the  $1/f^\alpha$ -noise in fully chaotic and fully integrable systems is tracked to the quantum interference between invariant manifolds of the classical dynamics and the dimensionality of those manifolds. This connection and the order-to-chaos transition are analyzed in terms of the statistics of Floquet's quasienergies of a classically chaotic driving non-linear system. The direct connection established here allows for predicting that in the presence of decoherence, the statistics of the spectral correlations of both, chaotic and integrable, coincide.

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