CONDUCTANCE FLUCTUATIONS IN GRAPHENE SYSTEMS: THE RELEVANCE OF CLASSICAL DYNAMICS

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Conductance fluctuations associated with transport through quantum-dot systems are currently understood to depend on the nature of the corresponding classical dynamics, i.e., integrable or chaotic. However, we find that in graphene quantum-dot systems, when a magnetic field is present, signatures of classical dynamics can disappear and universal scaling behaviour emerge. In particular, as the Fermi energy or the magnetic flux is varied, both regular oscillations and random fluctuation in the conductance occur, with alternating transitions between both, leading to a universal law among the Fermi energy, the critical magnetic flux, and the dot size.

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