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Remote Mesoscopic Signatures of Induced Magnetic Texture in Graphene

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Mesoscopic conductance fluctuations are a ubiquitous signature of phase-coherent transport in small conductors, exhibiting universal character independent of system details. In this work, however, we demonstrate a pronounced breakdown of this universality, due to the interplay of local and remote phenomena in transport. Our experiments are performed in a graphene-based interaction-detection geometry, in which an artificial magnetic texture is induced in the graphene layer by covering a portion of it with a micromagnet. When probing conduction at some distance from this region, the strong influence of remote factors is manifested through the appearance of giant conductance fluctuations, with amplitude much larger than (eˆ2)/h. This violation of one of the fundamental tenets of mesoscopic physics dramatically demonstrates how local considerations can be overwhelmed by remote signatures in phase-coherent conductors.

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