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Experimental observation of edge transport in graphene nanostructures[1] AMOGH KINIKAR, T. PHANINDRA SAI, SEMONTI BHATTACHARYYA, ADHIP AGARWALA, TATHAGATA BISWAS, Department of Physics, Indian Institute of Science, Bangalore 560012, SANJOY K. SARKER, Department of Physics and Astronomy, The University of Alabama, AL 35487-0324, H. R. KRISHNAMURTHY, MANISH JAIN, VIJAY B. SHENOY, ARINDAM GHOSH, Department of Physics, Indian Institute of Science, Bangalore 560012 —
The zizzag edges of graphene, whether single or few layers, host zero energy gapless states and are perfect 1D ballistic conductors. Conclusive observations of electrical conduction through edge states has been elusive. We report the observation of edge bound transport in atomic-scale constrictions of single and multilayer suspended graphene created stochastically by nanomechanical exfoliation of graphite. We observe that the conductance is quantized in near multiples of e^2/h. Non-equilibrium transport shows a split zero bias anomaly and, the magneto-conductance is hysteretic; indicating that the electron transport is through spin polarized edge states in the presence of electron-electron interaction. Atomic force microscope scans on the graphite surface post exfoliation reveal that the final constriction is usually a single layer graphene with a constricting angle of 30^o. Tearing along crystallographic angles suggests the tears occur along zigzag and armchair configurations with high fidelity of the edge morphology.

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