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Quantum Hall Effect in Graphene[1] ANTONIO H. CASTRO NETO, Department of Physics, Boston University, FRANCISCO GUINEA, Instituto de Ciencia de Materiales de Madrid, Spain, NUNO M.R. PERES, Universidade do Minho, Portugal — We study the integer and fractional quantum Hall effect on a honeycomb lattice at half-filling (graphene) in the presence of disorder and electron-electron interactions. We show that the interactions between the delocalized chiral edge states (generated by the magnetic field) and Anderson-localized surface states (created by the presence of zig-zag edges) lead to edge reconstruction. As a consequence, the point contact tunneling on a graphene edge has a non-universal tunneling exponent, and the Hall conductivity is not perfectly quantized in units of e^2/h. We argue that the magneto-transport properties of graphene depend strongly on the strength of electron-electron interactions, the amount of disorder, and the details of the edges.

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