

Abstract Submitted
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A Unified Description of the DC Conductivity of Monolayer and Bilayer Graphene Based on Resonant Scatterers AIRES FERREIRA, J. VIANA-GOMES, University of Minho, Portugal, JOHAN NILSSON, University of Gothenburg, Sweden, EDUARDO R. MUCCILOLO, University of Central Florida, USA, NUNO M.R. PERES, University of Minho, Portugal, ANTONIO H. CASTRO NETO, Boston University, USA, and National University of Singapore — We show that a coherent picture for the dc conductivity of monolayer and bilayer graphene emerges from considering that strong short-range potentials are the main source of scattering in these two systems. The origin of the strong short range potentials may lie in adsorbed hydrocarbons at the surface of graphene. The equivalence between results based on the partial wave description of scattering, the Lippmann-Schwinger equation, and the T-matrix approach is established. Scattering due to resonant impurities close to the neutrality point is investigated via a numerical computation of the Kubo formula using a kernel polynomial method. We find that realistic adsorbates originate impurity bands in monolayer and bilayer graphene close to the Dirac point. In the midgap region, a plateau of minimum conductivity of about e^2/h (per layer) is induced by the resonant disorder. In bilayer graphene, a large adsorbate concentration can develop an energy gap between midgap states and high energy states. As a consequence, the conductivity plateau is suppressed near the edges and a “conductivity gap” takes place.

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