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Effects of metallic contacts on electron transport through graphene SALVADOR BARRAZA-LOPEZ, MIHAJLO VANEVIC[1], MARKUS KINDERMANN, MEI-YIN CHOU, Georgia Institute of Technology — Despite their undoubted importance in eventual graphene electronics, theoretical studies of the specific features of electron transport through graphene between metal contacts are in their first stages. In order to bridge this gap we perform a first-principles based, non-equilibrium Green's functions study of the conductance through graphene junctions suspended between noncovalent aluminum contacts as a function of the distance L between metal leads and the width W (up to 100 nm) of the junction. Electron-hole asymmetry is obtained as a consequence of doping at the leads. Furthermore, the doping in graphene originated by charge transfer from metals at the leads results in two conductance minima at the energies of the crossing of the linear bands in suspended and clamped graphene, for sufficiently large L. We present a tight-binding model that accounts for the first-principles results and can be employed for larger lengths and widths of the junctions up to experimental accessible values and for arbitrary noncovalent-bonding metal leads.

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