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Current densities due to electron-hole puddles in graphene flakes at the charge neutrality point LEANDRO LIMA, CAIO LEWENKOPF, Universidade Federal Fluminense — Graphene flakes show a typical conductivity minimum of about e^2/h, almost independent of sample mobility, at the charge neutrality point. This is at odds with the notion that as the mobility increases, and graphene becomes more ballistic, its density of states (DOS) and conductivity at the charge neutrality point should vanish. The observed conductivity minimum is often attributed to the presence of electron-hole charge puddles, that give rise to an effective local-dependent chemical potential. In this way, the local chemical potential fluctuates creating p and n-doped regions and the electronic transport is facilitated by Klein tunneling through the p and n-doped domains. Although very attractive, there is little quantitative support for this this picture. We revisit this problem and analyze the transport properties using a self-consistent recursive Green's functions technique with spin resolution that includes the electronic interaction modeled by a mean field Hubbard term. We calculate electronic current densities between neighboring carbon sites near the p-n interface and relate the electronic propagation to the puddles charge, size and shapes.

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