Coulomb edge effects in graphene nanoribbons

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Graphene has became recently the most intensively studied material because it is expected to find applications in novel nano-electronic devices. Such applications require the usage of nanosize structures of graphene, like graphene nanoribbons (GNR), in which the properties of edges may be dominant. Graphene ribbons exhibit edge-localized electronic states with energies close to the Fermi level, which play a crucial role in transport and magnetic properties of GNRs. We investigate the influence of Coulomb effects on the edge localized states of GNRs with arbitrary shape of the edges. We work in the Hubbard model and the π-electron tight-binding approximation. We show that flat, edge-localized bands with energies at the Fermi level are especially sensitive for the electron interaction effects. Spin degeneracy of such bands is lifted when the edges are different and *non-minimal*. The strengths of the splitting depends on the edge modification and in some cases leads to spin-filter and magnetic transport properties of the ribbons.

References:

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