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Edge effects in quantum transport and quasiparticle spectra of graphene nanostructures J. WURM, University of Regensburg, I. ADAGIDELI, Sabanci University, K. RICHTER, University of Regensburg — In this work, we focus on the spectral and transport properties of graphene nanostructures. In recent work, we studied the effects of edges on the transport and spectral properties of graphene quantum dots, as well as on the conductance of graphene nanoribbons numerically[1]. Some edges can lead to effective time reversal symmetry breaking, others are effective intervalley scatterers. In this work, we develop a theory of transport that is capable of handling such effects in graphene nanostructures. We do this in two steps. First, we derive an exact expression for the Green function of a graphene flake, where each term in this expansion corresponds to the specific number of times the quasiparticle hits the edge. Second, we use the Green function to calculate: (i) the spectra for closed systems and; (ii) the conductance of open systems. In particular, we focus on the phase coherent effects, such as the weak localization correction to the conductance, and the universal conductance fluctuations. Moreover, we show how the size of these effects depends on the edges. [1] Wurm et al., Phys. Rev. Lett. 102, 056806 (2009)

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