Optical interband transitions in a graphene nanoribbon with the Rashba spin-orbit interaction

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Optical properties of a single layer of graphene are well known now [1]: the absorption coefficient does not depends on frequency and is related to the fine-structure constant with value 1/137. Hence, the one-layer graphene absorbs only 2.3% of the incoming light. However, this property can be substantially modified by a substrate generating Rashba spin-orbit interaction [2]. In our consideration we include the spin-orbit interaction and discuss the relation between the size of graphene nanoribbon and the optical interband transitions. Additionally, we switch a weak in-plane magnetic field on and find a strong light-induced spin density and the charge and spin current generation. Spin and charge current manipulation by using electromagnetic field in graphene have a great potential to applications. Our calculations show that manipulating the nanoribbon size can strongly affect the optical properties of graphene[3].

References:

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