Josephson effect in graphene based-junctions

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We study the Josephson effect in graphene based junctions where superconductivity in graphene is induced by the proximity effect from external contacts. The junction considered is described by the Dirac-Bogoliubov-de-Gennes equation with appropriate boundary conditions imposed on the normal metal-superconductor (SN) interface [1]. We calculated the Josephson current taking into account two types of reflections with the electron-hole conversion, which occur at the graphen-based SN interface, namely, the specular Andreev and retro Andreev reflections. In addition, we discuss the influence of the chiral nature of the quasiparticle in graphene on the Josephson supercurrent. We claculate the Josephson supercurrent, in the diffusive and ballistic limits [2,3], and show that the supercurrent is determined both by the width and length of a graphene strip as well as by the different types of graphene edges.

References:

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