

Abstract Submitted
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Electromagnetic properties of graphene junctions SERHII

SHAFRANJUK, Northwestern University — A photon-assisted resonant chiral tunneling across a graphene junction (GJ) induced by an external a.c. electromagnetic field is examined. We find that the a.c. field impacts the directional diagram of the charge transport across the GJ since it modulates the phase shift ϕ between the electron and hole wave functions. This results in an angular redistribution of the tunneling current. We also report our study of a directional photon-assisted resonant chiral tunneling through a bilayer graphene barrier [1]. We find that an external electromagnetic field applied to the barrier switches the transparency T in the longitudinal direction from its steady state value $T = 0$ to the ideal $T = 1$ at no energy costs. The switch happens because the ac field affects the phase correlation between the electrons and holes inside the graphene barrier, changing the whole angular dependence of the chiral tunneling (directional photoelectric effect). The directional a.c. charge transport phenomena may be utilized in novel nanoelectronic devices working in the THz diapason.

[1] S. Shafraniuk, J. Phys.: Condens. Matter 21 (2009) 015301

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