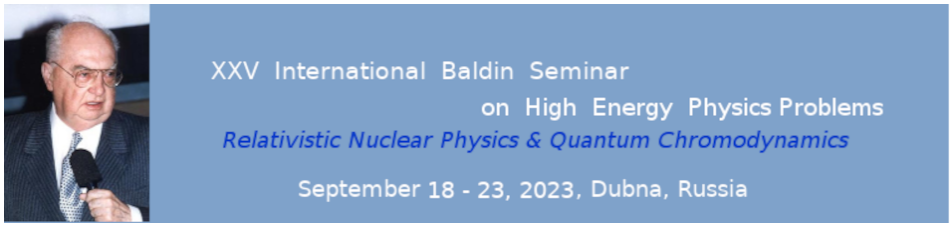

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Radiation Accompanying the Schwinger Effect in the Graphene

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Characteristics of two forms of the electron-hole (eh) plasma radiation, excited in the graphene under the action of an external time dependent electric field, namely, the quasiclassical radiation of plasma waves and the quantum photon emission in the annihilation channel of interaction of the eh-plasma with a quantized electromagnetic field, are investigated and compared among themselves by analytical and numerical methods. The analysis is based on a consequent kinetic theory where the excitation of the eh-plasma by an external field is described nonperturbatively [1, 2], while the interaction with a quantized field is taken into account in the second order of perturbation theory [3]. It is showed that the peculiarities of two types of radiation (spectrum, radiation patterns) are accessible for experimental verification. The obtained results are compared also with a direct analysis of the photon emission in the graphene, based on an exact solution of a Dirac-like equation [4], and also with the experimental data [5]. Developed in the present work methods of description of radiation in the D = 2 + 1 graphene permit direct generalization on the more complicated D = 3 + 1 situations [6, 7].

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