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Photon emission accompanying a vacuum instability under the action of a quasiconstant external electric field in graphene

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Following a nonperturbative formulation of strong-field QED developed in our earlier works, and using the Dirac model of the graphene, we construct a reduced QED_{3,2} to describe one species of the Dirac fermions in the graphene interacting with an external electric field and photons. On this base, we consider the photon emission in this model and construct closed formulas for the total probabilities. Using the derived formulas, we study probabilities for the photon emission by an electron and for the photon emission accompanying the vacuum instability in the quasiconstant electric field that acts in the graphene plane during the time interval T. We study angular and polarization distribution of the emission as well as emission characteristics in a high frequency approximation. We analyze conditions of the applicability of the presented calculations in possible experimental conditions. It allows one a laboratory verifying QED predictions for strong fields, in particular, real studying the Schwinger effect.

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