Bose-Einstein condensate of quasiparticles in graphene

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The graphene is very hot topic today in physics. In this talk will be given the status of few body problem in condensed matter and reflected our study of BEC on the based of our recent publications [1]-[5].

Particularly, a study of the formation of excitons as a problem of coupling of two Dirac particles in a gapped graphene layer and in two gapped graphene layers will be presented. This problem is not trivial and only recently was solved. Also the prediction of formation of BEC and superfluidity of excitons and polaritons (coupled excitons and light) will be discussed. I'll present the approached for treatment of four body problem (biexcitons formed by two electrons and two holes) and six body problem (triexciton formed by 3 electrons and 3 holes) in condensed matter physics. I'll analyze the nonlinear dynamics of a Bose-Einstein condensate based on Gross-Pitaevskii equation.

[1] PHYSICAL REVIEW A 87, 042513 (2013)

[2] PHYSICAL REVIEW B 85, 035418 (2012)

[3] PHYSICAL REVIEW B 86, 235404 (2012)

[4] Physics Letters A 376 3664.3667 (2012)

[5] PHYSICAL REVIEW B 86, 045108 (2012)

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