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Local 2PI vertex approximation: Nanoflakes, ferromagnets, and SU(2) gauge theory for antiferromagnets

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I discuss application of local 2PI Vertex Approximation (also known as a coupled ladder approximation) to description of charge, spin instabilities in graphene nanoflakes, as well as spin instabilities in magnetic systems. In graphene nanoflakes for strong on-site repulsion the spin density wave instability is obtained, while for strong non-local interaction the charge density wave instability occurs. For bare Coulomb interaction the boundaries of instabilities are in good agreement with quantum Monte-Carlo method. At the same time, realistic screening of Coulomb interaction strongly suppresses charge density wave instability. For magnetic systems with fcc lattice we obtain doping dependence of Curie temperature. The used approximation and its results are related and compared to those of dynamical mean-field theory.

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