Effective Properties of Graphene with Large Periodic Anti-dots[1]

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— Antidot graphene is an interesting material system which can exhibit a bandgap. In this work we present the effective properties of graphene with large periodic anti-dots, obtained by solving the Weyl equation numerically, as well as through the k dot p theory calculation. We find the dispersion relation to be hyperbolic in character, leading to an effective mass m* with an altered Fermi velocity v_{eff} as compared to the pristine case. The gap is exactly given by $2m^*c^2$, where c is the speed of light. The dependence of m* and v_{eff} on geometric parameters is investigated. A remarkable enhancement of the Coulomb interaction parameter is seen in the antidot graphene, in the region close to the bottom of the band. This can explain the appearance of a Coulomb quasi-gap discovered recently in this material system.

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