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Interplay between Electromagnetic and Coulomb Coupling DANHONG HUANG, US Air Force Research Laboratory, GODFREY GUMBS, Hunter College of the City University of New York, ALEXEI MARADUDIN, University of California at Irvine, BO GAO, Hunter College of the City University of New York — Both the transverse electromagnetic and longitudinal coulomb couplings of the surface-plasmon mode to the collective excitation of Dirac electrons are investigated. The unique features of coupled quantum-plasmon modes are demonstrated. The predicted dispersion relations of these quantum-plasmon modes should be experimentally observable. For a double-layer graphene structure, the interplay between the interlayer Coulomb forces and the electromagnetic coupling to each layer is calculated. The effective polarizability matrix for coupled double-layer graphene and a semi-infinite conductor is obtained for constructing an effective-medium theory, which includes correlation effects from the Coulomb interaction between electrons in graphene and the conductor as well as the electromagnetic field between them.

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