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Many-body effects in neutral graphene bilayers CSABA TOKE, Lancaster University, VLADIMIR I. FALKO, Lancastr University — A graphene bilayer is studied within the Hartree-Fock approximation in the tight-binding model. The exchange self-energy is studied systematically in an momentum expansion. Up to first order in the coupling constant (the effective fine structure constant) and to first order of the nonperpendicular hopping parameter we find that, for zero magnetic field, the exchange interaction with the valence band contributes with a logarithmically divergent correction to the Fermi velocity, the perpendicular interlayer hopping, and the trigonal warping. The effective mass renormalization in the two-band effective Hamitonian is studied. For a strong perpendicular magnetic field the exciton dispersions are calculated.

Csaba Toke
Lancaster University

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