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Signature of the electron-phonon interaction in the electron spectral function of graphene[1] CHEOL HWAN PARK, FELICIANO GIUSTINO, MARVIN L. COHEN, STEVEN G. LOUIE, University of California at Berkeley and Lawrence Berkeley National Laboratory — The spectral function of graphene has been measured with high energy and momentum resolution by angle-resolved photoelectron spectroscopy. It has been proposed that the measured spectral function exhibits combined signatures from electron-phonon, electron-electron, and electron-plasmon interactions. We here present a first-principle investigation of the contribution to the electron self-energy of graphene arising from the electron-phonon interaction. We compute the electron self-energy treating the graphene bandstructure within density functional theory, the lattice dynamics within density functional perturbation theory, and the electron-phonon interaction within the Migdal approximation. Due to its peculiar cone-shaped bandstructure, the electron-phonon contribution to the electron self-energy of graphene shows qualitative differences as compared to the case of ordinary bulk metals.

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