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Excitonic Effects on Optical Absorption Spectra of Doped Graphene LI YANG, Washington University in St. Louis — We have performed first-principles calculations to study optical absorption spectra of doped graphene with many-electron effects included. Both self-energy corrections and electron-hole interactions are reduced due to the enhanced screening in doped graphene. However, self-energy corrections and excitonic effects nearly cancel each other, making the prominent optical absorption peak fixed around 4.5 eV under different doping conditions. On the other hand, an unexpected increase of the optical absorbance is observed within the infrared and visible-light frequency regime ($1 \sim 3$ eV). Our analysis shows that a combining effect from the band filling and electron-hole interactions results in such an enhanced excitonic effect on the optical absorption. These unique variations of the optical absorption of doped graphene are of importance to understand relevant experiments and design optoelectronic applications.

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