

Abstract Submitted
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Quasiparticle Energy and Excitonic Effects of Gated Bilayer Graphene LI YANG, Department of Physics, Washington University in St Louis — By employing the first-principles GW-Bethe-Salpeter Equation simulation, we obtain the accurate quasiparticle (QP) band gap and optical absorption spectra of gated bilayer graphene (GBLG). Many-electron effects are shown to be extremely important for understanding these excited-state properties; enhanced electron-electron interactions dramatically enlarge the QP band gap; infrared optical absorption spectra are dictated by bright bound excitons. In particular, these QP band gaps, exciton binding energies, and even the exciton spectra can be tuned in a wide range by the gate field. Our results satisfactorily explain recent experiments. Moreover, our calculation predicts exotic excitonic effects that have not been observed yet, which can be of interest for optoelectronics applications based on GBLG.

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