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First-principles quantum Monte Carlo study of the density-density response in free-standing graphene[1] HUIHUO ZHENG, LUCAS K. WAGNER, University of Illinois at Urbana-Champaign — Electrons in graphene behave like 2D massless Dirac fermions in low energy. According to RPA, the usual screening in a metal should be absent; however, experiments on free-standing graphene suggest that the electron interactions are screened and it is a weakly correlated semimetal. However, it is still unclear whether the screening effect is due to exciton effects, the sigma electrons or the core electrons. We will report progress on first-principles quantum Monte Carlo calculations of the density-density response of free-standing graphene. We will use this quantity to investigate the screening in graphene.

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