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Charge inhomogeneity in a single and bilayer graphene HARI DAHAL, Boston College, TIM WEHLING, University of Hamburg, KEVIN BEDELL, Boston College, JIAN-XIN ZHU, ALEXANDER BALATSKY, Los Alamos National Laboratory — We study the possibility of charge ordered state in both single and bilayer graphene using a real space tight binding model. We find that the single layer graphene always remains in a liquid phase; the reason being the higher kinetic energy compared to the potential energy. The bilayer graphene on the other hand can have an inhomogeneous distribution of the charge, namely the charge density wave (CDW) state. The CDW state is commensurate with the lattice. The charge ordered state is stabilized by the Coulomb interaction of the carriers of two layers. We also predicted a kinetic energy driven (KID) inhomogeneous phase. This phase can be stabilized by the inter layer hopping energy. The KID phase and the CDW phase compete with each other below the half filling whereas they cooperate above half filling. For the physical parameter of bilayer graphene CDW phase always wins over the KID phase. Hari P. Dahal, Tim O. Wehling, Kevin S. Bedell, Jian-Xin Zhu, Alexander V. Balatsky

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