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Electronic instabilities of extended Hubbard models on the honeycomb lattice[1] DAVID SÁNCHEZ DE LA PEÑA, JULIAN LICHTENSTEIN, CARSTEN HONERKAMP, RWTH Aachen — We investigate the quantum many-body instabilities for electrons on the honeycomb lattice at half-filling with extended interactions[1], as a model for graphene-type systems. We use a recently developed functional Renormalization Group scheme[2] which allows for highly resolved calculations of momentum dependences in the low-energy effective interactions. We find the expected anti-ferromagnetic instability for a pure on-site repulsion term, and charge order with different modulations for pure n^{th} nearest neighbor repulsive interactions. An interaction induced Quantum Spin Hall state is not realized as a dominant instability in our results, with charge order being favored instead. Novel instabilities towards incommensurate charge density waves take place when non-local density interactions over several bond distances are included simultaneously. We further comment on the effect of realistic Coulomb potentials from ab-initio interaction parameters for graphene, where the semi-metallic state is stabilized due to competition effects between different ordering tendencies.
[1] D. Sánchez de la Peña et al., *ArXiv e-prints* (2016),arXiv:1606.01124.
[2] J. Lichtenstein et al., *ArXiv e-prints* (2016),arXiv:1604.06296.

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