Abstract Submitted
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Electron interactions in graphene through an effective Coulomb potential[1] JOAO N. B. RODRIGUES, Centre for Advanced 2D Materials and Department of Physics, National University of Singapore, SHAFFIQUE ADAM, Centre for Advanced 2D Materials and Department of Physics, National University of Singapore and Yale-NUS College — A recent numerical work [H.-K. Tang *et al*, PRL 115, 186602 (2015)] considering graphene's π-electrons interacting through an effective Coulomb potential that is finite at short-distances, stressed the importance of the sp^2-electrons in determining the semimetal to Mott insulator phase transition in graphene. Some years ago, I. F. Herbut [PRL 97, 146401 (2006)] studied such a transition by mapping graphene's π-electrons into a Gross-Neveu model. From a different perspective, D. T. Son [PRB 75, 235423 (2007)] put the emphasis on the long-range interactions by modelling graphene as Dirac fermions interacting through a bare Coulomb potential. Here we build on these works and explore the phase diagram of Dirac fermions interacting through an effective Coulomb-like potential screened at short-distances. The interaction potential used allows for analytic results that controllably switch between the two perspectives above.

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