Abstract Submitted
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Ground-state carrier density in graphene ENRICO ROSSI, SANKAR DAS SARMA, Condensed Matter Theory Center, University of Maryland, College Park, MD 20742-4111, USA — We calculate the carrier density spatial distribution for the ground state of a single layer graphene sheet in presence of randomly distributed charged impurities. In our calculation we include the effects due to the exchange and correlation energy. We carefully study how the distance d of the charge impurities from the graphene layer and an external bias affect the spatial distribution of the carrier density. At zero bias we find that the carrier density is characterized by the presence of electron and hole puddles with equal probability and that, for $d \approx 1$, the typical size of the puddles is of the order of 30 nm in agreement with recent experiments [1]. With the same approach we study the situation when a tunable barrier potential is applied locally and a bipolar junction within the graphene sheet is formed. This work is supported by NRI-NSF.

[1] J. Martin *et al.*, Nature Physics (2007)

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