Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Density of states of a graphene in the presence of strong point defects BOR-LUEN HUANG, MING-CHE CHANG, Department of Physics, National Taiwan Normal University, CHUNG-YU MOU, Department of Physics, National Tsing Hua University — The density of states near zero energy in a graphene due to strong point defects with random positions are computed. Instead of focusing on density of states directly, we analyze eigenfunctions of inverse T-matrix in the unitary limit. Based on numerical simulations, we find that the squared magnitudes of eigenfunctions for the inverse T-matrix show random-walk behavior on defect positions. As a result, squared magnitudes of eigenfunctions have equal a priori probabilities, which further implies that the density of states is characterized by the well-known Thomas-Porter type distribution. The numerical findings of Thomas-Porter type distribution is further derived in the saddle-point limit of the corresponding replica field theory of inverse T-matrix. Furthermore, the influences of the Thomas-Porter distribution on magnetic and transport properties of a graphene, due to its divergence near zero energy, are also examined.

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Date submitted: 17 Nov 2010 Electronic form version 1.4