Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Competing many-body instabilities and unconventional superconductivity in graphene CHRISTIAN PLATT, MAXIMILIAN KIESEL, WERNER HANKE, Institute for Theoretical Physics, University of Würzburg, DMITRY A. ABANIN, Department of Physics, Harvard University, RONNY THOMALE, Department of Physics, Stanford University — The band structure of graphene exhibits van Hove singularities (VHS) at doping x = ±1/8 away from the Dirac point. Near the VHS, interactions effects, enhanced due to the large density of states, can give rise to various many-body phases at experimentally accessible temperatures. We study the competition between different many-body instabilities in graphene using functional renormalization group (FRG). We predict a rich phase diagram, which, depending on long range hopping as well as screening strength and absolute scale of the Coulomb interaction, contains a d + id-wave superconducting (SC) phase, or a spin density wave phase at the VHS. The d + id state is expected to exhibit quantized charge and spin Hall response, as well as Majorana modes bound to vortices. In the vicinity of the VHS, we find singlet d + id-wave as well as triplet f -wave SC phases.

[1] arXiv:1109.2953v1

Christian Platt
Institute for Theoretical Physics, University of Würzburg

Date submitted: 05 Dec 2011 Electronic form version 1.4