Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Strain-Engineering of Graphene Based Topological Quantum Devices[1] GINETOM S. DINIZ, MARCOS R. GUASSI, FANYAO QU, Institute of Physics, University of Brasilia, Campus Darcy Ribeiro,DF, 70910-900, Brazil — We have investigated the spin-charge transport in quantum devices based on graphene nanoribbons (GNR). Our calculation is based on the surface Green's function technique, considering the presence of an uniform uniaxial strain, spin-orbit interactions (SOIs), exchange field and a smooth staggered potential. We propose the use of uniaxial strain as an efficient mechanism to tune the conductance profiles of GNR with different edge terminations. Our results show that distinct behaviors can be achieved: for armchair GNR there is a complete suppression of the conductance close to the Fermi level with the formation of a band gap that depends on the direction and strength of the strain deformation, while for zigzag GNR there is only a small conductance suppression. We also discuss the effects of SOIs and the appearance of spin-resolved conductance oscillations, and the local density of states of these GNR devices in the quantum anomalous Hall regime. Furthermore, we demonstrate that the local density of states show that depending on the smoothness of the staggered potential, the edge states of AGNR can either emerge or be suppressed. These emerging states can be probed by scanning tunneling microscope. Our findings can be potentially used in novel GNR based topological quantum devices.

[1]Supported by FAP-DF, CNPq and CAPES

Ginetom Souza Diniz
Institute of Physics, Universidade de Brasilia - Brazil

Date submitted: 14 Nov 2014 Electronic form version 1.4