Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

First principles electronic transport simulations of spin coherence length in disordered graphene nanoribbons due to spin-orbit interaction[1]
ALEXANDRE R. ROCHA, Instituto de Fisica Teorica - Unesp, Brazil, WUDMIR ROJAS, Univ. Fed. do ABC, Brazil, STEFANO SANVITO, Trinity College Dublin, Ireland, ADALBERTO FAZZIO, Inst. Fisica, Univ. Sao Paulo, Brazil, ANTONIO J.R. DA SILVA, Lab. Nac. de Luz Sincrotron, Brazil — Graphene presents high hopes for next-generation electronic applications. In particular, due to the small spin-orbit coupling in carbon one might envision using the electron's spin - instead of its charge - for information processing. In what has been dubbed Spintronics one of the main challenges, as one strives to obtain spin-based devices, is to obtain long spin coherence times (small spin relaxation) during electronic transport. Albeit the spin-coherence length in pristine graphene is deemed to be very large, the presence of defects and impurities can lead to spin-flips due to spin-orbit interactions. The presence of a large number of impurities randomly distributed in the system can, consequently, lead to the loss of spin-coherence. In this talk we will discuss spin-flip processes in disordered graphene nanoribbons containing a number of metal impurties. This will be achieved via a combination of Density Functional Theory - including Spin Orbit effects - with a recursive Green's function method to simulate the electronic transport of disordered systems. This way one is able to atomistically infer the spin-coherence length in graphene nanoribbons in the presence of defects or impurities. As a point in case I will show results for Ni adatoms.

[1]We acknowledge support from FAPESP-Brazil grant 13/02112-0

Alexandre R. Rocha
Instituto de Fisica Teorica - Unesp, Brazil

Date submitted: 15 Nov 2013 Electronic form version 1.4