Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Spin waves in finite graphene ribbons ANDREA LATGE, FRANCISCO CULCHAC, ANTONIO COSTA, Instituto de Física, Universidade Federal Fluminense — In a previous work we have shown that the spin excitations of a graphene zigzag ribbon have a dispersion relation predominantly linear for large wave lengths, due to the antiferromagnetic coupling between the magnetizations of the opposite edges. Although the excitations are weakly damped in electrically neutral nanoribbons, the damping can be enhanced by the application of gate voltages. This allows control of the spin relaxation times by purely electrostatic means. Here we investigate spin excitations and also electronic transport in finite zigzag ribbons, connected to graphene-like metallic leads. The ground state is described self-consistently within a mean-field scheme. The spin excitations are extracted from transverse dynamic susceptibility. As a general result we found conductance gaps populated with localized states that are swept out as the length of the conductor increases. The magnetic moment is site dependent, differently from the infinite case, and diverse spin wave excitation modes are exhibited. We study the spin wave behavior and the dynamic susceptibility dependence on the coupling intensity between ribbon and leads. We analyze the role played by the coupling on the spin wave life times and the effects of external doping.

Andrea Latge
Instituto de Física, Universidade Federal Fluminense

Date submitted: 17 Nov 2011 Electronic form version 1.4