Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Spin-dependent scattering from gated potential obstacles in graphene systems[1] MAHMOUD ASMAR, SERGIO ULLOA, Ohio University — We study the scattering of Dirac fermions in a sheet of graphene from potential obstacles created by external gates in the presence of both intrinsic and extrinsic Spin-Orbit(SO) interactions [1]. Obtaining an analytical solution in real-space representation for the eigenvectors allows us to calculate the phase shifts generated by a finite-size obstacle in the presence of SO interactions [2]. These states take into account the total angular momentum of the Hamiltonian, which includes spin, pseudo-spin and orbital angular momentum. We find an interesting interplay of both SO interactions, which results in oscillations of the spin-flip cross sections with energy; this also generates a difference between both cross sections for different interaction ranges. These results may open a possibility of obtaining spin-polarized currents that are of importance in the field of spintronics.

[1] C. L. Kane and E. J. Mele, PRL 95, 226801 (2005).
[2] A. H. Castro Neto and F. Guinea, PRL 103, 026804 (2009).

[1]Supported by NSF PIRE and MWN/CIAM.

Mahmoud Asmar
Ohio University

Date submitted: 29 Dec 2010 Electronic form version 1.4