Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Spin Dependent Scattering from Gated Obstacles in Graphene Systems[1] MAHMOUD ASMAR, SERGIO ULLOA, Ohio University — We study scattering of Dirac fermions in the presence of both intrinsic and Rashba spin orbit interactions (SOIs). We use the analytical form of eigenstates in a system with cylindrical symmetry to calculate useful quantities for the scattering of Dirac particles such as phase shifts, and both transport and total cross sections, as well as the corresponding scattering times. At low energies the scattering from a gated obstacle in the absence of SOIs is anisotropic and predominantly forward [1]. In contrast, for energies close to the intrinsic SOI amplitude, the scattering becomes *isotropic*, which can be seen as arising from the effective Dirac mass generated by the SOI interaction. In the presence of Rashba fields we find that the spin-flip scattering is isotropic while it remains anisotropic and predominantly forward for spin-preserving scattering, leading to persistent spin polarization in the forward direction. At high energies, we find a series of resonances in the elastic scattering times, associated with particle trajectories orbiting the obstacle and characterized by long lifetimes. The Rashba SOI is found to double the number of long lived states in both spin-preserving and spin-flip scattering channels. [1]M.Monteverde et al., PRL **104**,126801 (2010)

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

Mahmoud Asmar
Ohio University

Date submitted: 10 Nov 2011 Electronic form version 1.4