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Probing Spin Orbit Interaction in Single Layer Graphene via Electronic Transport[1] SERGIO ULLOA, Ohio University and Freie Universität, Berlin, MAHMOUD ASMAR, Ohio University — An important effect on the dynamics of spins in materials is the spin orbit interaction (SOI), which may reflect or arise from intrinsic symmetries in the lattice structure, or via broken symmetries (Rashba interaction) in the system. Resonant scatterers, limiting electron mobility in graphene, are realized by impurities such as hydrogen atoms, molecules, clusters of impurities, vacancies, or metallic islands deposited on (or grown under) the surface of graphene. Resonant scatterers can also generate or enhance the Rashba SOI in graphene samples. We have developed analytical spinor solutions of the Dirac equation that include spin dependent observables, and use these to examine the role of SOI on scattering cross sections.By making use of the ratio of the total to transport cross section in the system at low energy, we predict a strong enhancement in the scattering isotropy in the presence of the intrinsic SOI. Similarly, we see fundamental changes in resonant scatterers in the presence of the Rashba SOI, which also lead to enhanced isotropy. We will discuss how these results have implications on the better characterization of impurities in graphene samples, and how typical experimental results can provide quantitative estimates of the SOI present in the system.

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