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Spin Hall Effect Induced by Resonant Skew Scattering in Graphene TATIANA RAPPOPORT, Federal University of Rio de Janeiro, AIRES FERREIRA, National University of Singapore, MIGUEL CAZALILLA, National Tsing Hua University, ANTONIO CASTRO NETO, National University of Singapore — The spin Hall effect is the appearance of a transverse spin current in a non-magnetic conductor by pure electrical control; it can originate from the spin-dependent skew scattering of electrons by impurities in the presence of SOI. We consider a monolayer of graphene decorated by a small density of impurities generating a spin-orbit interaction in their surroundings. We show that large spin hall effect develops through skew scattering and it is strongly enhanced in the presence of resonant scattering. Our single impurity scattering calculations show that impurities with either intrinsic or Rashba spin-orbit coupling in a graphene sheet originate robust SHE. Also, the solution of the transport equations for a random distribution of impurities suggests that the spin Hall effect is robust with respect to thermal fluctuations and disorder averaging.

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