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Spin Transport and Accumulation in 2D Weyl Fermion System TZE TZEN ONG, NAOTO NAGAOSA, University of Tokyo — In this work, we study the spin Hall effect and Rashba-Edelstein effect of a 2D Weyl fermion system in the clean limit using the Kubo formalism. The spin Hall current arises from two mechanisms, skew scattering off the non-magnetic impurities and an intrinsic spin-torque contribution from time-evolution of the spin-dipole moment. The spin-torque current is is found to be dominant, and the spin Hall conductivity σ^x_{xy} is given in terms of the transport scattering rate, and a skew scattering rate. The spin-conversion efficiency for the SHE and the Rashba-Edelstein effect are summarized in the spin Hall angle, $\theta^{SH} = (\frac{e}{c})^{-1}\alpha^{SH}$, and the spin-accumulation angle, $\theta^{SA} = (\frac{ev_F}{c})^{-1}\alpha^{SA}$, with $\alpha^{SH} \approx \frac{1}{2}$ and $\alpha^{SA} = 1$ being universal constants.

Tze Tzen Ong
University of Tokyo

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