

# Bilinear magnetoresistance and planar Hall effect in topological insulators: Interplay of scattering on spin-orbital impurities and non-equilibrium spin polarization

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Bilinear magnetoresistance (BMR) and nonlinear planar Hall effect (NPHE) appear in nonmagnetic materials as a consequence of strong spin-orbit interaction. These effects behave linearly with respect to both external electric and in-plane magnetic fields. As far, several microscopic mechanisms have been proposed such as Berry Curvature dipole, the inhomogeneity of spin-momentum locking, as well as the hexagonal warping of the Dirac cones [1-3].

Using Green functions formalism and diagrammatic techniques, we have performed a consistent theoretical study of the nonlinear terms in the diagonal and transverse conductivity, taking into account the renormalized velocity vertex function and the side-jump diagrams. These terms appear due to the current-induced spin polarization and spin-orbital component of the impurities scattering potential. We will present detailed characteristics of BMR and NPHE, and compare our new results with those obtained recently without impurity vertex correction [4].

## References:

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