

# Spin-charge coupling effects in a two-dimensional electron gas

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## ABSTRACT

The disordered two-dimensional electron gas with Rashba spin-orbit interaction is one of the most studied models for analyzing spintronics effects. In this lecture, by using the Keldysh Green function technique, I will describe the effects of the spin-orbit interaction in terms of a  $SU(2)$  gauge field and derive a generalized Boltzmann equation for charge and spin distribution functions. I will then apply the developed formalism to discuss the spin Hall effect and the Edelstein effect. The effect of extrinsic spin-orbit coupling from impurities will be also taken into account.

## References

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