

Temperature dependence of electronic transport in two-dimensional electron gas with Rashba spin-orbit interaction

A. DYRDAŁ¹, V. K. DUGAEV², AND J. BARNAŚ^{1,3}

¹*Faculty of Physics, Adam Mickiewicz University, ul. Umultowska 85, 61-614 Poznań, Poland*

²*Department of Physics and Medical Engineering, Rzeszów University of Technology,
al. Powstańców Warszawy 6, 35-959 Rzeszów, Poland*

³*Institute of Molecular Physics, Polish Academy of Sciences, ul. M. Smoluchowskiego 17,
60-179 Poznań, Poland*

ABSTRACT

Rashba spin-orbit interaction in a two-dimensional electron gas is responsible, among others, for the spin Hall and spin Nernst effects. We will present theoretical results on temperature variation of the corresponding conductances, derived in terms of the Matsubara Green function formalism. Vertex correction due to scattering on defects is also included, and is shown to totally suppress the spin Hall conductance for any temperature [1]. Such a suppression does not occur in the case of spin Nernst effect, where we also include the contribution due to spin-resolved orbital magnetization [2].

References

- [1] A. Dyrdał, J. Barnaś, V. K. Dugaev, *Physical Review B* 94, 035306 (2016).
- [2] A. Dyrdał, V. K. Dugaev, J. Barnaś, to be published.