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Spin-Hall effect and related spin-charge transport in one and two-dimensional mesoscopic systems EWELINA HANKIEWICZ, Texas A&M University, MARKUS KÖNIG, LAURENS MOLENKAMP, Physikalisches Institut (EP3), Universität Würzburg, Germany, TOMAS JUNGWIRTH, Institute of Physics ASCR, Czech Republic, JAIRO SINOVA, Texas A&M University — We study theoretically the spin transport and the spin Hall effect in one and two-dimensional mesoscopic systems with Rashba spin-orbit coupling. The non-equilibrium Green function formalism is used to model the samples with mobilities and Rashba coupling strengths experimentally available. In particular, we propose the realistic H-shape experimental setup where the indirect detection of spin-Hall effect is possible by measurement of voltage through paramagnetic contacts. We confirm the robustness of the intrinsic spin-Hall effect in mesoscopic systems against the disorder in agreement with the exact diagonalization and Born calculations in the bulk. Also, we discuss the influence of the effective Rashba and Zeeman fields on the spin and charge transport in mesoscopic structures of various shapes. Reference: Hankiewicz et al Phys. Rev. B Rapids (2004); cond-mat/0409334.

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