



Spin Current Transport

Pure spin currents – i. e., directed flows of spin angular momentum – are a fascinating manifestation of spin physics in the solid state. Pure spin currents can propagate not only in metals and semiconductors, but also in (magnetically ordered) insulators. This makes a whole new set of materials and material combinations interesting for spin transport experiments and spin-electronic devices. Moreover, robust experimental schemes for the generation and/or detection of pure spin currents have been established in the last decade. In ferromagnet/metal thin film heterostructures for example, spin currents can be generated by means of spin pumping [1-3], via the application of thermal gradients using the spin Seebeck effect [4,5], or the spin Nernst effect [6]. Taking advantage of spin Hall physics, spin currents can be converted into charge currents and thus detected using conventional electronics [2-8]. The interplay between spin and charge transport furthermore gives rise to the so-called spin Hall magnetoresistance (SMR) [7], which allows for the electrical quantification of spin transport parameters in magnetic insulator/normal metal nanostructures [7,8]. In the talk, I will give an introduction to pure spin current transport and spin Hall physics, and then address recent highlights as well as interesting perspectives for spin current based experiments and spin current circuits.

References

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Prof. Dr. Sebastian Gönnerwein

TU Dresden

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