

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Anisotropic Spin Hall Effect from First Principles¹ FRANK FREIMUTH, STEFAN BLÜGEL, YURIY MOKROUSOV, Institut fuer Festkoerperforschung & Institute for Advanced Simulation, Forschungszentrum Juelich and JARA, 52425 Juelich, Germany — We present first principles calculations [1] of the intrinsic non-dissipative spin Hall conductivity (SHC) for $3d$, $4d$ and $5d$ transition metals focusing in particular on the anisotropy of the SHC in nonmagnetic hcp metals and in antiferromagnetic Cr. For the metals of this study we generally find large anisotropies. We derive the general relation between the SHC vector and the direction of spin-polarization and discuss its consequences for hcp metals. Especially, it is predicted that for systems where the SHC changes sign due to the anisotropy the spin Hall effect may be tuned such that the spin polarization is parallel either to the electric field or to the spin current. Additionally, we describe our computational method [2,3] emphasizing the Wannier interpolation technique and the definition of the conserved spin current.

[1] e-print: <http://arxiv.org/abs/1011.2714>

[2] F. Freimuth et al. Phys. Rev. B **78**, 035120 (2008)

[3] www.flapw.de

¹This work is supported by the DFG Project MO 1731/3-1 and HGF-YIG grant VH-NG-513.

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Date submitted: 17 Dec 2010

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