

Abstract Submitted
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Skew-scattering contribution to anomalous and spin Hall effects in dilute ferromagnetic alloys BERND ZIMMERMANN, Peter Grünberg Institut and Institute for Advanced Simulation, Forschungszentrum Jülich and JARA, D-52425 Jülich, Germany — The spin Hall effect (SHE) possesses great potential for the generation of pure spin currents, but it is difficult to measure directly. The closely related anomalous Hall effect (AHE) is much easier to access in experiment via a finite Hall voltage. Phenomenologically, the only difference between the two effects is the ferromagnetic order needed for the AHE.

In this work [1], we investigate the skew-scattering contribution to the AHE in dilute ferromagnetic alloys from first principles. We compare three state-of-the-art methods and analyze chemical trends by considering $3d$ impurities in bcc-Fe, as well as magnetic $3d$ impurities in fcc Pd, Pt and Au. We arrive at general rules to obtain a large anomalous Hall angle, which represents an efficiency for the conversion of a longitudinal into a transverse current. Moreover, we reveal a clear correlation between the AHE and SHE in the alloy s which are based on a nonmagnetic host material.

[1] B. Zimmermann, K. Chadova, D. Ködderitzsch, S. Blügel, H. Ebert, D.V. Fedorov, N.H. Long, P. Mavropoulos, I. Mertig, Y. Mokrousov and M. Gradhand, accepted by Phys. Rev. B (2014); preprint on arXiv:1406.2712.

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