Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Switchable spin orbit gaps in Fe(001)[1] EWA MLYNCZAK, MARKUS ESCHBACH , Forschungszentrum Juelich, STEPHAN BOREK, JAN MINAR, JUERGEN BRAUN, Ludwig-Maximilians-Universitat Muenchen, IRENE AGUILERA, GUSTAV BIHLMAYER, SVEN DOERING, MATHIAS GEHLMANN , PIKA GOSPODARIC, SHIGEMASA SUGA, LUKASZ PLUCINSKI, STEPHAN BLUEGEL, Forschungszentrum Juelich, HUBERT EBERT , Ludwig-Maximilians-Universitat Muenchen, CLAUS M. SCHNEIDER, Forschungszentrum Juelich — In this contribution we will present results of a recent study of the influence of spin-orbit interaction (SOI) on the electronic properties of a prototypical ferromagnet, Fe(001). Using high resolution angle-resolved photoemission spectroscopy we demonstrated openings of the SOI - induced electronic band gaps, spin-orbit gaps (SOG), near the Fermi level. The SOG and thus the Fermi surface could be manipulated by changing the remanent magnetization direction. The experimental results were compared with the first-principles calculations and one-step photoemission calculations. Switchable SOG are the basis of many fundamental and technologically relevant phenomena, such as magnetocrystalline anisotropy, anisotropic magnetoresistance, intrinsic anomalous Hall effect or spin relaxation. We envision that a methodology similar to the one introduced here could be used to judge the potential of new materials for spintronic applications.

[1]This work was supported by the Helmholtz Association's Initiative and Networking Fund

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Date submitted: 10 Nov 2016 Electronic form version 1.4