O 21: Invited Talk Stefan Blügel

Time: Tuesday 9:30–10:15 Location: HE 101

Invited Talk O 21.1 Tue 9:30 HE 101

Electrons at Surfaces Taking an Unexpected Turn — •Stefan Blügel — Institut für Festkörperforschung, Forschungszentrum Jülich, D-52425 Jülich, Germany

Electrons in the vicinity of surfaces are in a space asymmetric environment. This causes a number of interesting phenomena, like the Rashba spin-orbit effect [1], spin-depending scattering [2] and spin-polarized electrons [3] at non-magnetic surfaces, which little attention had been paid to in the past. For electrons at magnetic surfaces, thin films and nanostructures also time-inversion symmetry is broken. This can give rise to an unidirectional exchange interaction, known as Dzyaloshinsky-Moriya (DM) interaction. Although this interaction, favoring spatially rotating spin structures, is known for nearly 50 years, its consequences for the magnetic structure in low-dimensional magnets remained basically unexplored. We show by *ab initio* calculations that the DM interaction can cause homochiral magnetic phases at achiral surfaces – phases, which had been overlooked during the past 20 years – but have been observed recently in terms of a left rotating cycloidal spiral for Mn on W(110) [4]. Theoretical models [5] display a rich phase diagram of possible magnetic phases. At the end, I will present arguments motivating the search for the existence of a lattice of nano-skyrmions.

[1] Yu. M. Koroteev *et al.*, Phys. Rev. Lett. **93**, 046403 (2004).
[2] J.I. Pascual *et al.*, Phys. Rev. Lett. **93**, 196802 (2004).
[3] T. Hirahara *et al.*, Phys. Rev. Lett. **97**, 146803 (2006).
[4] M. Bode *et al.*, Nature **447**, 190 (2007).
[5] M. Heide *et al.*, submitted to Phys. Rev. B.