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First-principles analysis of a Dzyaloshinskii-Moriya driven magnetic structure in a monolayer Cr on W(110) STEFAN BLÜGEL, BERND ZIMMERMANN, TIMO SCHENA, MARCUS HEIDE, YURIY MOKROUSOV, GUSTAV BIHLMAYER, Peter Grünberg Institut and Institute for Advanced Simulation, Forschungszentrum Jülich and JARA, D-52425 Jülich, Germany — The observation of a chiral magnetic spin spiral in a magnetic Mn monolayer on a W(110) substrate has opened a new vista in low-dimensional magnetism [1] with possible applications in spintronics. The origin was explained by the occurrence of the Dzyaloshinskii-Moriya interaction (DMI), which occurs due to the presence of a structure inversion-asymmetry. In this talk, we turn our attention to a monolayer Cr on W(110) [2]. We show by DFT calculations, that the DMI is so strong that it creates a non-collinear spin-spiral ground state, with excellent agreement to spin-polarized STM experiments [3]. We determine a considerable inhomogeneity of the spin spiral by means of a micromagnetic model. We compare our results to the systems Mn and Fe on W(110), where the direction of the spiral and period length are different. We present a minimal tight binding model [4] and show that indeed the sign and strength of the DMI reveals a non-trivial dependence on the electronic structure.

- [1] M. Bode *et al.*, Nature **447**, 190 (2007).
- [2] B. Zimmermann *et al.*, Phys. Rev. B **90**, 115427 (2014).
- [3] B. Santos *et al.*, New J. Phys. **10**, 013005 (2008).
- [4] V. Kashid *et al.*, Phys. Rev. B **90**, 054412 (2014).

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