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Nanoscale and proximity effects on low-dimensional helical magnetic structures LEONID SANDRATSKII, J. FISHER, S. PARK, S. OUAZI, D. SANDER, J. KIRSCHNER, Max Planck Inst Microstructure — We combine symmetry arguments, first-principles calculations and spin-resolved STS measurements to study a 2D helical magnet of some nm extension in proximity to ferromagnetic Co and vacuum regions. Considering the prototypical helical 2D system, an Fe bilayer with intrinsic helical spin structure (1), we report a non-uniform distortion of the spin helix which depends on the lateral extension of the bilayer and on the proximity to either Co or vacuum. The proximity effect manifests itself in different modifications of the magnetic and electronic structures of Fe in vicinity of the interfaces with Co and vacuum. These nanosize and proximity effects have not been discussed before. We demonstrate that, in contrast to an ideal helix of infinite length, the lack of symmetry of the nm-long distorted Fe spin helix, induces an energy dependence of the direction of the electronic magnetization which is revealed in the measured energy dependence of the spin-asymmetry of the differential tunneling conductance.
(1) Phark, S. H.; Fischer, J. A.; Corbetta, M.; Sander, D.; Nakamura, K. Kirschner, J. Reduced-dimensionality-induced helimagnetism in iron nanoislands Nat Commun 5 (2014) 5183.

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