

# Unique spin-spiral structures in low dimensional magnets

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Magnetic nanostructures are often complex, multicomposite materials with low symmetry, non-collinearity and strong spin-orbit coupling effects. In the last years we could establish first-principles methods to describe accurately the underlying magnetic interactions, i.e. the symmetric and antisymmetric exchange, the magnetocrystalline anisotropy and their dependence on dimensionality and structure in realistic materials. This talk will focus on low-dimensional magnetic systems and the importance of relativistic effects for the magnetic properties: due to the lack of inversion symmetry at the surface, the Dzyaloshinskii-Moriya interaction can induce non-collinear spin structures of a particular rotational sense in ultra-thin magnetic films. This behavior will be discussed in three different examples, domain walls in two monolayers Fe on W(110) [1], an antiferromagnetic monolayer Mn of W(110) [2], and the ferromagnetic Mn on W(100) [3]. A related phenomenon, the Rashba-effect on magnetic surfaces, will be demonstrated on Lanthanide surfaces [4,5].

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- [4] O. Krupin, G. Bihlmayer, K. Starke *et al.*, Phys. Rev. B **71**, 201403 (R) (2005)
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