On-line SPICE-SPIN+X Seminars

SPIN PHENOMENA INTERDISCIPLINARY CENTER

SPIN+X SFB/TRR 173 Kaiserslautern • Mainz

Wednesday, 27th October 2021, 15:00 (CET)

The seminar will be via Zoom (Meeting ID: 854 0324 2671) and live streamed in the SPICE YouTube Channel.

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Nano-scale skyrmions and atomic-scale spin textures studied with STM

Non-collinear magnetic order arises due to the competition of different magnetic interactions. Often the dominant interaction is the isotropic pair-wise exchange between neighboring atomic magnetic moments. An additional sizable contribution from anisotropic exchange (Dzyaloshinskii-Moriya-Interaction) typically leads to spin spiral ground states in the absence of magnetic fields. In applied magnetic fields such systems can transition into skyrmion lattices or isolated skyrmions with diameters down to a few nanometer.

In zero magnetic field single skyrmions can arise as metastable states, stabilzed by frustrated exchange interactions, which originate from competing non-negligible exchange interaction to more distant magnetic moments. Periodic two-dimensionally modulated magnetic states on the atomic scale can arise due to higher-order magnetic interactions. Such higher-order interactions can favor superpositions of spin spirals, so called multi-q states. Depending on the sample system atomic-scale non-collinear magnetic lattices of different symmetry and size can form. Higher-order interactions can also determine the type and width of domain walls in antiferromagnets.

I will present several examples of ultra-thin magnetic film systems studied with spin-polarized scanning tunneling microscopy, and discuss the origin of the different observed non-collinear magnetic states.