Seminar: Hard Condensed Matter Theory

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Room: Galilei Raum, 01-128 (Staudinger Weg 9)
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Sensing skyrmions at the atomic scale combining magnetic exchange and spin-polarized imaging

Recent developments in surface and interfacial magnetism have raised the question if it is possible to realize a memory derived from single atoms or nanometer sized skyrmions. Therefore, it is important to understand how the local magnetic anisotropy driven by the crystal field symmetry, magnetic exchange, and hybridization influences the magnetization at the atomic length scale. Nevertheless, a vast majority of atomic-scale studies have utilized spin-polarized scanning tunneling microscopy (SP-STM), limiting the scope of materials which can be probed. In order to gain new insight into magnetism at the atomic scale, we combine SP-STM with magnetic exchange force microscopy (together called SPEX), based on a qPlus tuning fork design. We use SPEX to characterize the magnetic non-collinear nano-skyrmion structure of a single monolayer of Fe on Ir(111). We show that SPEX is capable of disentangling structural from electronic or magnetic effects, which spin-polarized STM alone cannot achieve, as well as probing direct and indirect magnetic exchange. Furthermore, we use SPEX to study the structure of the complex spin spiral dislocation network in the second Fe layer on Ir(111).

All interested are cordially welcome!

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