TECHNISCHE UNIVERSITÄT CHEMNITZ

Institut für Physik
Physikalisches Kolloquium

Mittwoch, 26.06.2019, um 16:00 Uhr

Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude,
Raum 2/N013

Dr. Sebastian Wintz

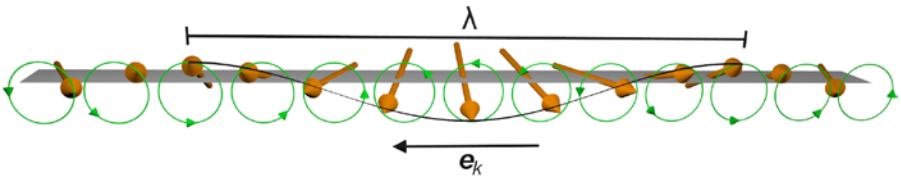
Max-Planck-Institut für Intelligente Systeme

Spin textures and spin waves as seen by x-ray microscopy

The investigation of spin-wave phenomena, also referred to as magnonics, plays an important role in present condensed matter research [1] [Fig. 1]. This holds true, in particular, as spin waves are seen as signal carriers for future spintronic information processing devices, with a high potential to outperform present charge-based technologies in terms of energy efficiency and device miniaturization. Yet a successful implementation of magnonic technology will require the usage and control of spin waves with nanoscale wavelengths.

In this colloquia, I will show that ferromagnetic spin textures in metallic systems can be used as nanoscale spin-wave emitters and wave guides. In particular, topological spin vortex cores prove to act as efficient and tunable generators for sub-100 nm waves [2,3] [Fig. 2(a,b)], while domain walls can be utilized as quasi one-dimensional channels for spin-wave propagation and routing [4] [Fig. 2(c)]. The underlying spin dynamic processes were directly imaged by using time-resolved x-ray microscopy.

Figure 1: Schematics of a propagating spin wave [3].



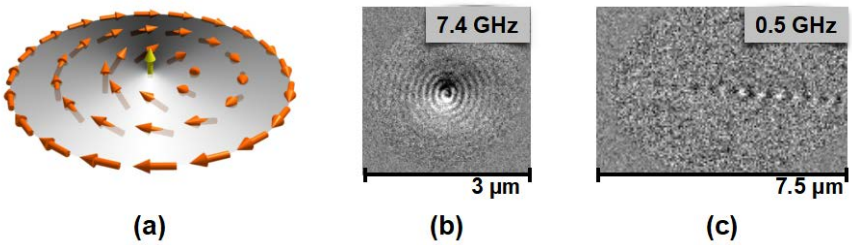


Figure 2:
(a) Schematics of a spin vortex.
(b) Spin-wave emission from a vortex core.
(c) Domain wall as 1D spin-wave channel.

[1] A. V. Chumak *et al.*, Nat. Phys. **11** 453 (2015). [3] G. Dieterle *et al.*, Phys. Rev. Lett. **122** 117202 (2019).
[2] S. Wintz *et al.*, Nat. Nanotech. **11** 948 (2016). [4] V. Sluka *et al.*, Nat. Nanotech. **14** 328 (2019).

Alle Zuhörer sind ab 15:45 zu Kaffee und Tee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
Prof. Dr. Olav Hellwig, Tel. 0371 531 30521

www.tu-chemnitz.de/physik