

PHYSIKALISCHES KOLLOQUIUM

Referent: **Dr. Vincent Cros**

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Thema: **The magnetic skyrmions: newcomers in spintronics**

Zeit und Ort: Dienstag, 9.1.2018, 16:40 Uhr
Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter: Prof. Dr. Hans-Henning Klauß

Kurzfassung: Magnetic skyrmions are topological spin textures that can be found in magnetic materials which break bulk or interface inversion symmetry, in which the skyrmions are stabilized by the Dzyaloshinskii-Moriya interaction (DMI). Due to their reduced size (as small as a few atomic lattices) and expected low depinning threshold for current-induced motion, magnetic skyrmions are expected to allow for improved scalability and be suitable for "abacus"-type applications in information storage, or logic or neuro-inspired technologies. Up to recently however, magnetic skyrmions have been observed mostly at low temperature and under large magnetic fields in a few bulk non-centrosymmetric compounds and ultra-thin Fe films. In this presentation, I will first provide the basic understanding of this new kind of magnetic solitons. Then I will illustrate the wealth of skyrmions and describe some of the key results from the important efforts of research has been devoted in the last couple of years to find thin films and multilayered structures in which skyrmions are stabilized above room temperature and manipulated by current. These achievements represent important steps as they demonstrate the basic functions required for any type of skyrmion based devices i.e. writing the information (nucleation), processing the information (displacement, creation/annihilation), reading the information (detection). These advances made in technologically relevant materials opens the way for the development of several concepts of skyrmion based devices going from race-track memory type to MRAM, from still highly silicon-compatible memories, such as multi-level MRAM or skyrmion racetrack memories to disruptive "beyond CMOS" technologies such as neuro-inspired architectures.

Biographie: Dr. Vincent Cros is CNRS senior researcher in the CNRS/Thales research lab (Palaiseau, France), one of the pioneer groups in the field of spintronics. Since 2000, he is leading there the research activities on magnetization dynamics and spin torque phenomena as well as its related potential applications for example for radiofrequency spintronic devices. His research interests include: noise properties, nonlinear phenomena and synchronization of spin torque oscillators; Spin transfer dynamics generated by spin-orbit torques and more recently the physics of magnetic skyrmions in nanostructures. In 2013, he received the Carnot prize from the French Academy of Sciences for his work in spintronics.

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