

Prof. Dr. Stuart S.P. Parkin
Max Planck Institute
of Microstructure Physics, Halle



Chiral spin textures

physikalisches

Mo. 20.6.22
16:00 Uhr
Ort: H34

Chiral domain walls are just one member of an ever-expanding family of chiral spin textures that are of great interest from both a fundamental as well as a technological perspective [1]. Recently a zoology of complex spin textures stabilized by volume or interface Dzyaloshinskii-Moriya interactions have been discovered including, in our work, anti-skyrmions [2], elliptical Bloch skyrmions [3], two-dimensional Néel skyrmions [4] and fractional antiskyrmions [5]. Such nano-objects are potential candidates as magnetic storage bits on the racetrack. We also discuss our recent observation of Néel skyrmions in two distinct but closely related 2D van der Waal's ferromagnetic compounds. We show that the crystal structures are substantially modified by self-intercalation, lowering the symmetry so as to allow for chiral spin textures that require acentric structures [6, 7]. Finally, we discuss the unusual properties of chiral Kagome antiferromagnets and how their magnetic structure can be manipulated by a previously unobserved seeded spin orbit torque mechanism [8].

- [1] S.-H. Yang, R. Naaman, Y. Paltiel, and S. S. P. Parkin, "Chiral spintronics", Nat. Rev. Phys., vol. 3, 2021.
- [2] A. K. Nayak et al., "Magnetic antiskyrmions above room temperature in tetragonal Heusler materials", Nature, Letter, vol. 548, 2017.
- [3] J. Jena et al., "Elliptical Bloch skyrmion chiral twins in an antiskyrmion system", Nat. Commun., vol. 11, 2020.
- [4] A. K. Srivastava et al., "Observation of Robust Néel Skyrmions in Metallic PtMnGa", Adv. Mater., vol. 32, 2020.
- [5] J. Jena et al., "Observation of fractional spin textures in a Heusler material", Nat. Commun., vol. 13, 2022.
- [6] A. Chakraborty et al., "Magnetic skyrmions in a thickness tunable 2D ferromagnet from a defect driven Dzyaloshinskii-Moriya interaction", Adv. Mater., vol. 34, 2022.
- [7] R. Saha et al., "Observation of Néel-type skyrmions in acentric self-intercalated Cr_{1+δ}Te₂", Nat. Commun., 2022.
- [8] B. Pal et al., "Setting of the magnetic structure of chiral kagome antiferromagnets by a Seeded Spin-Orbit Torque", Sci. Adv., 2022.