

On-line SPICE-SPIN+X Seminars



Wednesday, 9th February 2022, 15:00 (CET)

The seminar will be via Zoom ([Meeting ID: 890 8853 5823](#)) and live streamed in the SPICE YouTube Channel.



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Detecting, imprinting and switching spin chirality in magnetic materials

Among magnetic materials, those which exhibit chiral non-collinear spin ordering are intensively explored these days from the viewpoint of basic properties and diverse applications. In this context, an ability to read out the exact chiral state from basic transport measurements is of great importance, since it allows for an educated design of spintronics devices based on spin chiral effects. In my talk I will attempt to outline a way which can be used to categorize various chiral contributions to charge and spin currents arising in non-collinear magnets. I will show that this gives an important ability to track the overall features and exact details of spin distribution in various classes of magnetic materials ranging from canted antiferromagnets [1] to smooth magnetization textures [2,3]. Moreover, I will demonstrate that chiral charge and spin currents are intrinsically related to the effect of spin-orbit torque in chiral spin systems, and they play a pivotal role for enabling chirality switching. Finally, I will show that chiral functionality can be activated even in intrinsically non-chiral materials either by thermal fluctuations or controlled optical pulses [3]. While the former type of incoherent chirality can give rise to unexpected manifestations in transport and magnetization dynamics, the optical control of chirality can be key to our ability to engineer chiral states and chiral dynamics in complex magnets.

- [1] Kipp et al., *Comm. Phys.* 4, 99 (2021); Bac, Lux et al., arXiv:2103.15801
- [2] Lux et al., *Phys. Rev. Lett.* 124, 096602 (2020)
- [3] Kipp et al., *Phys. Rev. Res.* 3, 043155 (2021)
- [4] Ghosh et al., arXiv:2011.01670; Zhang et al., *Comm. Phys.* 3, 227 (2020)