Contribution ID: **42** Type: **Poster**

The strengths of small-angle neutron scattering for magnetic nanoparticle characterization

Wednesday 9 December 2020 17:40 (20 minutes)

In this talk, we will present our recent advances in applying magnetic small-angle neutron scattering (SANS) for the in-depth characterization of magnetic nanoparticles.
In the first part, we will discuss the benefits of a Bayesian analysis as the new standard for fitting magnetic SANS data of nanoparticle samples [1]. Such a standardized protocol for the refinement of magnetic SANS data is especially useful with biomedical applications of magnetic nanoparticles in mind, as regulatory work regarding prior particle characterization is required to guarantee a safe and effective administration of the particles into the human body.
In the second part, we will demonstrate the unique ability of magnetic SANS to detect very small deviations of the magnetization configuration from the homogeneously magnetized state within nanoparticle (NP) systems [2,3]. The SANS technique has been already used in several other studies to investigate the intra- and interparticle magnetization profile in various NP systems. However, in contrast to the previous works, our analysis is focused on model-independent approaches. Moreover, we employ large-scale micromagnetic continuum simulations to support our findings and to disclose the delicate interplay between the particle size and the magnetization profile within NPs.

[1] Bersweiler *et al.*, Nanotechnology, in press (2020)
[2] Bersweiler *et al.* PRB **100**, 144434 (2019)
[3] Vivas *et al.* arXiv:2003.08694 (2020)

Author: BERSWEILER, Mathias (University of Luxembourg)

Co-authors: Dr BENDER , Philipp (University of Luxembourg); Dr GONZÁLEZ VIVAS , Laura (University of Luxembourg); Dr EROKHIN, Sergey (General Numerics Research Lab,); Prof. BERKOV, Dmitry (General Numerics Research Lab,); Dr HONECKER, Dirk (ISIS Neutron and Muon Source); Prof. MICHELS, Andreas (University of Luxembourg)

Presenter: BERSWEILER, Mathias (University of Luxembourg)

Session Classification: Joint poster session of MLZ User Meeting and DN2020

Track Classification: DN: Magnetism