Contribution ID: **80** Type: **Oral**

Soft X-ray Correlation Spectroscopy at Fourth Generation Synchrotron Source to Investigate Domain Fluctuations in Ho

Thursday, 9 October 2025 10:25 (25 minutes)

Non-colinear spin structures have gained interest due to their connection to multiferroicity. One of most well-known examples of such materials is the helical antiferromagnetic Holmium. The occurrence of domain-wall fluctuations over a wide range of time scales has been observed [1]. These fluctuations show a slow dynamic on the order of nanoseconds to seconds and are important to understand thermally-activated magnetization reversal processes. In order to probe these dynamics, techniques with nanometer spatial resolution and nanosecond temporal resolution are necessary and thus making X-ray photon correlation spectroscopy (XPCS) the ideal method. However, the temporal resolution in the soft X-ray range is often-case still limited, among others due to the detector as well the lack of coherent soft X-ray scattering beamlines in fourth-generation sources. Until now, the dynamics of Ho on the micro- to nanosecond scale has therefore not been investigated yet.

In order to increase the temporal resolution in XPCS, we have recently commissioned a mobile resonant scattering endstation at the new coherent scattering beamline SoftiMAX at the fourth-generation synchrotron source MAX IV, Sweden. Even with a slow readout CCD, this setup combined with the high coherent flux provided new intriguing insights into the dynamics of domain fluctuations: Over only a small temperature range of 10 K the dynamics change by more than two orders of magnitude. In the long-term, the goal of this instrument is to push the resolution down to the nanosecond scale and enable single-shot XPCS in the soft X-range at synchrotrons.

[1] Konings et al., *Physical Review Letters* **106**, 7 077402 (2011).

Primary author: MAROTZKE, Simon (Deutsches Elektronen-Synchrotron DESY / Christian-Albrechts-Universität zu Kiel)

Co-authors: SCHÜSSLER-LANGEHEINE, Christian (Helmholtz-Zentrum Berlin für Materialien und Energie); SCHWENKE, Jörg (MAX IV Laboratory / Lund University); BEYE, Martin (Stockholm University); AHSAN, Safiya (Stockhoklm University)

Presenter: MAROTZKE, Simon (Deutsches Elektronen-Synchrotron DESY / Christian-Albrechts-Universität zu Kiel)

Session Classification: Talks Thursday Morning