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Vector-magnetometry using soft x-rays

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Vector-magnetometry using soft x-rays

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Abstract:

The goal of magnetism research is to determine the magnitude and orientation of local magnetic moments and their response to external excitations (field, temperature, pressure, etc.), to correlate these observables with other intrinsic material properties (crystal structure, electronic structure, dopant concentrations, etc.) and to describe all these quantities in appropriate theoretical models. To take full advantage of the strengths of soft x-ray magnetic dichroism (XMD) measurements for the detailed and quantitative characterization of multi-element magnetic materials, we developed an eight pole electromagnet that provides magnetic fields up to 0.9 T in any direction relative to the incoming x-ray beam. The setup allows us to measure magnetic circular and linear dichroism spectra as well as to thoroughly study the field dependence of the magnetization vector with very high precision. In this talk, recent detailed studies of the magnetization reversal in exchange biased bilayer will be presented. Moreover, a brief discussion of the key technical difficulties in developing a similar superconducting device with peak fields of 5 T and ramping rates suitable for point-by-point full field reversal in an XMD experiment will be discussed.