Poster Presentation

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Novel phase plate strategy for X-ray magnetic dichroism

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We report on a new strategy to use a x-ray 1/4 wave plate [1] to convert linearly polarized x-rays into circularly polarized for efficient x-ray magnetic circular dichroism (XMCD) experiments. This instrumentation, unique in the world, combines the use of dispersive optics present at DXAS beamline of the LNLS and a phase plate with synchronous acquisition mode using a method know as Turbo-XAS [2]. Using this setup, we have successfully generated 98% rate of circularly polarized x-rays (compared with the previous 70%) with a diamond quarter wave plate with the possibility to switch the helicity in up to 100 Hz synchronized by a lock-in acquisition. This significantly improved the signal over noise ratio of the XMCD data with also a reduced duration of the experiment. In addition, this same setup was designed to be used in any monochromatic spectroscopic beamlines, and was already commissioned at XDS beamline of the LNLS and will be used at the EMA beamline of the new Brazilian synchrotron source (Sirius). To characterize this state-of-art instrumentation we measured XMCD spectra of the ferromagnetic GdCo2 compound at Gd L3-edge and Co K-edge. Our results demonstrated an unprecedented improvement on the quality of the data provided by this new instrumentation when compared with the conventional scheme in the x-ray dispersive optics (polarization provided by the out-of-orbit dipole radiation).

[1] Hirano, K. et al. (1991). Japanese J. of Applied Physics. 30, L407-L410.
[2] Pascarelli, S. et al. (1999). J. of Synchrotron Radiation. 6, 1044-1050.

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