

XMCD in the electron microscope : Nanometer resolution and below

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Invité par Nicolas JAOUEN

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Séminaires

Two years after the discovery of the EMCD effect [1] (energy loss magnetic chiral dichroism) an impressive improvement in signal and spatial resolution has been achieved. Several labs are now beginning to use this novel technique with the aim to investigate nanomagnetic systems.

The particular attraction of EMCD rests in the possibility to detect atom specific magnetic moments in combination with spin and orbital sum rules with nm resolution.

A review of the most important results achieved so far will be presented, and several experimental conditions and limitations are discussed.

An analysis of the inelastic scattering process based on the kinetic equation [2] reveals a new aspect of EMCD: The possibility to perform EMCD in image mode instead of the standard diffraction setting. This would allow to map the chirality of transitions in real space on the atomic scale. Simulations of a model system show that last generation TEMs could do the job. These maps would also reveal the angular momentum of an electronic transition if the rotational symmetry of free space were not broken by the crystal lattice, providing additional angular momentum to the probe electron.

We discuss also the paradox that in the standard geometry (incident plane wave, detection of a plane wave) no angular momentum seems to be transferred to the specimen whereas the atom's angular momentum changes in the chiral transition.

1. Schattschneider P., Rubino S., Hébert C., Rusz J., Kunes J., Novák P., Carlino E., Fabrizioli M., Panaccione G., Rossi G., *Nature* **441** (2006) 486- 488
S. Dudarev, L. Peng, M. Whelan, *Phys. Rev.B* 48 (1993) 13408

Formalités d'entrée : accès libre dans l'amphi du Pavillon d'Accueil. Si la manifestation a lieu dans le Grand Amphi Soleil du Bâtiment Central, merci de vous munir d'une pièce d'identité (à échanger à l'accueil contre un badge d'accès).

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