

Séminaire SOLEIL

**Coupled electron-spin-lattice
dynamics in rare earth materials
investigated by femtosecond laser-
synchrotron experiments****Uwe BOVENSIEPEN***(University Duisburg-Essen, Faculty of Physics, Duisburg, Germany)*

Invité par Fausto SIROTTI

**Mardi 26 avril à 11h00
Grand Amphi SOLEIL**

Dynamics in the optically excited state proceeds in the ultrafast regime, i.e. on sub-picosecond timescales. Pump-probe experiments are carried out directly in the time domain and allow an analysis of the interaction between electronic, phononic, and magnetic excitations. In this talk recent work on Tb and Gd will be discussed. In the laboratory a variety of experiments using time-resolved photoelectron spectroscopy and non-linear magneto-optics have been carried out and led to a detailed insight into excitation and relaxation of the optically excited state at Gd(0001) and Tb(0001) surfaces [1]. Using the femtosecond slicing facility at BESSY II time-resolved x-ray magnetic circular dichroism (tr-XMCD) studies have been performed on polycrystalline Gd and Tb films. This approach provides a reliable observable of the transient ferromagnetic state, which was controversially discussed on the basis of time-resolved magneto-optical experiments. In a very recent tr-XMCD study we show, that Tb and Gd demagnetize after optical excitation in a two step manner [2]. The slower timescale (Gd 40 ps, Tb 8 ps) is attributed to spin-lattice coupling and a quasi-equilibrium process. The ultrafast process (750 fs for both Gd and Tb) is active while hot electrons decay and is therefore linked to the non-equilibrium regime.

[1] U. Bovensiepen, J. Phys.: Cond. Matter **19**, 083201 (2007).

[2] M. Wietstruk, A. Melnikov, C. Stamm, T. Kachel, N. Pontius, M. Sultan, C. Gahl, M. Weinelt, H.A. Dürr, U. Bovensiepen, Phys. Rev. Lett. (2011), in press; available on arxiv.org

**Ce séminaire sera suivi d'une pause-café**

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).

SYNCHROTRON SOLEIL

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