



GEMaC

Groupe d'Étude de la Matière Condensée

FEMTOSECOND OPTO-MAGNETISM : A KEY TO NOVEL MECHANISM OF SPIN REORIENTATION

This seminar demonstrate the discovery of novel mechanisms of spin-reorientation by the control of magnetism with light.

le mardi 02 mars 2010 à 10h30

Université de Versailles St-Quentin

Bâtiment Fermat

45 av. des Etats-Unis, 78000 Versailles

The demand for the ever-increasing speed of information storage and manipulation has triggered an intense search for ways to control the magnetization of a medium by means other than magnetic fields. The control of magnetism by light is one of the promising approaches to

this problem, because such methods may access timescales of a picosecond or less [1]. Can light directly and nonthermally magnetize a medium? In my lecture I will demonstrate that the effect of an ultrashort circularly polarized optical pulse on a magnetic system is equivalent to the effect of an equally short magnetic field pulse with strengths up to few Tesla [2-5]. Using such short pulses of effective magnetic field we were able to discover novel mechanisms of spin-reorientation [6,7]. Finally, I will demonstrate that using two single subpicosecond laser pulses it is possible to do both all-optical recording and reading on an ultrashort time scale. The magnetic information was recorded by a subpicosecond laser pulse and read-out by a similarly short pulse after 30 ps, which is the fastest "write-read" event demonstrated for magnetic recording medium so far. [6].

- [1] A. V. Kimel et al, Nature 429 850 (2004).
- [2] A. V. Kimel et al., Nature 435 655 (2005).
- [3] F. Hansteen et al, Phys. Rev. Lett. 95 047402 (2005).
- [4] A. V. Kimel et al., Laser & Photonics Rev. 1 275 (2007).
- [5] C. D. Stanciu et al, Phys. Rev Lett. 99 047601 (2007); Patent PCT/NL2006/000264.
- [6] K. Vahaplar et al, Phys. Rev Lett 103, 117201 (2009).
- [7] A. V. Kimel et al, Nature-Physics 5 727 (2009).

INFORMATIONS COMPLÉMENTAIRES

Séminaire présenté par A. V. Kimel de l'Institut des Molécules et Matériaux à Nijmegen, en Hollande

Contacts :

Joseph Scola - Enseignant en physique-environnement

Tél. : 01 39 25 46 69

joseph.scola@uvsq.fr