

# Special Seminar

## Speaker

**Prof. Salim. Mourad CHERIF**

*LSPM-CNRS, Université Paris 13, France*

## Date

**April 23, 2014 (Wednesday)**

## Time

**3:30 p.m. ~ 4:30 p.m.**

## Location

**R618, CCMS & New Physics Building**

## Topic

**SPIN WAVE PROPAGATING ALONG  
ULTRA THIN MAGNETIC NANOWIRES  
IN A TRANSPARENT MATRIX**

### Abstract

Self-assembled nanowires of ferromagnetic metals embedded in a dielectric matrix are interesting both for applications and fundamental science. Suffice it to mention ultra-dense magnetic recording media and metamaterials, including recently discovered artificial hyperbolic media.

Mainstream research in this domain is relying on ferromagnetic structures elaborated by means of a technology, today already conventional, based on electro deposition of metals in a porous alumina matrix [1] giving nanowires with diameters varying from 20 nm to 200 nm. Recently, the use of a novel elaboration approach, consisting in co-deposition, by laser ablation, of the nanowires and the matrix, taking advantage of the natural segregation and of the columnar growth [2] allowed fabricating really ultrathin wires with a diameter as small as 2-6 nm, which is entirely impossible if the conventional technology is employed.

The purpose of the talk is the study of spin wave modes (thermal magnons) of various arrays of ferromagnetic nanowires, obtained using the two elaboration ways, by means of Brillouin light scattering (BLS) technique, which gives access to spin waves modes with non-zero wave vector values in the 3-300 GHz spectral frequency range. The inelastic scattering by magnetic modes allows a detailed study of the dynamics of magnetization of the nanowires.

Respective role of the direction of the applied field, of the magneto-crystalline and the shape anisotropies as well as the effect of the aspect ratio and of the packing density of the nanowires will be discussed.

[1] U. Ebels et al., *Phys. Rev. B* 64, 144421 (2001).

[2] P. Schio et al., *Phys. Rev. B* 82, 094436 (2010).

### Sponsors

- ◆ 國立台灣大學物理系 Department of Physics, National Taiwan University
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