SEMINAIRE DE LA MATIERE CONDENSEE

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Probing magnetic dynamics using MIEZE techniques

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Salle de conférence 15 – Bâtiment 563

The MIEZE principle has been derived on the basis of Neutron Resonant Spin Echo in the early 90's by Gähler and Golub1. Essentially, it allows building a Mach- Zender spectrometer in time by producing intensity modulated neutron beams. The great advantage compared to traditional spin-echo techniques is that spin manipulations are perform upstream of the sample position and thus, any depolarizing sample or environment will not diminish the achieveable resolution. During the last decade, substantial efforts have been concentrated on the development of appropriate instrumentatal components. The method is now mature and can be employed for the study of microscopic dynamics within condensed-matter systems. In this talk, I will give two recent examples illustrating the main advantages of using such a time-resolved polarized neutron technique. First, I shall present novel results concerning the spin dynamics at the helimagnetic/conical to paramagnetic phase transition in the intermetallic compound MnSi2. The latter has recently attracted great scientific interest because of the observation of a skyrmion lattice at moderate applied magnetic field3. However, its (H,T)-phase diagram presents several features that are still to be well understood, notably the intermediate fluctuation-disordered phase and the field-induced tri-critical point located at 0Hint 340 mT4. In a second part, I will describe the study of re-magnetization kinetics of Fe-Si multilayers under the application of an AC magnetic field. A fundamental description of the domain wall motion at a microscopic level in such structures is becoming more and more important (e.g. in view of development of new types of magnetic memories) and neutron scattering could have an important role to play.

1R. Gähler, R. Golub, and T. Keller, Physica B 180-181, 899 (1992).

2J. Kindervater, et al., to be published (2014).

3S. Mühlbauer, B. Binz, F. Jonietz, C. Pfleiderer, A. Rosch, A. Neubauer, R. Georgii, and P. Böni, Science 323, 915 (2009).

4A. Bauer, M. Garst, and C. Pfleiderer, Phys. Rev. Lett. 110, 177207 (2013).

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