Physics in High Magnetic Field Environments

High magnetic field environments, accessible to the scientific community, are large scale infrastructures quite rare on the planet. In Europe, the European Magnetic Field Laboratory (EMFL) unites high field infrastructures in Dresden, Nijmegen, Toulouse and Grenoble within a European collaboration network.

A magnetic field is a thermodynamic parameter and as such it can be used to tune and control the ground states of matter. In particular, high magnetic fields can be used to produce new states of matter which do not exist otherwise, such as the Fractional Quantum Hall Effect,the normal state of a superconductor at low temperature, or phase transitions in quantum spins systems. In addition applying a magnetic field introduces a new characteristic length, the magnetic length, which decreases as the value of the magnetic field is increased. In magnetic fields available in laboratories, the magnetic length lies in the nanometer scale and nano-objects can hence be probed in the different regimes for which the magnetic length is larger or smaller than the physical dimensions of the system. Finally a magnetic field produces a variety of electronic phenomenon, such as the Hall effect and the Nernst effect, that can be used to determine the Fermi surface of metals.

Today, a large number of scientific fields benefit from results obtained in high magnetic fields environment: the physics of semiconductors, metals, mesoscopic physics, superconductors, highly correlated systems, nanophysics, magnetism. More recently new scientific domains characterized by coupled phenomena at mesoscale have benefited from high magnetic field environment such as magneto-hydrodynamics, earth core modelization, crystal growth, magneto-chemistry. This makes of the use of high magnetic fields environments a transverse technique, gathering many different topics, actors at the national and international level, and that produced in the past a high number of scientific breakthroughs.

This mini-colloque aims at reviewing the most recent advances obtained thanks to the use of high magnetic fields. We also aim at gathering the community of users of high magnetic fields in order to have a large panorama of the different scientific topics using high magnetic fields, and also of the various experimental techniques available.

The mini-colloque will host **two invited talks** by **Dr P. Plochocka-Maude (LNCMI-Toulouse)** and by **B. Fauquet (ESPCI, Paris)** of (25+5) min. The organizers will then select **8 contributed talks** among the abstracts submitted by participants for oral presentations of (12+3) min. Posters are highly welcome to stimulate intense scientific discussions.

Contributions to this mini-colloque should be given in English and abstract should be sent to JMC.HighMagneticField@lncmi.cnrs.fr

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