# SEMINARIUM Z MAGNETYZMU I NADPRZEWODNICTWA

Uprzejmie zawiadamiamy, że w środę

## 16 kwietnia 2014 r., o godz. 10:00

**w sali 203** (bud. 1) odbędzie się seminarium, na którym

## Dr Sylvain Petit

*Laboratoire Léon Brillouin, CEA Saclay, 91190 Gif sur Yvette, France*

wygłosi referat na temat:

## Spin dynamics in highly frustrated pyrochlore magnets

Geometrical magnetic frustration is a central concept in condensed matter physics, at the heart of a number of issues. In this field, rare earth pyrochlore magnets $R_2Ti_2O_7$ (R is a rare earth) play a prominent role, as they form model systems showing a rich variety of ground states, depending on the balance between dipolar, exchange interactions and crystal field. Actually, the crystal electric field (CEF) scheme drives different kinds of anisotropies, for instance Ising-like or XY, with magnetic moments respectively constrained along or perpendicular to the local <111> axes. In the Ising-like case, an effective ferromagnetic interaction leads to a degenerate ground state. The ground state is then a "spin-ice", as for instance in $Ho_2Ti_2O_7$ and $Dy_2Ti_2O_7$ and exhibits fractionalized excitations (the celebrated magnetic monopoles). In contrast, $Tb_2Ti_2O_7$ remains a cooperative paramagnet, or a "quantum spin ice", with strongly correlated moments still fluctuating at 50 mK. The reason for this behavior remains so far a theoretical puzzle and an experimental challenge. Recent time of flight neutron and triple-axis neutron scattering experiments have recently shed light in this field, revealing a complex ground state characterized by "pinch points" (a so-called Coulomb phase) and supporting a low energy (bosonic) excitation. These studies reveal further that a coupling between CEF transitions and an acoustic phonon mode is likely at the origin of these properties. By combining the same kind of experiments, we will also review the case of an antiferromagnetic XY system, namely $Er_2Ti_2O_7$. In this case a transition towards a Néel state is observed, probably induced by an order-by-disorder mechanism. Effective exchange parameters can then be extracted from $S(Q,\square)$.

Serdecznie zapraszamy

Roman Puźniak
Henryk Szymczak
Andrzej Wiśniewski