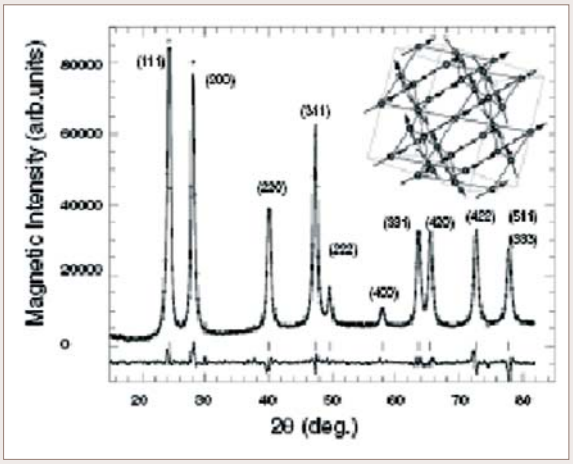
[*C3.* I. Mirebeau] Ordered spin ice state and magnetic fluctuations in $Tb_2Sn_2O_7$

$Tb_2Sn_2O_7$ is a geometrically frustrated pyrochlore showing antiferromagnetic liquid like correlations down to 4 K. Below 1.3 K we have observed by neutron diffraction a "two steps" transition towards a new magnetic structure, with both ferromagnetic and antiferromagnetic character [1]. The local structure in a Tb tetrahedron is akin to a spin ice [2], but the four tetrahedra of the unit cell are identical, yielding ferromagnetic component. The ordered ground state, previously predicted by theory [3] but not observed before, seems to result from the combined influence of dipolar interactions and finite anisotropy. We have also indirectly observed *fluctuations of the ordered moments* below T_c, by comparing the ordered moment measured by neutron diffraction to that derived from specific heat. These abnormal fluctuations were recently probed by muons, at such extend that they completely wash out the static field felt by the muon spin [4]. Their precise nature and the way how they coexist with the ordered state remains a mystery, opening a new field of investigation for both experiment and theory.



Magnetic neutron diffraction spectrum at 0.10 K, with the ordered spin ice structure in inset. From ref. [1]

[1] I. Mirebeau, A. Apetrei et al *Phys. Rev. Lett.* **94**, 246402, (2005).; [2] S. T. Bramwell and M. J. P. Gingras, *Science* **249**, 1495, (2001); [3] J. D. M. Champion et al *Europhys. Lett.* **57**, 93, (2002). ; [4] P. Dalmas et al *Phys Rev. Lett.* **96**, 127202, (2006); F. Bert et al condmat 0603434 to appear in PRL (2006).

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[*C4.* V. Hardy] Magnetism of the geometrically frustrated spin-chain compound Sr_3HoCrO_6: Magnetic and heat capacity measurements and neutron powder diffraction

Sr_3HoCrO_6 has been investigated versus temperature by combining magnetic and specific heat capacity measurements, as well as neutron powder diffraction, by using the G4.1 diffractometer. The structure, refined in R-3c with a=9.78 and c=11.30 Å, can be described as a triangular lattice that consists of chains, running along the c-axis, alternating face-shared HoO_6 prisms and CrO_6 octahedra, the Sr cations lying between the chains. Long-range antiferromagnetic order occurs around 1 K but this magnetic state has features consistent with partially disorder antiferromagnetism, a state theoretically expected in quasi-1D compounds experiencing geometrical frustration. Two of the three chains on the triangular lattice are found ferromagnetic along c, with an antiferromagnetic coupling between them, the third chain remaining incoherent (Fig. a). This leads to unusual temperature dependence of the magnetic Bragg peaks, with a maximum of intensity at 9K, and a broadening at lower temperature. It also gives rise to puzzling behaviours as exemplified with the pattern of steps on the M(H) curves at low temperature (Fig.b).

V. Hardy et al, *Physical Review* B **74**, 064413 (2006)

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