Single crystal neutron experiments under pressures up to 38 GPa

Igor Goncharenko[a], Arsen Gukasov[a], Paul Loubeyre[b], [a]*Laboratoire Léon Brilloun, C.E.A.-C.N.R.S., CEA Saclay, 91191 Gif-sur-Yvette, Franc.* [b]*Département Physique Théorique et Applications, C.E.A., 91680 Bruyères-le-Châtel, France.* E-mail: gonch@llb.saclay.cea.fr

Single crystal neutron diffraction is the most powerful technique to characterize magnetic orderings and crystal structures in solids. The "Kurchatov-LLB" pressure cells with sapphire and diamond anvils provide an opportunity to study neutron diffraction in unprecedented range of thermodynamical parameters: pressures above 10 GPa, temperature down to 0.1 K, and applied magnetic fields up to 8 T [1,2]. Recently we used the same pressure technique to study magnetic neutron diffraction under a combination of a hydrostatic pressure and a controlled uniaxial stress [3]. Another "hybrid" pressure cell has been developed to perform both x-ray and neutron diffraction experiments. The cell is compatible with gas loading. This cell was used to study orientational order in solid deuterium under pressures up to 38 GPa and temperatures down to 1.5 K [4]. Neutron experiments on samples as small as $80x80x25\mu^3$ have been carried out at the ORPHEE reactor of the Laboratoire Léon Brillouin.

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