Unusual magnets studied by synchrotron radiation under pressure

I. Goncharenko
Laboratoire Léon Brillouin C.E.A.-C.N.R.S., CEA Saclay, 91191Gif-sur-Yvette, France

Magnetic instability, which comes from a transition from localized to itinerant magnetic states or topological frustration in the magnetic sublattice, could result in many interesting physical phenomena, such as giant spin fluctuations, huge magnetostriction and various magneto-structural transitions. In particular, a new class of "unusual magnets" – magnetic hydrides – had attracted much of attention during last decade. These compounds exhibit a strong coupling between the chemical (hydrogen) and magnetic sublattices [1] and very high sensitivity to applied pressure [2,3]. A combination of neutron and synchrotron diffraction techniques is the most effective way to study microscopical origins of the above phenomena. Whereas neutron scattering allows to determine spin arrangements and positions of hydrogen atoms in the structure, X-ray diffraction is more suitable for careful determination of equation of state and determination of phase boundaries. The presented studies had been carried out at the ESRF (beamline ID30) and the LLB (diffractometer G6.1 "MICRO") in wide ranges of pressures (up to 45 GPa) and temperatures (1.5-300K).

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[3] O. L. Makarova, I. Goncharenko, T. Le Bihan Sol. State Comm. **132,** 329 (2004)