

ABSTRACT CODE

MAGNETISM OF ANIONS IN URANIUM COMPOUNDS: XMCD STUDIES.

A. Rogaley¹, F. Wilhelm¹, N. Jaouen¹, J. Goulon¹, N. Kernavanois² and J.P. Sanchez³

¹European Synchrotron Radiation Facility (E.S.R.F.), B.P.-220, 38043 Grenoble, France

²Institute Laue-Langevin, BP 156, 38042 Grenoble, France

³DRFMC, CEA-Grenoble, 17 rue des Martyrs, 38054 Grenoble, France

One of the key issues in the magnetism of uranium compounds is to unravel how the 5f magnetic moments localized on uranium atoms are coupled to each other and to the surroundings. The latter coupling strongly depends on the nature of chemical bonding in a compound. Even though the interplay between chemical bonding and magnetism has been a subject of studies for a long time, the mechanisms of magnetic interactions involving valence electrons are not yet well understood. X-ray magnetic circular dichroism (XMCD), being element and orbital selective, provides us with a unique experimental tool to disentangle the role of each element in both the chemical bonding and the magnetic coupling.

We present here the first systematic XMCD studies of the magnetic properties of anions in various ferromagnetic uranium

compounds (US, UGe₂, UGa₂ etc). The observation of relatively large XMCD signals at the K-edges of anions unambiguously demonstrates that *p* valence electrons can be strongly polarized. Moreover, magneto-optical sum rules allow us to identify the observed features in K-edge XMCD spectra as a density of states of the orbital polarization in the anion's *p* shell. Comparisons with *ab-initio* calculations and with other experimental results show that the orbital moment carried by *p* electrons is acquired *via* a strong hybridization with the spin-orbit split 5f electrons of Uranium. We shall emphasize the role played by the orbital polarization of the valence shell in magnetic interactions as well as in a strong magnetic anisotropy of ferromagnetic uranium compounds.