

X-ray Magnetic Circular Dichroism Studies of 5f-based Magnetic Systems



Dr. Fabrice Wilhelm

European Synchrotron Radiation Facility, Grenoble (France)

email: wilhelm@esrf.fr

Over the last 25 years, x-ray absorption near edge structure (XANES) and x-ray magnetic circular dichroism (XMCD) spectroscopy¹ have proven to be particularly valuable tool to study the electronic and magnetic properties of actinide-based compounds². Application of magneto-optical sum rules to XMCD spectra recorded at the $M_{4,5}$ edges offer a possibility to disentangle the spin and orbital contributions to the total magnetic moment carried by the 5f electrons of actinide atom. Monitoring XMCD signal as a function of applied magnetic field affords element selective magnetization curve. In this lecture, use of XANES/XMCD techniques in physics and chemistry of actinides will be illustrated by a number of selected examples, such as molecular magnets, strongly correlated electron systems and uranium-based multilayers.

References

- 1) *Magnetic Circular Dichroism in the Hard X-ray Range*, A. Rogalev and F. Wilhelm, *The Physics of Metals and Metallography*, Vol. 116, No. 13, pp. 1285–1336 (2015).
- 2) *Magnetism of uranium compounds probed by XMCD spectroscopy*, F. Wilhelm, J.-P. Sanchez and A. Rogalev, *Journal of Physics D: Applied Physics*, Vol. 51, No. 33, 333001 (2018).