ESRF	**Experiment title:** Induced polarization effects of non-magnetic elements in uranium compounds (Preliminary report)	**Experiment number:** HE-971
Beamline: ID12 A	**Date of experiment:** from: 11-avr-01 to: 17-avr-01	**Date of report:** 10-oct-01
Shifts: 18	**Local contact(s):** A. ROGALEV and F. WILHELM	*Received at ESRF:*

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Report:

Recently, a series of measurements using both x-ray magnetic circular dichroism and resonant x-ray magnetic scattering techniques performed at the anion K absorption edge of several uranium compounds, evidenced a huge signal.
Among these measurements, dichroism experiments have been performed at the beamline ID12A of the ESRF at the sulphur K-edge of US. The observed K-edge dichroic effect is 250 times bigger than the signal at the iron K-edge in pure ferromagnetic iron and also much greater than the one found at the K-edge of sulphur in EuS. Following this discovery, important theoretical efforts have been made to address the physics underlying such phenomena. Band structure calculations managed to reproduce the experimental signal.
To test the available theoretical model, we did several measurements: *i*) on USe (cf. Fig. 1), the parent cubic compound of US ($T_C = 160$ K, 1.81 μ_B). *ii*) on representative samples from the hexagonal and tetragonal symmetry groups, UGa_2 (P6/mmm, T_C = 125 K, 2.71 μ_B) (cf. Fig. 2) and UGe_2 (Cmmm, $T_C = 52$ K, 1.50 μ_B) (cf. Fig. 3), respectively.
Such measurements are of two main interests: first, they allow to test band structure calculations to an extend number of compounds corresponding to different symetry groups; second, just comparing the different shapes and area of the measured spectra, one can expect to shed light on a trend (depending on the electronic properties of the anion) of the XMCD signal at the anion K absorption edge in the studied uranium compounds.

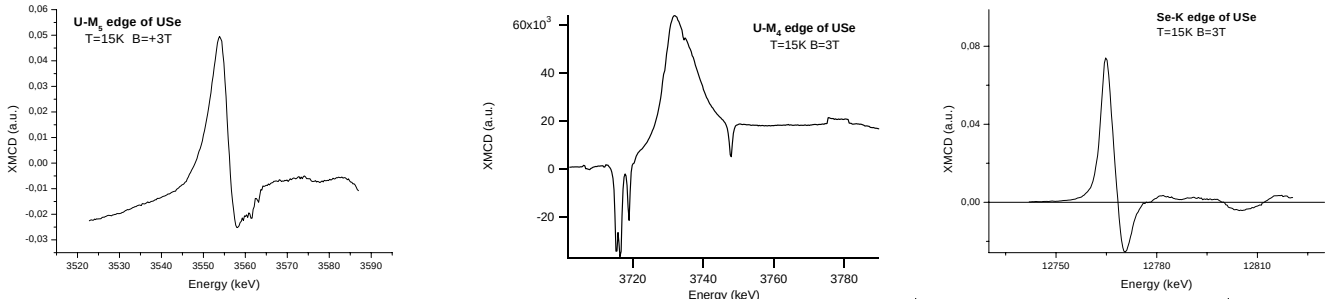

Figure 1: Raw X-ray magnetic circular dichroic spectra ΔI ($\Delta I = I_+ - I_-$) measured at the U-M_5 (left panel), U-M_4 (middle panel) and Se-K (right panel) edges of USe. The index + (−) specifies that the applied magnetic field is parallel (antiparallel) to the x-ray helicity. The intensity of the field was 3 T and the temperature 15 K.

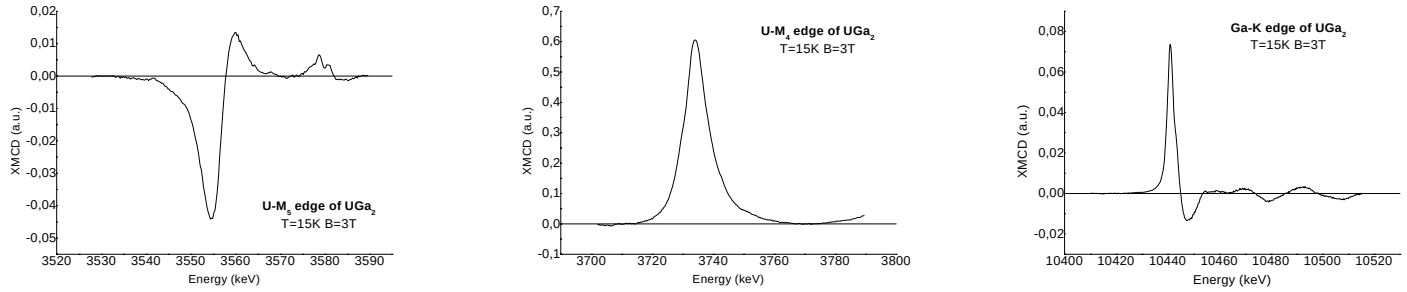

Figure 2: Raw X-ray magnetic circular dichroic spectra ΔI ($\Delta I = I_+ - I_-$) measured at the U-M_5 (left panel), U-M_4 (middle panel) and Ga-K (right panel) edges of UGa_2. The index + (−) specifies that the applied magnetic field is parallel (antiparallel) to the x-ray helicity. The intensity of the field was 3 T and the temperature 15 K.

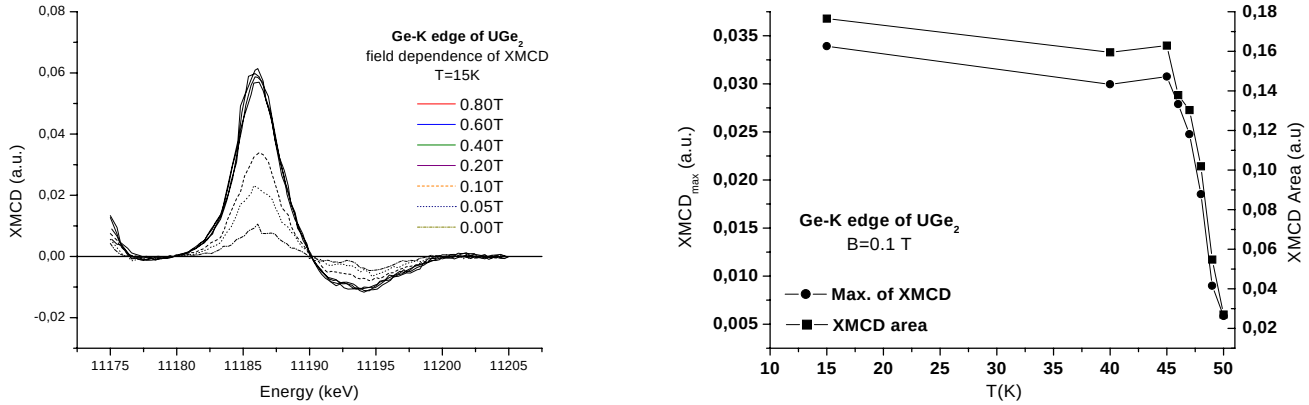

Figure 3: *Left panel*: Raw X-ray magnetic circular dichroic spectra ΔI ($\Delta I = I_+ - I_-$) measured at the Ge-K edge of UGe_2 for different values of applied magnetic field. The index + (−) specifies that the applied magnetic field is parallel (antiparallel) to the x-ray helicity. Measurements have been performed at a temperature of 15 K. *Right panel*: Temperature dependence of both the area (squares) and maximum (circles) of the raw X-ray magnetic circular dichroic spectra ΔI measured at the Ge-K edge of UGe_2. The intensity of the applied magnetic field was 0.1 T