

# Resonant x-ray diffraction of uranium sulphide at the S K-edge and the U M4-edge

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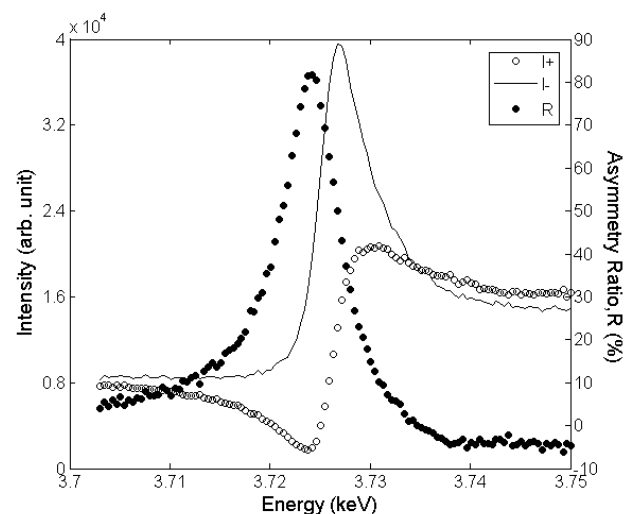
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While resonant magnetic diffraction has been extensively employed to study antiferromagnetic actinides, very little work has been done on ferromagnetic samples, where the charge and the magnetic peaks coincide in reciprocal space. Resonant charge-magnetic interference scattering (XRIS) was used to investigate the magnetic properties of ferromagnetic uranium sulphide. The induced sulphur ferromagnetic moment was measured for the first time at the sulphur K-edge (2.472keV) at XMaS as a function of field and temperature above and below the Curie temperature (180K). At the U M4-edge, the intensity of the energy line shapes measured with field up and field down is very different resulting in an asymmetry ratio close to 90%. This asymmetry ratio was measured as a function of field and temperature in order to extract the  $\beta$  function that describes the power-law temperature dependence of the sample's magnetisation. Ferromagnetism also causes strain within the crystal lattice, which can be observed by the splitting in the (111) peak which disappears when  $T_c$  is reached. Mean field theory predicts that  $\tilde{\beta} = 2\beta$ , where  $\tilde{\beta}$  describes the power-law temperature dependence of the lattice strain. Whereas magnetic measurements are in agreement with theory, previous x-ray results have found that  $\tilde{\beta}$  is half the expected value. Preliminary results from the critical exponent  $\tilde{\beta}$  extracted from the temperature dependence of the (111) peak splitting will also be presented.

**Figure:** Energy line shape of US at 100K for positive ( $\Gamma^+$ , line) and negative field ( $\Gamma$ , empty circles) across the U M4 edge in the  $\pi$ - $\pi$  channel. The corresponding asymmetry ratio, R, defined as  $(\Gamma^+ - \Gamma) / (\Gamma^+ + \Gamma)$  is the back dotted line.



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