	Experiment title:	Experiment number:
	Energy dependence of resonant magnetic x-ray scattering from bulk dysprosium at the L_{II} and L_{III} edges	HE-199
Beamline: ID20	**Date of experiment:** from: 03-sep-97 to: 08-Sep-97	**Date of report:** 01/03/98
Shifts: 18	**Local contact(s):** A.Stunault	*Received at ESRF:* 02 MAR. 1998

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Report:

The experiment has concentrated on a full study of the the polarisation dependence of the resonance of magnetic X-ray scattering at the L3 edge of bulk dysprosium (E=7.79 keV). The sample was cut with a face perpendicular to the c-axis of hexagonal dysprosium. The chosen scattering geometry was vertical, implying an incident σ polarisation., Integrated intensities have been measured for energies ranging from 7.74 keV to 7.82 keV in 3 different detector configurations: detector "straight through" (no polarisation analysis), and σ~σ and σ–π polarisation channels, using a pyrolitic graphite (0 0 6) as analyser crystal. Only the results in the σ–π geometry are shown here.

The first and second order magnetic satellites of the (0 0 2), (0 0 4) and (0 0 6) satellites were measured. We will quote them as (0 0 $L\pm\tau$) and (0 0 $L\pm2\tau$). We also looked for the third and fourth order satellites but could not observe them. This is a striking difference with holmium where (0 0 $2+3\tau$) and (0 0 $2+4\tau$) are no more than one order of magnitude weaker than (0 0 $2+2\tau$). Figures 1 shows some of the integrated intensities (corrected for attenuation and Lorentz factor) obtained in σ–π.

The scattering amplitudes are the sum of three contributions: non-resonant (only for (0 0 $L\pm\tau$), dipolar (2p-Sd transition) and quadrupolar (2p-4f transition). The dipolar contribution is corrected for the exchange splitting of the excited 5d level. The lines in figure 1 are fits to the model. The analysis of the Q-dependence of the amplitudes is presented in figures 2 and 3, for the (0 0 $L\pm\tau$) and (0 0 $L\pm2\tau$) satellites respectively. The solid lines are fits to the theory.

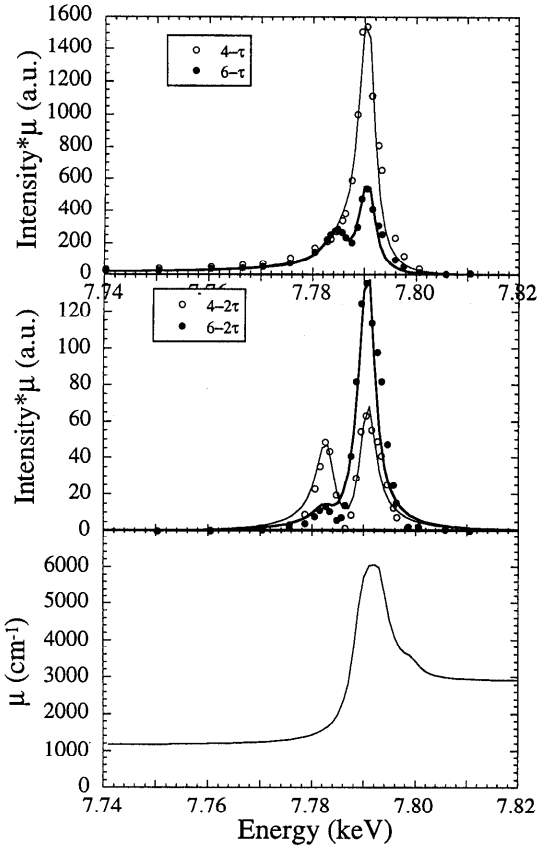

Fig.1

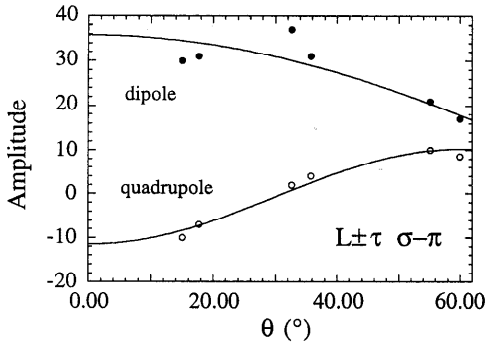

Fig.2

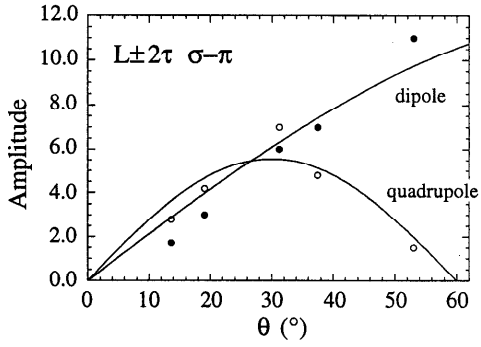

Fig.3

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