XMaS the UK-CRG	**Experiment title:** Energy and ionic site dependence of X-ray resonance exchange scattering from antiferromagnetically ordered Neodymium.	**Experiment number:** 28-01-01
Beamline: BM 28	**Date of experiment:** from: 23/9/98 to: 29/9/98	**Date of report:** 29/9/99
Shifts: 18	**Local contact(s):** Anne Stunault	*Received at XMaS:*

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Report:

We have investigated the ionic site dependence of XRES in antiferromagnetically ordered neodymium at 10K with a view to carrying out a refinement of the magnetic structure. In addition we have made a preliminary investigation into the energy dependence of the scattering process using polarisation analysis (this work has subsequently been continued with another experiment at XMaS [exp. no. 28-01-29]). We have also measured the incident beam polarisation available on the beamline; this is shown in figures 1 and 2. Greater than ninety-five percent polarisation can be achieved with a cost of one third of the beam intensity.

Below 20K neodymium exhibits a number of magnetic phases. At 10K a sinusoidally modulated 2q structure is present, with modulation vectors close to the (100) (q_1) and $(0\bar{1}0)$ (q_2) directions [1]. A large number of integrated intensities of magnetic satellites of the type (hkl)$\pm q_i$ (l=5,6…11 h;l=-1,0,1) were measured using the resonant enhancement in the magnetic scattering signal at both the L_{II} and L_{III} absorption edges. A series of integrated intensities taken using the L_{II} resonance have been collated for figure 2 (non-absorption corrected). The scans were made perpendicular to the Ewald sphere; it is believed that these

types of scan provide a more accurate measure of the integrated intensity [**2**] since Lorentz corrections [**3**] are not required and we scan perpendicular to the resolution ellipsoid. Once corrected for photon absorption within the sample these data will be used make a calculation of the magnetic structure. This will enable comparison with previous calculations using x-rays and Neutrons [**2,4**].

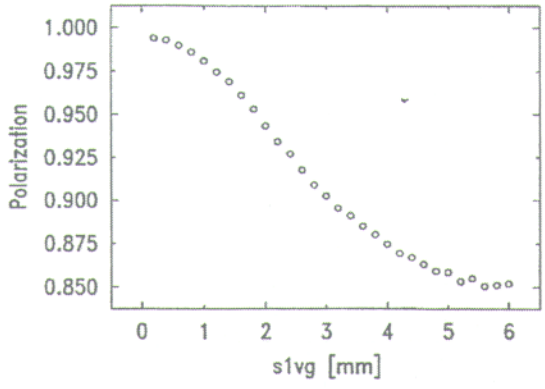

Figure 1.

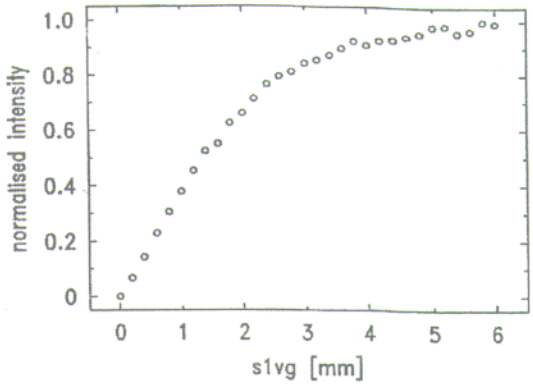

Figure 2.

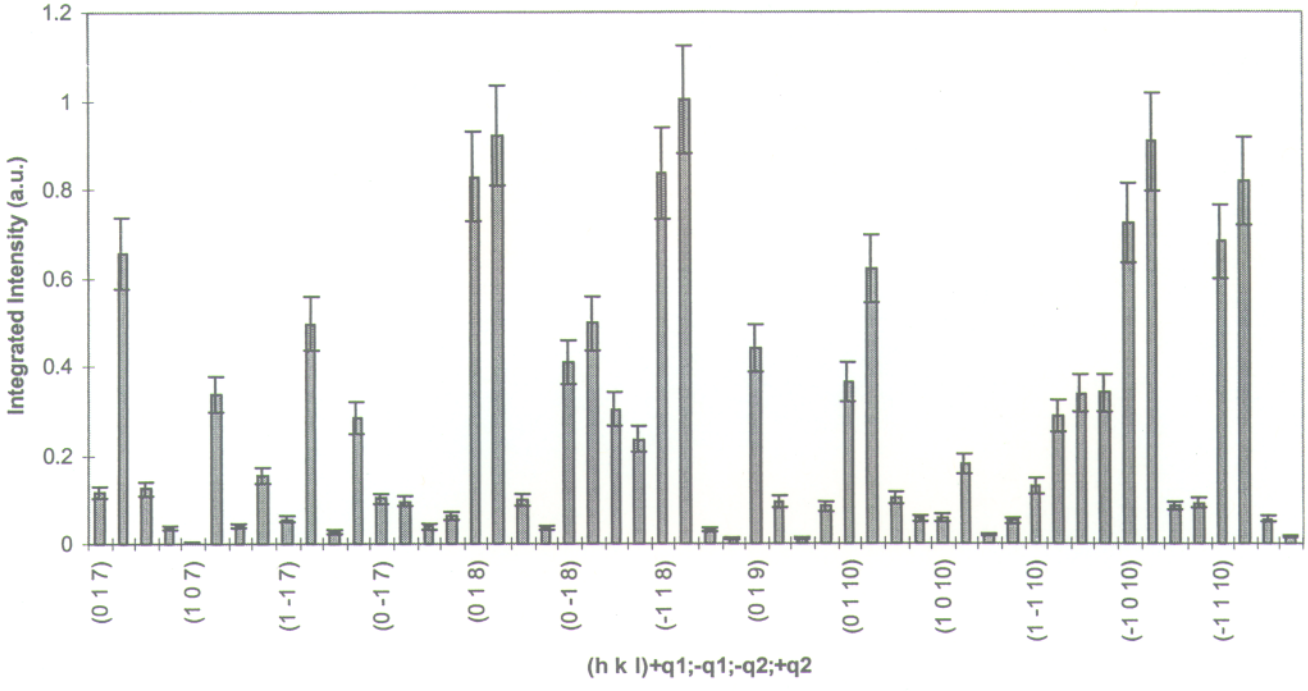

Figure 3.

References.

1. D. Watson, E.M. Forgan, W.J. Nuttall, W.G. Stirling and D. Fort, Phys. Rev. B **53**, 726 (1996)
2. D. Watson, W.J. Nuttall, E.M. Forgan, S.C. Perry and D. Fort, Phys. Rev. B **57**, 8095 (1997)
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