peak-to-background ratios and an almost constant resolution of 2.5 X10^{-3} down to sinθ/λ = 0.04 $Å^{-1}$ (25 Å neutrons). The contributions to the resolution are given. The performance has enabled us to determine the incommensurate magnetic propagation vector in the triclinic antiferromagnet $FeVO_4$ and to study its temperature dependence in the range from 4 K to its Néel point at 21 K. Other examples include the magnetic scattering from the two commensurate antiferromagnetic phases of Mn_5Si_3 and the pressure dependence of their magnetic structures. The design of a purpose-built cold neutron diffractometer is described.

PS-01.04.07 CIRCULAR MAGNETIC X-RAY DICHROISM AT FE K-EDGE AND GD $L_{2,3}$-EDGES IN Fe/Gd MULTILAYERED FILMS

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Fe/Gd multilayered film is known to have interesting properties such as spin flop[1)] and temperature compensation[2)]phenomena which sensitively depend upon artifacial period of the multilayer. In this paper, we report measurements of circular magnetic x-ray dichroism(CMXD) at Fe K-edge and Gd L_2- and L_3-egdes of Fe/Gd multilayetred films as a function of artifacial period of the film, using circular polarized X-rays at AR NE-1 of KEK.

It is shown that the CMXD spectra of Fe K-egde in samples with longer period than 10 Å is similar to that in pure Fe while the CMXD spectra of Gd L_2- and L_3-edges are opposite in sign to that in pure Gd. In samples with shorter period than 5 Å, on the other hand, spectra of Fe K-egde and Gd L_2 and L_3-egdes are com@pletely reversed compared to those in samples with longer period. This means that Fe moments are dominant in sapmles with longer period than 10Å, while Gd moments become dominant in samples with shorter period than 5Å, keeping both Fe and Gd moments anti-ferromagnetic. A L-S separation of Gd moment was tried based on the sum rule[3)], showing clear change of both components against the artifacial period of the multilayered film.

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PS-01.04.08 MAGNETIC X-RAY DIFFRACTION FROM FERROMAGNETIC MATERIALS

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This poster describes the simple 'White-beam' technique, developed at the SRS to measure non-resonant magnetic X-ray diffraction from ferromagnetic crystals with synchrotron radiation. The results of several experiments are presented.

Early work on iron [1, 2] has demonstrated the feasibility of the X-ray technique, and produced data which are in excellent agreement with, and of similar quality to, the first polarized neutron measurements.

More recent data have highlighted the complementarity between X-ray and neutron diffraction in two important respects. First, X-ray diffraction has been adopted to determine the *ratio* of spin to orbital magnetization in a ferrimagnetic Rare Earth compound [3] - a measurement which cannot be made directly with neutron diffraction.

The second aspect of complementarity brought to light by the synchrotron X-ray measurements concerns the accessible range of momentum transfers. We show that high-energy X-ray data can extend far beyond the maximum wavevectors which are practicable with thermal neutrons, and that the corresponding data quality is surprisingly good. This is in contrast to situation with low momentum transfers where neutron data are currently of far superior quality.

References
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PS-01.04.09 EXCITATIONS OF CONDENSED MATTER STUDIED BY INELASTIC X-RAY SCATTERING WITH HIGH ENERGY RESOLUTION By E. Burkel, Sektion Physik, University of Munich, Munich, Germany

Very high energy resolution measurements using X-rays can be achieved by extreme backreflection (Bragg angle close to 90°) from perfect crystals. This technique allowed the development of the instrument INELAX for inelastic scattering experiments at the HARWI wiggler at DORIS, DESY Hamburg. At present, an energy resolution of 9 meV is achieved and the instrument proves to be an excellent tool to investigate collective excitations in condensed matter. Energy transfers from 10 meV to 5 eV and wavevectors up to 13 $Å^{-1}$ are accessible.

Longitudinal and transverse dispersion curves of beryllium and diamond were extracted from measurements of phonons in single crystals of these materials. The method was also applied to single crystals of He and to superconductors.

Furtheron, collective excitations of liquid lithium were studied and the dispersion of these excitations could be detected.

An important application of inelastic X-ray scattering is the study of electronic excitations in solids. Measurements of such excitations in single crystals of lithium were performed up to energy transfers of 5 eV with an energy resolution of 38 meV. They provided information on the dispersion of excitations which can be described as zone boundary collective states. The measurements revealed a fine structure which was not observed before.

01.05 – X-ray and Neutron Powder Diffraction

MS-01.05.01 MODELING AS A COMPLEMENT TO POWDER DIFFRACTION EXPERIMENTS IN STUDYING INORGANIC AND ORGANIC SOLIDS. By C. M. Freeman and J. M. Newsam*, BIOSYM Technologies Inc, 9685 Scranton Road, San Diego CA 92130, USA

Dramatic improvements in analytical instrumentation have been paralleled by equally impressive advances in computer hardware and in modeling and theoretical methods. Computer modeling has in fact become established as a key complement to diffraction experiments, aiding in the evaluation of experimental results and in the interpretation of analytical data in terms of atomic-level behavior. A suite of modeling methods appropriate for

