15.5-03 COMPRESSIBILITY MEASUREMENTS IN A MINIATURE PISTON CYLINDER PRESS AND A DIAMOND ANVIL SQUEEZER AT THE DESY HAMBURG. By W.Nuding, G.Will & E.Hinze, University Bonn, Bonn, West Germany.

We are using 4.3 GeV Synchrotron radiation from the DESY in Hamburg for energy dispersive X-ray diffraction of samples under pressure and temperature in the range up to 250 Kbar and 400 C. For pressures up to 35 Kbar a miniature piston cylinder press is used, which provides us with a comparatively large sample volume. This reduces the exposure times and yields very good diffraction spectra with respect to background and peak to background ratio. For higher pressures up to 250 Kbar a diamond anvil squeezer is used.

For NaCl a fair spectrum with 5 distinguishable peaks can be recorded in 1 sec. With an exposure time of 100 sec good spectra are obtained. This fast sequence of recording has been applied to study the compressibility and the time dependence of the phase transition of KCl at 19 Kbar from a NaCl-type to a CsCl-type structure. This transition has been found to be sluggish.

Other topics of research are concerned with the compressibility of FeO, of KCl, and of MnSO4. Or the phase diagram and the decomposition of CuFeS2 under quasi-hydrostatic pressure conditions into FeS, FeS2 and Cu5FeS4.

In the diamond anvil squeezer exposure times of 5 to 10 minutes are required. This compares to about 8 to 10 hours with the white radiation from a tungsten X-ray tube, or even 100 hours with Mo-K alpha radiation when using a flat film behind the squeezer.

15.5-04 APPLICATION OF X-RAY ENERGY-DISPERSIVE DIFFRACTOMETRY TO THE MEASUREMENT OF DIFFUSE SCATTERING. By H. Iwata, K. Ohshima and J. Harada, Department of Applied Physics, Nagoya University, Nagoya 464, Japan.

A method for diffuse scattering measurement by X-ray energy-dispersive diffractometry was developed which permits the study of short-range ordering in disordered binary alloys.

An analysis of the short-range order (S.R.O.) in disordered Au4Mn alloy was examined, in which we employed a computer-controlled four-circle X-ray diffractometer with the solid state detector (pure Ge) installed to the ultra high intensity X-ray generator (RU-1500) of Nagoya University. The scattering angle was set at 18 degrees and the white X-rays in an energy range from 25 to 45 KeV were used. By analysing the intensity data on the basis of a least squares fitting method, S.R.O. parameters up to the 50th shell were determined. They are in good agreement with those obtained by the standard technique proposed by Borie and Sparks (Fürnrohr et al., Z. Metallkde. 71 (1980), 403). This may imply that the present method is really available in this field of study, using synchrotron radiation. There are, however, a few restrictions in setting up the instrument in order to obtain better resolution, eliminating the fluorescent radiations from the sample: both the resolution and the elimination of the fluorescent radiations depend on scattering angle.

15.6-01 MAGNETIC COMPTON SCATTERING - A FEASIBILITY STUDY. By R. S. Holt and M. J. Cooper, SRC Daresbury Laboratory, Warrington, U.K. and Department of Physics, University of Warwick, Coventry, U.K.

Circularly polarized radiation interacts with unpaired spin electrons through the Compton cross section to yield information about the momentum distribution of magnetic systems. Previous exploratory measurements have been restricted to the use of very weak radioactive sources, however, synchrotrons are potentially strong sources of circularly polarised radiation. The angular distribution of polarized components at 1.5, 1.0 and 0.5 Å have been calculated specifically for the SRS at Daresbury Laboratory. From the relative contributions of each component it has been possible to determine the flux in a beam containing 80% circularly polarized synchrotron radiation for a typical experimental configuration. We conclude that sufficient flux is available on synchrotron sources currently under development for Compton studies on magnetic systems to be feasible.

15.6-02 HIGH RESOLUTION HOLOGRAPHY IN SYNCHROTRON RADIATION. By V.V.Aristov, G.A.Bashkina, A.I.Erko (a), G.N.Kulipanov (b), A.N.Scrinsky (b), V.F.Pindjurin (b), Institute of Solid State Physics, Academy of Sciences of the USSR, Chernogolovka, Moscow district, 142432, USSR (a) and Institute of Nuclear Physics, Siberian Branch Academy of Sciences of the USSR, Novosibirsk, 630090, USSR (b).

The possibility is investigated of producing X-ray holograms of microobjects along a new principle of recording and reconstruction [V.V.Aristov et al. Opt.Communs (1980) 34,332]. It is shown that the coherent properties of monochromatic synchrotron radiation permit the volume image to be obtained with a resolution up to 100 Å, but the illumination of the holograms proved to be insufficient to expose high-resolving photoresists. Real results can be obtained by using the undulator radiation, the natural coherence of which enables one to realize a transverse resolution of 700 A. The exposure time of PMMA is in this case about several seconds.