15.4–1 POLARIZATION ANISOTROPY OF ANOMALOUS SCATTERING. By David H. Templeton and Lieselotte K. Templeton, Materials and Molecular Research Division, Lawrence Berkeley Laboratory and Department of Chemistry, University of California, Berkeley, California 94720 USA.

Diffraction experiments with sodium bromate at wavelengths near the Br K absorption edge show that the principal values of the bromine anisotropic anomalous scattering terms differ by as much as 4 e/atom for f' and 6 e/atom for f''. Similar experiments with K_2PtCl_4 near the Pt L_3 edge show even larger anisotropy, up to 7 e/atom for f' and 10 e/atom for f''. This anisotropy causes substantial effects on the intensity and polarization of a diffracted ray and, for example, permits observation of reflections which violate the systematic-absence rules of the space group. Values of the anisotropy derived from direct measurement of the dichroism of single crystals are less anisotropic because this technique is more subject to effects of imperfect polarization of the radiation. In one of our experimental arrangements (SSRL Beam Line I-5, 3.0 GeV, 0.92 Å, double Si 111 monochromator) the polarization at the center of the beam was measured as 0.95 by the Borrmann effect in a large germanium crystal. Because this polarization perfection is sensitive to the precise position in the beam and to details of orbit dynamics which may change, it may have been lower when the measurements cited above were made. This work used the facilities of the Stanford Synchrotron Radiation Laboratory and was supported by the National Science Foundation (Grant CHE-8217443) in cooperation with the U.S. Department of Energy.

15.4–2 A SYNCHROTRON RADIATION STUDY OF SOME FRIEDEL PAIR REFLEXIONS FROM A CRYSTAL OF CENTROSYMMETRICAL STRUCTURE. By S. Åsbrink, Department of Structural Chemistry, Arrhenius Laboratory, University of Stockholm, S-106 91 Stockholm, Sweden, and V. Kupčik, M. Wendschuh-Josties, A. Wolf and R. Wulf, Mineralogisch-Kristallographisches Institut der Universität Göttingen, V.M. Goldschmidt Strasse 1, D-3400 Göttingen, Germany, FRG.

The present study was undertaken to test a theoretical result which implies that even crystal structures with a center of symmetry can give diffraction patterns which break Friedel's law if the X-ray wave-length is chosen close to an absorption edge of contained elements (R. Hosemann, Acta Cryst. (1960) 13, 794). Using the 5-circle diffractometer at the Hamburg Synchrotron Radiation Laboratory, HASYLAB, at DESY (V. Kupčik, R. Wulf, M. Wendschuh, A. Wolf and A. Paehler, Nucl. Instr. and Methods (1983) 208, 519), measurements were made on several Friedel pairs of a very small crystal of RbBr at several different wave-lengths, two of which were chosen very close to and on the high-energy side of the K absorption edge of Rb and Br, respectively. The paper discusses the results in relation to the theory.

15.4–3 ANOMALOUS X-RAY SCATTERING ON GUINIER-PRESTON ZONES (Al-Cu). By R.Reiter and H.Jagodzinski, Institut für Kristallographie und Mineralogie der Universität München, Theresienstr.41, D-8000 München 2, FRG

Diffuse X-ray scattering by Guinier-Preston Zones (GPZ) (A.Guinier Acta Cryst (1952)5, 121) has been investated by many authors. Slightly different models have been proposed with a fair agreement of the observed diffuse scattering around(002) with the calculated intensities of the various model structures. The diffuse scattering by GPZ's has been measured using 5 different energies, two of them were sufficiently large to excite the K-emission of copper, who's absorption edge is at 1.38043 Å. (Mo K =0.70926 Å, AuI =1.27639 Å; 1.385 Å, CuK =1.39217 Å, CrK =2.28962 Å)

The diffuse scattering near the Bragg peaks shows a remarkable difference for nearly all curves. Our measurements have been performed by using counter techniques. Major difficulties were due to a correct calibration of the various measurements, which have been overcome by equalling the intergrated intensities of Bragg peaks, which are nearly independent from anomalous scattering. It will be shown, how these differences may be used to get averaged phase relationships of diffuse scattering, in order to derive a structural model free from any assumption. Our complicated experiments emphasize the necessity of using Synchrotron radiation for measurements of this kind. The consequences of this method is discussed in terms of the varicus models reported in literature.

15.4–4 ON THE WAY TO RESONANT X-RAY SCATTERING FROM LIGHTER ATOMS. By H.B.Stuhrmann, B. Gillon G. Goerigk and B. Munk, Universität Mainz, DESY Hamburg, ILL Grenoble and CNRS Paris.

X-ray resonant (or anomalous) scattering has been used for the investigation of macromolecular structures in solution, polymers, glasses, membranes and fibres. Many of these experiments have come to a preliminary stage, where further progress is expected from technical improvements. The present state of art will be reviewed.
Biological applications of resonant X-ray scattering will profit from the natural labels like phosphorus and sulfur. The measurement of the important f'-bound resonant scattering of these elements necessitates the use of wavelengths at 5 to 6 Å , where absorption presents a serious difficulty in diffraction work.
We describe a new type of diffractometer, which is suitable for the measurement of resonant X-ray scattering in the normal and soft X-ray spectrum. It will use two mirrors - a focusing toroidal mirror and plane mirrors - for premonochromatization and one crystal monochromator (111 reflection of Ge or InSb) will select wavelengths up to 7.4 Å. The 2.5m camera is rotated around the monochromator in the vertical plane. Three area detectors cover a range of scattering angles up to 60°. This instrument will receive synchrotron radiation from the storage ring DORIS in HASYLAB. It will become operational in autumn 1984.