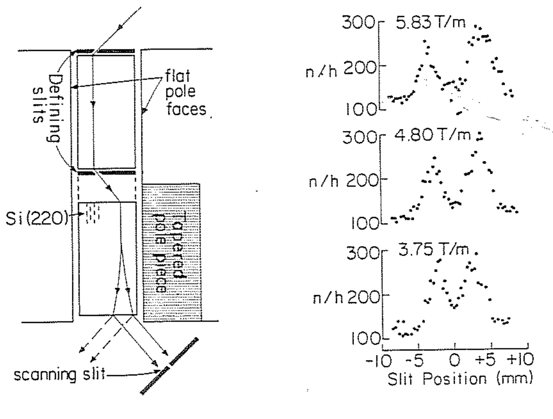
neutrons is positive while the effective mass of α wave field neutrons is negative in the vicinity of the Laue-point, the latter wave field having its nodes at the lattice planes.

Possible applications of the low effective mass for fundamental physics studies and for neutron topography will also be discussed.




**11.7–5** SOLUTION TO THE X-RAY PHASE PROBLEM FOR ACENTRIC CRYSTALS. By S.L. Chang and J. A.P. Valladares, Instituto de Física, UNICAMP, Campinas, SP, 13100, BRASIL.

An experimental method to solve the X-ray phase problem for noncentrosymmetric crystals is developed, using Bragg-type three-beam diffraction. This method results from a consideration of the phase dependence of line profiles in 3-beam reflections for wavelength $\lambda$ above and below a critical absorption edge $\lambda_E$ of the heaviest constituent atom in the crystal. It is found that for $\lambda<\lambda_E$ the sign of the sine of invariant phase is a product of the signs defined from asymmetry of the line profile and the sense of rotation of the crystal lattice. Application of this method to several 3-beam cases shows an exact agreement between the experimentally determined phases and the theoretical ones. Comparison between this method and the previously proposed method for centrosymmetric crystals (Chang, Phys. Rev. Lett. 48, 163, 1982) is given.
Dynamical calculation has also been carried out to provide dispersion surface and diffracted intensities for Bragg-type and transmission-type multiple diffractions in centro- and noncentro-symmetric crystals. It is shown that the phase-dependent line-profile asymmetry is an effect due to total reflection in 3-beam Bragg-type diffraction and that the line-profile asymmetry of transmission-type diffraction fails to provide correct phase information.
Support from SUBIN, Telebrás, CNPq and FINEP.

**11.7–6** TWO EXPERIMENTAL TECHNIQUES MEASURING X-RAY PENDELLÖSUNG INTENSITY BEATS USING WHITE RADIATION. By T. Takama, K. Kobayashi and S. Sato, Faculty of Engineering, Hokkaido University, Kita-ku, Sapporo, Japan.

A technique measuring the X-ray Pendellösung intensity beats of white radiation diffracted from perfect single crystals has been developed in the authors' laboratory. The intensity variations are directly measured with respect to the wavelength by using a solid-state detector and the energy-dispersive diffraction method. The values of the atomic scattering factors of Si, Ge, Cu, Al and Zn and their wavelength dependence have so far been determined by this technique. This method (No. 1) corresponds to the so-called "traverse topograph" taken of wedge-shaped specimen with characteristic X-rays.

A similar but slightly different method (No. 2) which corresponds to the "section topograph" was recently tried to measure the beats as well. The white radiation from a high energy X-ray generator falls upon a thick and parallel-sided perfect Si crystal in the symmetrical Laue position through a slit system. The diffracted intensities going out of the exit surface of the specimen were successively measured at the center of the Borrmann fan by changing the Bragg angle. Since the measured beats were composed not only of a large amplitude but also of a high frequency in the second method as shown in Fig. 1, the error in the obtained values of the atomic scattering factor was reduced to about one tenth of that in the first technique. See Fig. 2.

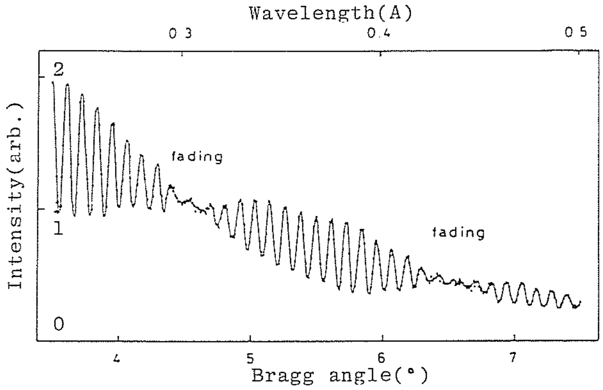



Fig.1 An example of measured Pendellösung intensity beats in the second method: Si,220 reflection,t=3.478mm.

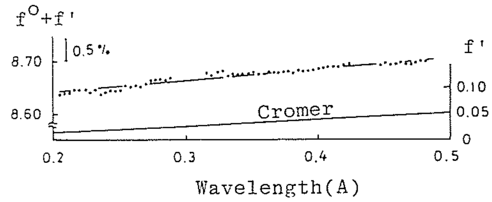



Fig.2 Atomic scattering factors, $f^0+f'$, of Si obtained from the beats in Fig.1, showing a clear wavelength dependence. The dispersion term f' calculated by Cromer is also shown.