11.7—25   INFLUENCE OF MINUTE CRYSTAL STRAIN-
FIELDS ON LAUE CASE ROCKING CURVES:
A THEORETICAL STUDY. By R.Teworte
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Laue case rocking curves of a pair of highly
perfect crystals display a detailed fine struc-
ture in the low-absorption case ($\mu_0 \cdot t \lesssim 2$, μ_0: ab-
sorption coefficient, t: crystal thickness).
The precise shape of the oscillations on the
wings of the rocking curves depends very sen-
sitively on the scattering factor of the crystal
atoms, thus allowing measurements of the
structure factor of silicon with uncertainties
well below 0.1% (Teworte & Bonse, 1984).

In this context, the question of the influence
of minute residual strain in the crystal on the
shape of the rocking curve is discussed. In
incident-spherical-wave approximation, beam
paths and phase integrals are numerically
computed on the basis of the ray optical
theory in the form given by Bonse (1964).
Rocking curves of pairs of crystals with
built in $\frac{\Delta d}{d}$ fluctuations and local lattice
rotations are presented. An example is shown
in Fig. 1. The influence of strainfields on
the precision of the structure factor measure-
ments is discussed and limits of such measure-
ments for a given crystal perfection are
deduced.

References: U.Bonse, Z.Phys. 177,385(1964)
            R.Teworte, U.Bonse,
            Phys.Rev. B29,2102 (1984)
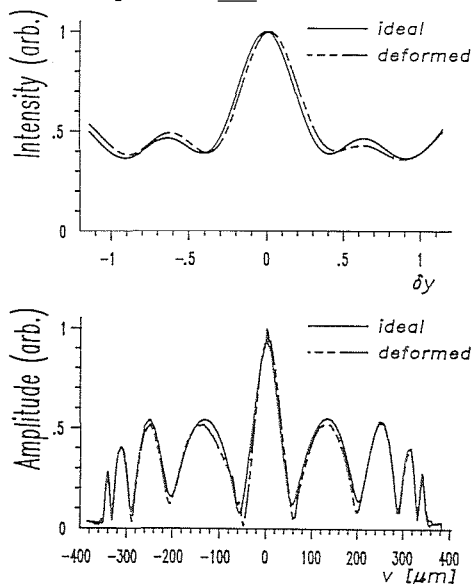

Fig.1   Rocking curve (top) and intensity dis-
        tribution at the exit surface for
        y=0.24 (bottom) of ideal and deformed
        crystals. Si 555-reflection, λ=0.559 Å.
        Crystal thickness is 350 μm. The defor-
        mation state is given by NN=$2 \times 10^{-10} \mu m^{-1}$
        x sin(0.025 x v[μm]).

11.7—26   PRIMARY EXTINCTION IN SPHERICAL
CRYSTALS. By T.M. Sabine,N.S.W. Institute of
Technology, Sydney, N.S.W. 2007 Australia and
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The extinction factor appropriate to perfect
crystal spheres is found to be

$$y = (1+x^2)^{-\frac{1}{2}}$$

$$x = \frac{3}{4} N_c \lambda F D$$

N_c = Number of unit cells per unit volume

λ = Wavelength

D = Crystal diameter

F = Structure factor per unit cell and
      includes the Debye-Waller factor.

Experimental tests of the validity of this
expression have been made using MgO powders
of controlled grain size and shape. Two
diffraction geometries have been used; fixed
wavelength, variable 2θ, at the HIFAR reactor
and variable wavelength, fixed 2θ at IPNS.
Experimental extinction factors are obtained
by taking ratios of integrated intensities
(assuming that extinction is negligible for
grain sizes <1μm).
Theoretical extinction factors are obtained
by a determination of D by scanning electron
microscopy and the use of the known
crystallographic parameters of MgO.   There
are no adjustable parameters. Theory and
experiment are compared in this paper.

11.7—27   A QUANTITATIVE STUDY OF FADING PHENOMENON
OF PENDELLÖSUNG FRINGES IN CRYSTALS.   By S. S.
Jiang, Department of Physics, University of Nanjing,
Nanjing, China.

The fading phenomenon of pendellösung fringes in
diamond crystals has been studied by x-ray dif-
fraction section topography. The fading periods
of dynamical interference fringes have been ob-
served in plate- like crystals and wedge-shaped
crystals, as well as in crystals containing a
stacking fault. In case of plate-like crystals, the
number of fringes in each fading period observed
in (1$\bar{1}$1)section topograph with Cu radiation is
approximately equal to 3.08 which is what we
calculated. In case of wedge-shaped crystals,
the fading phenomenon of hook-shaped fringes can
be seen in ($\bar{2}$20) section topograph with Mo radia-
tion (Fig.1). On the other hand, the hyperbolae
of constant phase in Borrmann fan is simulated
by computer according to dynamical diffraction
theory, in which both π and σ polarization state
are overlaped. Evidently, the number of fading
period is nearly the same for both experimental re-
sults and theoratical simulation. In case of
crystals containing a stacking fault, hour glass
image is dominated by I_3 fringes in (1$\bar{1}$1)