**11.5-09** THE DEBYE-WALLER FACTOR DUE TO STATIC DIS-
PLACEMENTS AROUND HYDROGEN IN NIOBIUM. By H. Behr,
H. Metzger and J. Peisl, University of Munich, W. Germany

H dissolved in Nb in the high temperature α-phase will
decrease the Bragg intensity due to static displacements
of the Nb atoms from their average lattice sites (static
Debye Waller Factor (DWF)). The relative integrated in-
tensity of Bragg reflections from single crystals NbH$_x$
has been measured. The corresponding static DWF was found
to decrease with the concentration (x < 0.2 H/Nb) and the
order of the reflection, as predicted by theory. For small
scattering-vectors the static DWF is primarily determined
by the displacements of the Nb atoms closest to the H im-
purity. Therefore the attenuation of the low order Bragg
reflections was used to determine the displacements of
these Nb atoms (u = 0.083 ± 0.009 Å). The measurement of
the static DWF seems to be a simple and useful method for
the determination of displacements close to impurities
and other lattice defects.

$$\frac{\cos\theta}{L} - \frac{1}{R} = \pm\, K(t/\Lambda)\cdot\frac{\mathcal{J}_h}{2t\cdot\sin^2\theta}$$

where L is the distance from the crystal, R
is the bending radius, t is the thickness of
the crystal, Λ is the extinction length,
$\mathcal{J}_h$ is the Fourier component of the crystal
polarizability, θ is the Bragg angle. The
computer calculation of the intensity distri-
butions in the focusing region shows that the
sharp dynamic focuses F_0 and F must appear near
the stationary phase points, but the coeffici-
ent K(t/Λ) ~ 1.22-1.27 must be introduced into
the focusing condition to take into account
the cylindrical aberration. To avoid the chro-
matic broadening of the focus, both monochro-
matization of the radiation and the double-
lens achromatic scheme were used. It was esta-
blished that the diffracted beam is exposed to
the dynamical contraction in the two regions
near the calculated points to the width of
W ~ 5μm (fig.2) that is an order less than
the Bormann delta base (80μm).
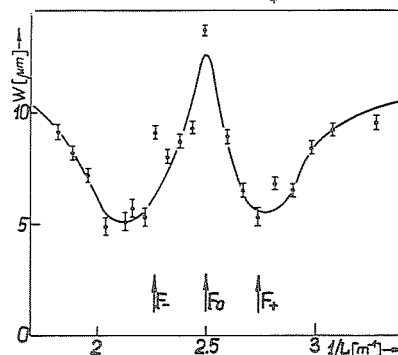
11.6-01 EXPLORATION OF THE DYNAMICAL DIFFRA-
CTION FOCUSING OF X-RAYS BY THE HOMOGENEOUSLY
BENT CRYSTAL. By V.I.Kushnir and E.V.Suvorov.
Institute for Solid State Physics, Academy of
Sciences of the USSR, Chernogolovka Moscow di-
strict, 142432, USSR.
The schemes of the dynamical focusing of X-ra-
ys by the homogeneously bent crystal stand out
of all the theoretically studied schemes of
the dynamical focusing owing to their characte
ristics because only in these schemes the mag-
nifying coefficient k differs from unity and
the resolution (when k>1) or the focus size
(when k<1) must be about 1000-100Å. The scheme
of the cylindrical reducing lens was studied
(fig.1).
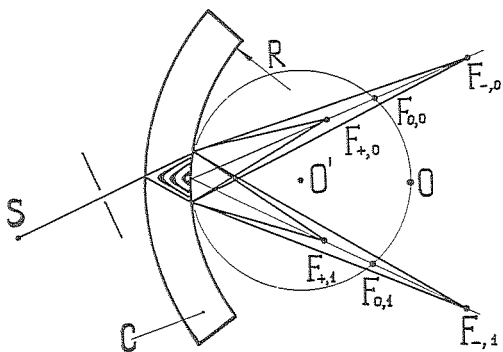
It was shown that the two stationary phase
points corresponding to the two types of the
Bloch waves in the crystal exist in both the di-
rect and diffracted beams. The focusing con-
dition is as follows:

11.6-02 X-RAY DISLOCATION CONTRAST
By E.V.Suvorov, V.L.Indenbom and K.Yu.Mukhin
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Moscow

The diffraction mechanisms forming the X-ray
image of the dislocations were studied. It
was established that the mechanisms determi-
ning the formation of the image in the short-
range and long-range dislocation fields have
different physical nature. While the geometri-
cal optics turned out to be convenient for the
description of the formation of the long-range
dislocation field image, the phenomena taking
place in the short-range field demand the em-
ployment of the Bloch waves diffraction optics
terms for their analysis. When exploring the
dislocation images it was found that they may
be formed due to a great variety of effects
such as: interference of the Bloch waves coming
along different trajectories, closeness and
rarefaction of the beams, tilt of trajectories
near the crystal surface, interference of the
wave fields of different origin, interbranch
scattering, waveguide effects, channeling, re-
flection and ets. The mechanisms were studied
of formation of the votrex-like dislocation
image that occures on the high-order reflecti-
on topographs. It was found that the image in
this case is formed as a result of the "new-
born" and "old" wave fields interference and
is a specific hologram of the elastic disloca-
tion field obtained on the Bloch waves in the
crystal. The experimental topograph, the com-
puter-calculated section topographs and the