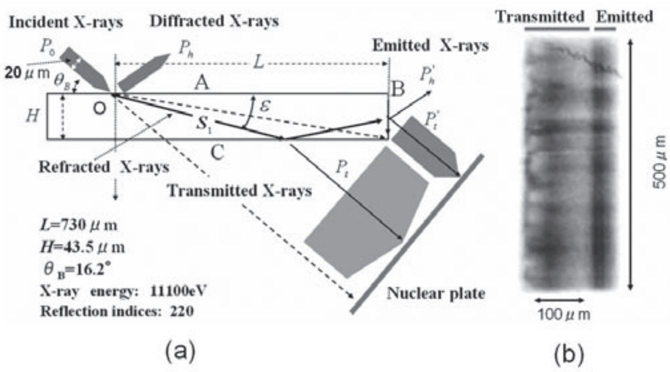
observed as the transmitted beams. The ratio of the dispersion angle $\delta\varepsilon$ of the refracted beams with respect to $\delta\theta$ ($\delta\varepsilon/\delta\theta$) becomes approximately 10^5. This means that the diffraction in this case works as a lens, which is quite useful for development of X-ray microscope, high resolution monochromator and X-ray interferometer.



Keywords: Bragg case, dynamical diffraction theory, X-ray microscope

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New mechanism of anomalous transmission, absorption and their additional unusually curious feature

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The recursion formulas of the photon paths in the Borrmann triangle (BT), which satisfies a modified Bragg law [1, 2] could be derived from the binomial distribution (BD) of the *n*-multiple X-ray reflections by regarding the permutation of the stochastic variables of the diffracted and transmitted photons. Sub-BT of the diffraction shows perfectly flawless symmetry but that of the transmission shows inevitable asymmetry. Novel understanding of both the high intense and very weak photon flows in BD, which are known as anomalous transmission and absorption, respectively are revealed from BD approximated to the standard normal distribution of $N(0, 1)$. Incident photons into the vertex "O" of BT propagate through the bypasses parallel to only the complementary half of the integral whole median with the high probabilities from the binomial theorem and emanate them from a very narrow slit of $O'O''$ on the base of the high intense photon flow BT of $\Delta OO'O''$, which could be defined by the standard deviation of $N(0, 1)$. The parallel paths to the whole median also pass as the very weak photon flows from the high exponent of $d^{-n}t^{-0}$ in *n*-degree homogeneous multinomials of *d* and *t* through the triangle $\Delta OO'O''$. It could be undetectable owing to the negligible small of $1/{}_nC_{\sim n/2}$ compared with the high intense photon flows. It is for this reason that X-ray photons never emerge from the crystal at a position, which is directly opposite the entrance point on a straight line on the diffraction plane. Therefore, an additional unusually curious feature could be clearly understood from the above.

[1] T. Nakajima:J. Low Temp. Phys. **138** 1039-1075 (2005).
[2] to be presented in this conference

Keywords: dynamical diffraction, transmission, absorption

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The influence of mosaic distribution upon the extinction factors in real crystals

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The evaluation of a series of wide ranging tables of secondary extinction factors Y for the spherical mosaic crystal, requires a detailed comparison of the numerical solutions of Darwin transfer equations for cylindrical crystals with different sorts of mosaic distributions [1]. Three probability functions t (n) were used: t (infinity) is close to Gaussian (G), t (1) is Lorentzian (L) and t (2) closely resembles the Lorentzian but the "tail" is shorter. From the figure one can see that when the ratio of absorption cross section to scattering cross section is small and the sample radius is large, the areas under the rocking curves, i.e. integrated reflection power ratio (IRPR), differ appreciably. The corresponding secondary extinction factors Y, which are proportional to IRPR, for G, L and t (2) are 0.0402, 0.1016 and 0.0781, respectively. The Y, for L distribution is 30% higher than that of the t (2). Thus it seems that the most reasonable mosaic distribution for real crystals would be G or t (2) but not L. This result may serve as a guideline for the evaluation of the appropriate extinction table.

[1] Hua-Chen Hu. Acta Cryst. A59, P. 297-310. (2003).

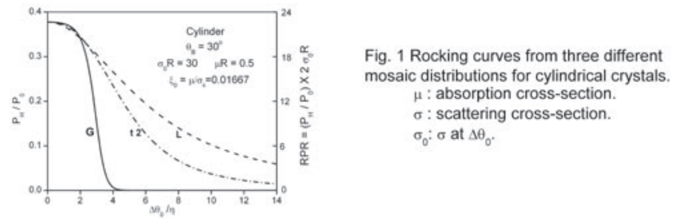

Fig. 1 Rocking curves from three different mosaic distributions for cylindrical crystals.
μ : absorption cross-section.
σ : scattering cross-section.
σ_0: σ at $\Delta\theta_0$.

Keywords: diffraction physics, mosaicity, extinction

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Absorption coefficient of X-rays in crystals in presence of temperature gradient

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The behavior of factor of linear absorption of X-rays in monocrystals on Laue geometry is experimentally investigated and shown, that the presence of a temperature gradient and ultrasonic vibration leads to essential reduction of absorption of X-rays. In the present work the theoretical analysis of the given process in plane wave approximation, in the presence of a temperature gradient is carried out. The theoretical analysis shows that (with beam penetration in a crystal) the presence of the curvature leads to the increase of amplitude diffracted and weakly absorbed field and simultaneously to the reduction of amplitudes of diffracted and strongly absorbed field and as well as amplitude of both passing fields. With magnification of curvature of reflecting atomic planes, transferred energy in diffracted weakly absorbed field is increases and the total energy is transferring via this field at certain value of curvature. As a consequence the crystal absorption coefficient sufficiently decreases. The further magnification of curvature, leads to reduction of energy transferred

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