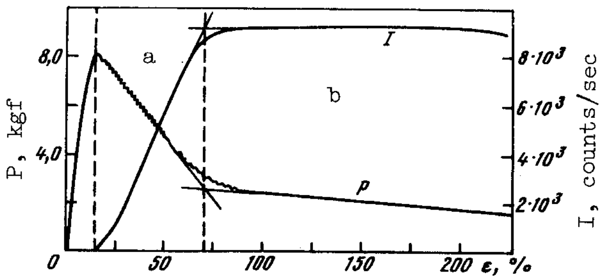
the lowering of the tension force on the sample, the emission intensity increases appreciably. Stabilization of the load corresponds to the maximum value of the emission current, which remains constant up to a 230% deformation.

The character of the stress-strain curve corresponds to a two- stage deformation process in the superplasticity regime. The first stage (a) may be connected with the recrystallization during the process of deformation [1], grain-boundary slip [2], or diffusion creep [3]. The second stage (b) is true superplasticity. The transition to this "quasiliquid " stage consists in accumulation of the strain energy in small regions of the lattice, and it is the spontaneous release of this energy which causes the metal to become weaker following the tension [4]. The stage of true superplasticity is characterized by a maximum value of the electron-emission intensity, which remains uchanged during the subsequent development of the process.



Change of electron emission intensity and of tensile force in superplastic deformation

In plastic deformation, there exist regions whose local temperatures differ from the mean value [5]. It can be assumed that the fluctuations of the local temperatures stimulate electron emission in the SP process. The growth of the emission current is due to the increase of the summary area of the heated metal sections during the first stage of the deformation, which remains constant on going over into true superplasticity.

The character of the change of the electron-emission intensity is a reflection of the kinetics of the deformation process in the SP regime. It is therefore possible that the same processes are responsible for the deformation mechanisms in the SP regime and for the electron emission.

A detailed study of the emission process can thus yield new information on the superplastic state and contribute to an explanation of this phenomenon. In addition, the observed emission effect affords greater experimental possibilities of investigating the dynamics of the relaxation processes occurring in superplasticity.

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CROSS SECTION AND ANISOTROPY OF URANIUM-235

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We have investigated the intermediate structure in the fission cross section $\sigma_{\gamma f}$ at gamma-quantum energies 5 - 12 MeV and the anisotropy at values of the maximum energy $E_{\gamma \max}$ from 6 to 15 MeV.

The experiments were performed inside the betatron chambers of the Leningrad Technological Institute. The target was a uranium layer 150 μg/cm^2 thick (90% U^{235}, 1.4% U^{234}, 8.6% U^{238}). In both cases, the fragments were registered with mica, using a standard processing and counting procedure.

In the study of the photofission yield, the target and the mica detector were oriented along the gamma-beam axis. The angular distribution of the fission fragments was obtained with a sector chamber of 34.4 mm radius, in the center of which a target of 3 mm diam was placed at a 45° angle to the gamma-beam axis.

The photofission yield, in relative units, is shown in Fig. 1. The statistical measurement error did not exceed 3%, and the standard deviation of the points of the yield curve was determined mainly by the assumed ionization-chamber error ($\sim$ 10%).

The cross section $\sigma_{\gamma f}$ was calculated by the method of Penfold and Leiss [1] with an interval width 0.5 MeV and a shift by 0.1 MeV within the limits of the interval, using a least-squares Chebysheff-polynomial approximation for the yield curve. The cross section $\sigma_{\gamma f}$ shows at E_γ = 5.5, 6.3, 7, 8.1, 10.4, and 11.4 MeV an irregular structure that correlates with measurements performed on monoenergetic γ quanta and in part with the data of [4] on bremsstrahlung. The general course of the cross section in the 5 - 8 MeV region is close to the data of [2]. The previously determined thresholds, 5.31 MeV [5] and 5.75 MeV [6], agree within the limits of errors with the values 5.35 and 5.65 MeV measured by us. The emission-fission threshold is 9.8 MeV (see Fig. 1). The discrepancy with the value given by Bowman (10.2 MeV) [3] is larger than the possible uncertainty of the energy scale in our experiment. The lower emission-fission threshold obtained in the double-barrier model can be attributed to the difference in the heights of the barriers A and B of U^{234}.

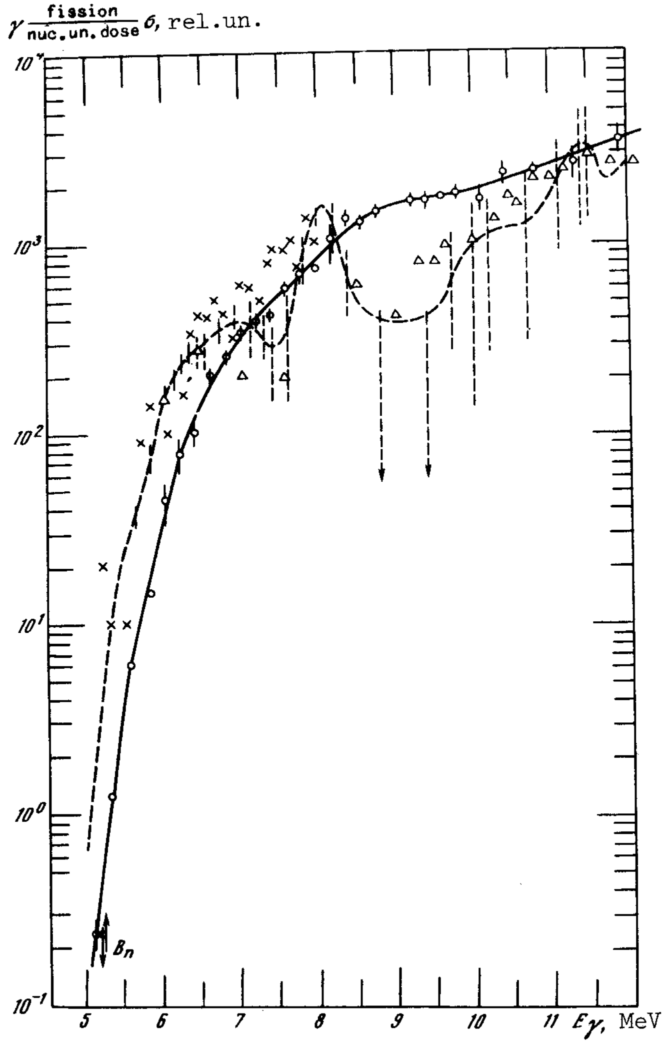

Fig. 1. Circles - energy dependence of total photofission yield of U^{235}; dashed - energy dependence of photofission cross section $\sigma_{\gamma f}$; the crosses and triangles show the results of [3] and [2], respectively; the arrow denotes the neutron detachment energy

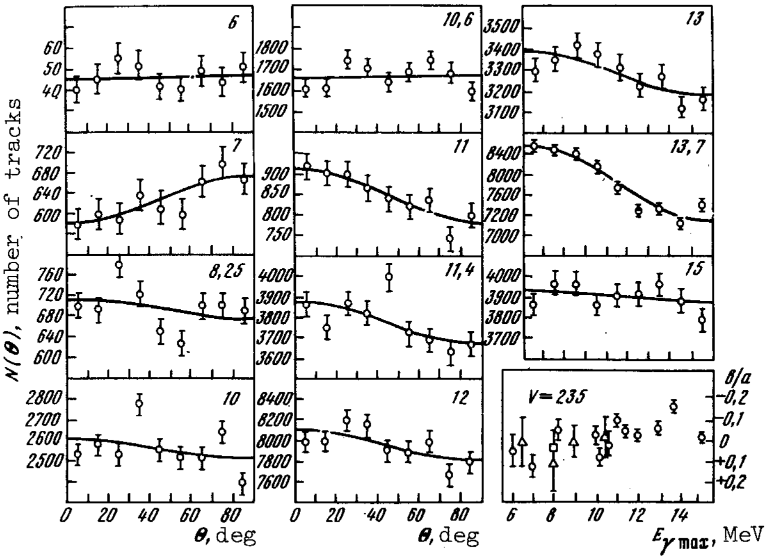

Fig. 2. Angular distributions of the U^{235} fission fragments and of the values of b/a. The numbers on the plots show the maximum bremsstrahlung energy. The squares and triangles denote the data of [8] and [9], respectively.

Figure 2 shows the anisotropy b/a as a function of $E_{\gamma max}$. The anisotropy was obtained by least squares, by representing the angular distributions by the function $W(\theta) = a + b \sin^2\theta$ in nine intervals of the angle θ. The values of b/a were corrected for the content of even-even nuclei, using the anisotropy data from [7]. The data on the anisotropy indicate that it varies non-monotonically with changing sign in the region of 8.10 and 10.6 MeV. The negative anisotropy near 13.7 MeV corresponds apparently to the threshold of emission fission of U^{235}. The positive anisotropy at $E_{\gamma max} = 7$ MeV was obtained from three measurements.

The presence of a peak in the cross-section curve at $E_\gamma = 7$ MeV and the presence, in part, of a dip in the 8 - 10 MeV region may be due to a difference in the sign of the anisotropy. The investigations are being continued.

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ELECTRIC BORN MODEL AND PION FORM FACTOR

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By choosing the electromagnetic pion form factor $F_\pi(k^2)$ in the form $(1 + 0.04k^2/m_\rho^2 - 0.108(k^2/m_\rho^2)^2)/(1 - k^2/m_\rho^2)$ for k^2 in the interval from 0.26 to 0.83 $(\mathrm{GeV}/c)^2$ we obtain a satisfactory description of the experimental data on the electroproduction of π^+ mesons on hydrogen on the basis of the electric Born model.

The experiment performed at DESY [1] on the electroproduction of π^+ mesons on hydrogen is analyzed in the present article on the basis of the electric Born model (EBM) for the purpose of extracting information on the electromagnetic form factor $F_\pi(k^2)$ of the π meson.

At very small momentum transfers to the nucleon, the EBM calculations agree well with the results of experiments on high-energy $\pi^\pm$-meson photoproduction and high-energy ρ^0-meson production in the reaction $\pi^- + p \to \rho^0 + n$ [1]. In the latter reaction, in the spirit of the known ρ^0-γ analogy, the ρ^0 meson can be regarded as a virtual isovector photon γ_V^* of mass m_ρ. We propose to generalize the EBM to include electroproduction of charged pions, namely, for concreteness, to include the reaction $e^- + p \to e^- + \pi^+ + n$ at high energies of the final π^+n system and very low momentum transfers to the nucleon. In electroproduction in the one-photon approximation (OPA), the 4-momentum k of the virtual photon is space-like ($k^2 \leq 0$ in the chosen metric $g_{00} = -g_{11} = -g_{22} = -g_{33} = 1$), and the photon γ^* itself is assumed to be isoverctor (concerning the smallness of the contribution of the isoscalar photon component in the related photoproduction reaction see, e.g., Richter's paper [2]).

The differential cross section of pion electroproduction in the OPA is given by [1]

$$\frac{d^3\sigma}{dW^2\,dt\,dk^2} = \frac{\alpha}{8\pi}\,\frac{1}{E_1^2M^2(-k^2)}\,\frac{W^2-M^2}{1-\epsilon}\left[\frac{d\sigma_T}{dt} + \epsilon\frac{d\sigma_L}{dt}\right], \qquad (1)$$

where ε is the polarization parameter of the exchanged photon, defined by