decreasing excitation level or with increasing distance from the excitation region to the p-n junction, the magnitude and duration of the fluctuations decreased rapidly. This fact is apparently connected with the rapid decrease of the "dimensions" of the drops falling in the p-n junction region. With increasing distance that the "drops" must traverse to the p-n junction, a time delay of the fluctuation appeared relative to the excitation pulse.

It is important that all these effect vanish at concentrations lower than 1×10^{15} cm^{-3} or when the temperature rises to about 6°K. The figure shows the region of concentrations where exciton condensate is observed in accordance with our results. Our data confirm the conclusions of [2, 3] that the condensate is produced in germanium under conditions when the density of the exciton gas is close enough to the density of the particles in the liquid phase, and that the heat of sublimation is close to 1 meV.

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POLARIZATION OF PROTONS PRODUCED IN INTERACTIONS BETWEEN 650 - 840 MeV PHOTONS AND Li^7 AND C^{12} NUCLEI

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Only a few investigations have been made to date of the polarization of the protons produced in the interactions between high-energy photons and nuclei.

The polarization of protons from the light nuclei Li^7, Be^9, B^{11}, and C^{12} at photon energies up to 335 MeV was investigated in [1, 2] in the kinematic region where the participation of real pions in the mechanism of the reaction is excluded. The results of these investigations are in satisfactory agreement with Levinger's quasideuteron model.

In this paper we present preliminary results of the measurements of the polarization of protons emitted at a lab angle 41° in reactions between 650 - 840 MeV photons and Li^7 and C^{12} nuclei. The measurements were made in a kinematic region admitting the photoproduction of pions on the free nucleon, as well as outside the region. The work was performed with the bremsstrahlung beam of a 2-GeV linear electron accelerator, using a magnetic spectrometer [3] with a subtended angle ±2° and a spark-chamber telescope.

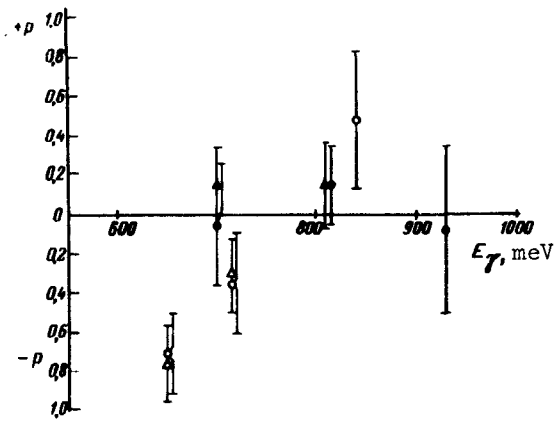

Fig. 1. Proton polarization vs. photon energy. ▲ and ● - Li^7 and C^{12} respectively in the kinematic region I; Δ and o - in the kinematic region II.

The proton polarization was detected and analyzed with the aid of a spark-chamber telescope and scintillation counters. The telescope contained two spark chambers, one with 10 gaps and foil electrodes to separate the proton direction, and one with 42 gaps and graphite electrodes measuring 250 x 250 x 6.7 mm, used for the proton-polarization analysis.

Alignment of the spectrometer focal line with the second gap of the 42-gap spark chamber has made energy calibration of the focal line possible.

To calculate the polarization, we selected the protons that experienced elastic scattering from the nuclei of the graphite electrodes.

As the elasticity criterion we used the expression

$$T_H - (T_p + \Delta T_k) \leqslant 6 \text{ MeV},$$

where T_H is the kinetic energy of the proton entering the chamber, T_p the total energy lost by the proton entering the chamber on its path before and after scattering, and ΔT_p is the energy loss corresponding to elastic scattering of the proton.

The polarization was calculated by the maximum-likelihood method with the aid of a computer.

The table lists the preliminary results for the nuclei $_3Li^7$ and $_6C^{12}$.

Nucleus	$E_{\gamma max}$, MeV	$E_{\gamma eff}$ MeV	ΔE_γ, MeV	P, MeV/c	ΔP, MeV/c	Polarization	Kinematic region
Li^7	700	–	–	755	23	-0.15± 0.19	I
	810			790	25	-0.15± 0.22	
C^{12}	700	–	–	755	23	+0. 05± 0.31	
	810			790	24	-0.05± 0.20	
	930			840	25	0.08 ± 0.43	
Li^7	700	650	33	618	18	-0.76 ±0.20	II
	810	715	38	655	20	-0.31± 0.19	
C^{12}	700	650	33	618	18	-0.71 ± 0.21	
	810	715	38	655	20	-0.35 ± 0.26	
	930	840	43	754	23	+0.48 ± 0.35	

The authors of [1, 2] have previously established that for the light nuclei Li^7, Be^9, B^{11}, and C^{12}, at a photon energy not higher than 335 MeV, the proton polarization is close to zero in the kinematic region where the real pions do not take part in the reaction.

In the present paper we show that at higher photon energies (700 - 900 MeV) the proton polarization in the same kinematic region is also close to zero for the nuclei Li^7 and C^{12}.

The figure shows the dependence of the proton polarization on the photon energy.

As seen from the figure, the proton polarization in the meson region II changes strongly with increasing photon energy, from - 0.76 to + 0.48.

The small proton yield in the kinematic region I and the results presented for the proton polarization in the kinematic region II have made it possible to calculate the proton polarization in the reaction $\gamma + n \to \pi^- + p$ for the photon energies 650, 715, and 840 MeV. The obtained values of P turned out to be, respectively, 0.74 ± 0.33, -0.16 ± 0.40, and $+1.66 \pm 1.04$. The absence of published data on the proton polarization in the reaction $\gamma + n \to \pi^- + p$ does not make it possible to compare the obtained values of the polarization for all the presented photon energies. For the energy E = 715 Mev, the value -0.26 ± 0.06 obtained in [4] agrees with our result.

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DYNAMICS OF RADIATION AND SPECTRUM CHANGES OF A NEODYMIUM LASER WITH SELF LOCKING OF AXIAL MODES

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Experiments [1] on the mode-locking in lasers with saturable filters have shown that complete locking, which we shall define as the presence in the axial period of one spike of duration $\tau \sim 1/\Delta\nu$ ($\Delta\nu$ - width of spectrum) and exceeding in energy by at least one order of magnitude all the remaining spikes, rarely occurs in such lasers. The proposed statistical approach to the development of generation from spontaneous noise [2,3] predicts the possibility of incomplete locking and gives certain quantitative criteria for this possibility. It is of interest to compare the experimental results with the theoretical ones. In the experiments set up for this purpose, we investigated both the temporal structure of the emission of a neodymium laser, and the time evolution of the spectral distribution of this emission.

The experimental setup was similar to that described earlier in [1]. The neodymium-laser resonator length was 140 cm, the cell with the saturable filter was mounted in the center of the resonator. Separation of the axial modes only was effected with the aid of a diaphragm of 2.7 mm diameter.

In the first part of the work we investigated the temperal structure of the generation. The laser emission was time-scanned with an electron-optical camera. Unlike in [1], where the most intense part of the generation pulse was investigated, in the present study we have