The best agreement with experiment is obtained assuming a transition of the type $4 \rightarrow 4 \rightarrow 2$, for which the correlation function has the following form (with allowance for the geometrical corrections)

$$W(\theta) = 1 + 0.1865\, P_2(\cos\theta),$$

where $P_2(\cos\theta)$ — Legendre polynomial. From this function follows the theoretical value

$$W(135°)/W(90°) = 1.15; \qquad W(180°)/W(90°) = 1.31;$$

the values of these ratios, calculated from the experimental data, are 1.16 ± 0.06 and 1.31 ± 0.06, respectively. It follows therefore that the spin of the 1360 keV level is equal to 4.

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THE REACTIONS (n, 2n) ON $Sn^{112,124}$ *AND (n, p) ON* $Sn^{112,117}$ *AT* 14.1 MeV

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It was observed[1] that for (n, p) reactions induced by 14-MeV neutrons in nuclei with the magic number Z = 28 of protons the cross sections are several times larger than those calculated by the statistical theory, if the level-density function is taken in the form $\exp(au)^{1/2}$ and the influence of the evenness of N and of Z on the density of the levels is taken into account by the Cameron δ-quantities.[2]

In the present paper we present an analogous comparison of the experimental results for (n, p) and (n, 2n) reactions with the theoretical ones in the case of Z = 50. The cross sections were measured by the method of induced β activity. The calibration reactions were $Cu^{63}(n, 2n)$ (σ = 552 mb) and $Al^{27}(n, p)$ (σ = 73 mb). The separation of the activities due to the (n, p) and (n, 2n) reactions on Sn^{112} was carried out analytically. To this end we used the decay schemes of Dzelepov and Peker[3]. The results are listed in the table. The experimental accuracy is not worse than 20%.

For the reaction $Sn^{124}(n, 2n)Sn^{123}$ it is possible to determine the cross section only on the ground level of Sn^{123}, owing to the large half-life of the isomer level (125 days). The ratio of the cross section on the metastable level (σ_m) to the cross section on the ground level (σ_g) is not more than 1.1, since the cross section for the neutron capture is 1900 mb. The calculated ratios of the cross sections imply that $\sigma_m/\sigma_g = (2I_m + 1)/(2I_g + 1)$, where I_m and I_g are the spins of the corresponding levels. As can be seen from the

Reaction	σ_{exp}, mb	σ_{calc}, mb	Data by others	$\sigma_{exp}/\sigma_{calc}$	σ_m/σ_g calc
$Sn^{112}(n, 2n)Sn^{111}$	1610	1660	1500±7 % [4]*	1	
$Sn^{124}(n, 2n)Sn^{123g}$	900	450		2	3
$Sn^{112}(n, p)In^{112}$	145	35		4	3
$Sn^{112}(n, p)In^{112m}$	100	27			
$Sn^{117}(n, p)In^{117}$	23	2		11.5	

*Measured by the annihilation method.

table, Cameron's set of quantities does not satisfy the experimental cross sections. This must be attributed to the influence of shell effects as well as of direct interactions (particularly for Sn^{117}). Inasmuch as the chosen procedure does not make it possible to separate the contribution from the compound nucleus to the cross section of the (n, p) reaction, we do not present the values of the corrected δ-quantities, as was done in [1].

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PHOTOPROTONS FROM CALCIUM

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RECENTLY Balashov et al. [1] and Brown et al. [2] have carried out calculations of the photodisintegration of Ca^{40} according to the many-particle shell model, which helped to remove the difficulties encountered in explaining the nature of the giant resonance by the single-particle shell model. Consideration of the residual interaction led to agreement of the position of the peaks of the calculated and experimental cross sections. However, a more detailed comparison of the theoretical results with the experimental data disclosed some contradictions, particularly in the explanation of the photoproton spectra. The difficulties which arose could be the result of inadequacy of the experimental data. Thus, up to the present time no measurements have been made of the cross section for the (γ, p) reaction on Ca^{40}, and the angular and energy distributions of photoprotons which have been obtained [3,4] do not agree completely among themselves.

In the present work we have measured angular and energy distributions of photoprotons from Ca^{40} for $E_{\gamma max}$ = 22 MeV, and also have obtained cross sections for the reactions $Ca^{40}(\gamma, p)$.

The measurements were made on the 35 MeV betatron at the Institute of Nuclear Physics of the Moscow State University. The angular and energy distribution measurements were made by the photographic emulsion method [5], and the measurements of the photoproton yield curves were made with scintillation spectrometers [6].

Figure 1 shows a histogram of the energy distribution of photoprotons formed in the photodisintegration of Ca^{40} by bremsstrahlung with $E_{\gamma max}$ = 22 MeV. In the histogram and the curve obtained from it by the method of Ferreyr and Valoshek, four peaks are involved, two of which are in the energy region of 2–5 MeV, the third at ~ 6.5 MeV, and the fourth at ~ 9 MeV. The angular distributions obtained for all groups of photoprotons are practically isotropic, with the exception of the low energy group (3–5 MeV) whose angular distribution has the form $1 - 0.5 \sin^2 \theta$. Yield curves for photoprotons with energies E_p of 3–5 MeV, 5–7 MeV, ≥ 8 MeV, and ≥ 3 MeV were measured for

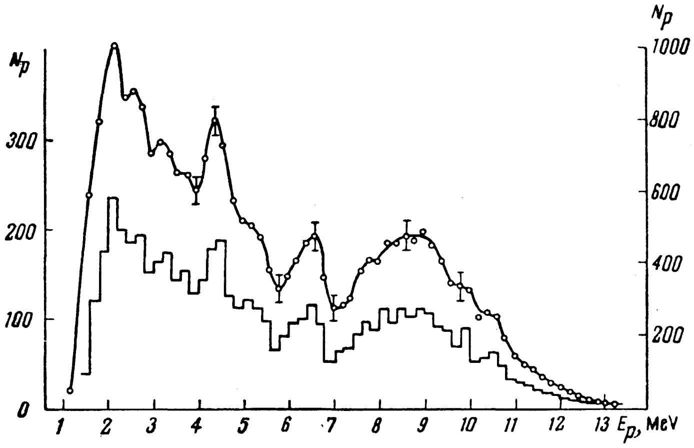

FIG. 1. Energy spectrum of photoprotons from calcium for $E_{\gamma max}$ = 22 MeV. The histogram is plotted to the left ordinate scale, and the curve to the right scale.