energy 3680 keV. In this case, this state cannot have the 1^- quantum characteristics which have been imputed to the excited state of the Ge^{72} nucleus with energy 3740 keV which was found in As^{72} decay [4]. With 1^- characteristics, the β-transition would belong to the $3^- \rightarrow 1^-$ type and would be twice-forbidden ($\log ft \geq 12$).

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YIELD OF PHOTOPROTONS FROM CALCIUM

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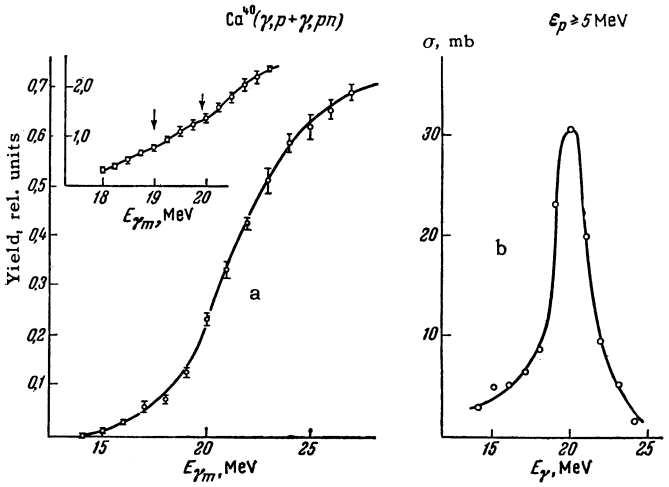
THE yield curve of the reaction $Ca^{40}(\gamma, p + \gamma, pn)$ has been measured up to the γ-ray energy $E_{\gamma m}$ = 27 MeV by counting protons in CsI(Tl).

The method differs from that described earlier by us [1] in the use of pulse shape discrimination of particles. Protons were counted with energies $\epsilon_p \geq 5$ MeV. The yield curve of photoprotons as a function of $E_{\gamma m}$, measured with 1 MeV intervals between points, is shown in Fig. a. More exact measurements in the region of the giant resonance indicate the existence of two peaks at energies E_γ = 19.0 and 19.9 MeV. The cross section for emission of photoprotons was calculated according to the method of Penfold and Leiss for the yield curve measured every 1 MeV (Fig. b). The peak in the cross section at E_γ = 19.9 MeV is 30.6 mb, and the half-width of the resonance curve amounts in all to 2.7 MeV. The integrated cross section for emission of photoprotons with $\epsilon_p \geq 5$ MeV turned out to be 124 ± 10 MeV-mb, and taking into account the unrecorded part of the photoproton spectrum, 280 MeV-mb. The ratio of the photoproton yield from calcium and from copper at $E_{\gamma m}$ = 27 MeV is 0.93 ± 0.09. The ratio of the photoproton yields at angles θ = 90 and 135°, and also at 90 and 45°, measured as a function of energy $E_{\gamma m}$, is constant within the experimental error.

The experimental position of the peaks in the photoproton cross section is extremely close to that found by Miller et al. [2] in a study of the reaction $Ca^{40}(\gamma, n + \gamma, np)$ and agrees fairly well with the data of Tanner et al. [3] obtained for the reaction $K^{39}(p, \gamma)Ca^{40}$. According to shell model calculations by Brown et al. [4] for a potential with exchange forces, the entire dipole sum is exhausted by the two transitions at 19.2 and 20.6 MeV.



a) Yield of photoprotons of energy $\epsilon_p > 5$ MeV from Ca^{40} as a function of $E_{\gamma m}$. Upper inset: the same quantity, measured every 0.25 MeV for $E_{\gamma m}$ from 18 to 21.5 MeV. The arrows indicate the location of inflection points in the curve. Root-mean-square errors are shown. b) Cross section for emission of photoprotons of energy $\epsilon_p > 5$ MeV from Ca^{40}.

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