fore concluded that the observed activity with a half-life of 3.7 ± 0.3 days should be ascribed to Pd^{100}

The gamma spectrum of Pd^{100} is shown in Fig. 2. The relative intensities of the gamma transitions and the results of the investigation of the $\gamma\gamma$ coincidence spectra are listed in the table. The intensity of all the observed gamma lines decreased with $T_{1/2}$ = 3.7 ± 0.3 days. The total absorption spectrum of the Pd^{100} gamma radiation is shown also in Fig. 2. The sum lines with energies 158, 126, and 84 keV are clearly seen, in agreement with the data on the $\gamma\gamma$ coincidences of Pd^{100}.

From the aggregate of the obtained results we have deduced the decay scheme of Pd^{100}. This scheme contains all the gamma transitions observed by us except for the gamma transition with energy ~ 52 keV. The high values of the ratio K/L for the most intense 74.4- and 83.8-keV γ transitions show that these transitions can be of the type M1 or E1.

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STUDY OF THE (γ, p) REACTION IN CARBON

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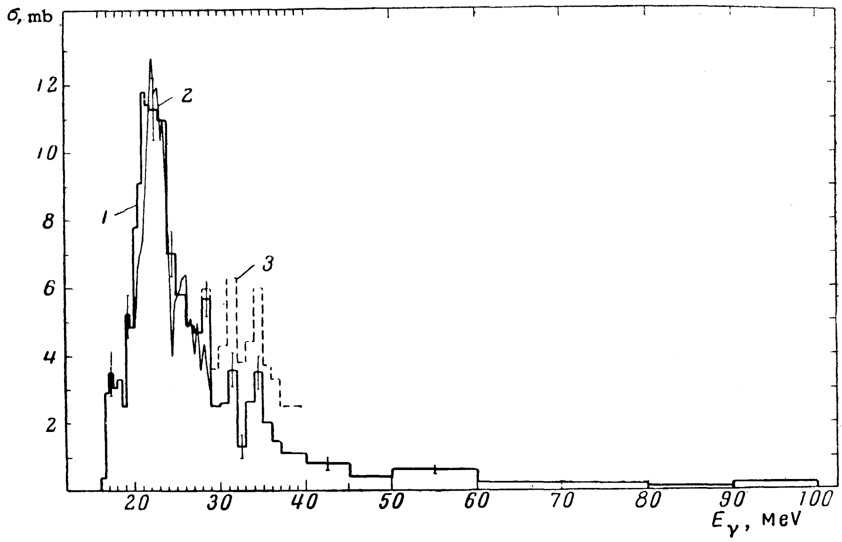
ALTHOUGH a large number of investigations have been devoted to the study of the photodisintegration of carbon, at the present time considerable uncertainty still exists both as to the shape and as to the magnitude of the photodisintegration cross section. Calculations of the dipole levels of the carbon nucleus, carried out on the basis of the shell model by Vinh-Mau and Brown[1] and Nilsson et al[2] have shown that there should be a rather intense dipole level at an energy above 30 MeV. Up to the present time this level has not been observed experimentally. In this connection it has been of interest to carry out a study of the photodisintegration of carbon at energies above 30 MeV. In the present work we have studied the (γ, p) reaction on carbon by means of a cloud chamber in a magnetic field, operating in a bremsstrahlung beam with a maximum energy of 170 MeV.

The cross section of the (γ, p) reaction has been calculated on the assumption that the final nucleus B^{11} is left in its ground state. The energy of the proton was determined from its momentum, which in turn was found from the curvature of the track. The energy of the recoiling nucleus was determined by its range. The accuracy of the energy determinations was 6–7% for the

Yield of various reactions on carbon

Type of reaction	No. of events observed	Yield relative to total yield, %	Type of reaction	No. of events observed	Yield relative to total yield, %
(γ, p)	2207	42	(γ, 3α)	137	2.5
(γ, n)	1541	31	(γ, $2\alpha\alpha'n$) [$C^{12}(\gamma, nHe^3)2He^4$]	42	0.8
(γ, pn)	408	8	including 4-prong stars	301	5.5
(γ, α')[$C^{12}(\gamma, He^3)Be^9$]	83	1.5	(γ, $3pn$)	32	0.6
(γ, αn)	92	1.8	(γ, $2p2\alpha$)	99	1.8
including 3-prong stars	542	10	(γ, $2\alpha pt$)	141	2.7
(γ, $p\alpha$)	229	4.5	5-prong stars	28	0.5
(γ, $p\alpha n$)	52	1	6-prong stars	5	0.1
(γ, $2p$)	51	1			
(γ, $2pn$)	31	0.6			



Total (γ,p) cross section: 1) observed in the present experiment; 2) differential (γ,p) cross section at an angle of 76° from the work of Dodge and Barber[3], normalized to the maximum cross section obtained by Vanhuyse and Barber[4]; 3) combined cross section for the reactions (γ,p) and (γ,pn).

proton and 15—30% for the recoiling nucleus. Because of the high reaction threshold (15.95 MeV), the error in determination of the photon energy in the giant resonance region was 0.3—0.5 MeV. The intensity of the synchrotron pulses recorded by the cloud chamber were measured by a pulse-type ionization chamber calibrated by a quantameter with an absolute accuracy of 5—6%.

In 18,000 photographs, 5207 events were recorded. The table lists the yields of the various photonuclear reactions from carbon.

The cross sections for the (γ, p) reaction are given in the figure. For comparison we have also shown the differential cross section for this reaction at an angle of 76° from the work of Dodge and Barber[3], normalized to the peak cross section given by Vanhuyse and Barber[4]. The dashed line shows the sum of the (γ, p) and (γ, pn) cross sections. The (γ, pn) cross section was also determined in the present experiment.

As can be seen from the figure the (γ, p) cross section has a number of peaks. The peak located at an energy 20.5—24 MeV gives the greatest contribution to the integrated cross section, amounting to 42 ± 2 MeV-mb or 36% of the cross section integrated up to 170 MeV.[1)] At energies of 31.5 and 34.5 MeV, two additional peaks are observed whose integrated cross section (over the region 30—37 MeV) amounts to 17 MeV-mb, i.e., about 15% of the total integrated (γ, p) cross section. Peaks have also been observed at these same energies by Maĭkov[5] for the (γ, pα) cross section and in the present work for the (γ, pn) cross section. It follows from this that the observed peaks are connected with the excitation of two different levels of the C^{12} nucleus. The position of these levels and their combined integrated cross section (taking into account the contribution of other reactions) agrees well with the position of the expected intense dipole level (at 34.3 MeV according to Vinh-Mau and Brown[1] and at 31.9 MeV according to Nilsson et al[2]) and with its integrated cross section, which amounts to 15—20% of the dipole sum.

The total integrated cross section of the (γ, p) reaction from threshold to 170 MeV is 122 ± 5 MeV-mb, and the integrated cross section up to 37 MeV is 102 MeV-mb or 85% of the total integrated cross section. The combined integrated cross section of the reactions (γ, p), (γ, n), and (γ, pn) from threshold to 37 MeV is ~180 MeV-mb (the cross section for the (γ, n) reaction was taken from the work of Barber et al[6]), i.e., it agrees with the value given by the sum rule without consideration of exchange forces, $\sigma_{TRK} = 60 \times NZ/A$. We can expect that the integrated cross section for absorption of photons will exhaust the entire dipole sum $\sigma_0 = \sigma_{TRK}(1+\Delta)$ at an energy of 37 MeV for an exchange force contribution of $\Delta = 0.4$.

[1)]Here and subsequently we list only statistical errors.

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