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PHOTOPRODUCTION OF π^+ MESONS BY LINEARLY POLARIZED PHOTONS

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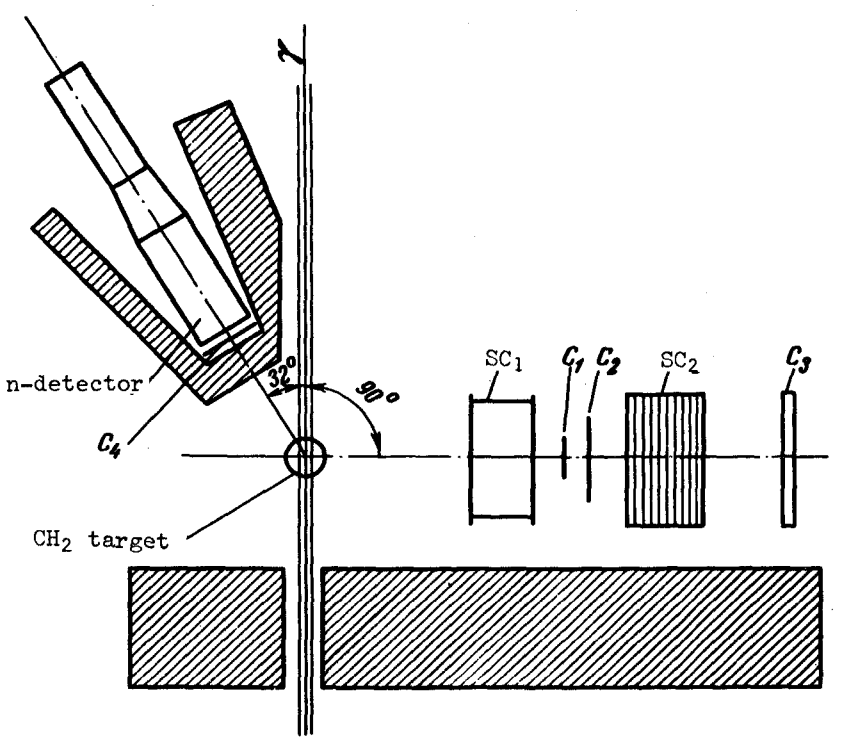
The need for additional measurements of the photoproduction of π^+ mesons by polarized photons has been discussed many times in both theoretical and experimental papers [1 - 4].

A polarized photon beam was obtained with the "Sirius" synchroton from interactions of electrons with energy E_e = 850 MeV ± 3.5% with a crystalline diamond target of thickness 0.0157 radiation units. The characteristics of the beam were determined with a magnetic pair spectrometer [5] of resolution $\Delta E_\gamma / E_\gamma$ = ± 3%. Good agreement was obtained between the theoretical and experimental spectra. The polarization at the 268-MeV peak of the coherent bremsstrahlung was calculated theoretically and amounted to 14.4%.

The figure shows the experimental setup consisting of scintillation counters C_1 (100 x 100 x 5 mm), C_2 (170 x 170 x 10 mm), C_3 (240 x 240 x 20 mm), C_4 (150 x 150 x 5 mm), n-detector (100 dia x 200 mm) made of plastic scintillators, and spark chambers SC_1 and SC_2. The chamber SC_1 has 0.2 mm aluminum windows and a 100 mm gap, and SC_2 is an eleven-gap chamber with 10 copper plates up to 2 mm thick. The signals from C_1, C_2, and the n-detector (neutron counter) were fed to a fast triple-coincidence circuit with resolution time 1.7 nsec. The signal from the triple-coincidence circuit, when not blocked by the counters C_3 and C_4, was fed to a scaler circuit and to the triggering circuit of the high-voltage genera-



tor feeding SC_1 and SC_2 [6].

The useful events were selected in accordance with their ranges in SC_2, the pion emission angles (determined in SC_1), the neutron emission angle, by setting of the n-detector to a corresponding kinematic angle for the reaction $\gamma p \to \pi^+ n$, and also in accordance with the time of flight of the pion and neutron, determined by the fast triple coincidences.

In the measurements, the counters with the spark chambers were placed in planes parallel and perpendicular to the photon polarization plane. In each such measurement, the background events from the carbon nuclei present in the polyethylene target, were taken into account by taking the neutron counter out of the reaction plane [7], and ranged from 30 to 10%.

On the basis of the selected 2500 out of 11000 scanned events, we calculated the values of the asymmetry, which are listed in the following table for $\theta_{c.m.} = 106°$.

E_γ, MeV	229 ± 19	241 ± 13	250 ± 13	258 ± 13
P- photon beam polarization	0,122±0,011	0,129±0,0075	0,134±0,0085	0,137±0,0063
$A=\frac{(d\sigma_\perp - d\sigma_\parallel)}{(d\sigma_\perp + d\sigma_\parallel)}$	0,020±0,19	0,17±0,26	0,17±0,2	0,34±0,22

Here $d\sigma_\perp$ and $d\sigma_\parallel$ are the cross sections for the photoproduction of π^+ mesons in planes perpendicular and parallel to the photon polarization plane.

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SUBBARRIER FISSION OF Am^{241} BY NEUTRONS

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The dependence of the fission cross section σ_f of Am^{241} on the neutron energy E_n has a clearly pronounced "threshold character" [1 - 3]. The fission threshold determined from these data amounts to approximately 0.9 MeV, below which $\sigma_f(Am^{241})$ decreases steeply (exponentially) to 9 mb at E_n = 0.4 - 0.5 MeV. Recent measurements of this cross section, performed by the time of flight method using an underground nuclear explosion as the neutron source [4], have made it possible to investigate a wider range of lower energies. The in-