Now, if $n(E, x)$ is the number of the electrons of energy E produced by the multiplication process like the cosmic ray shower at the depth x distant from the point where the initial electron of energy E_0 is produced, the total probability of penetration $p_\gamma(E_0, x)$ with which the electron of initial energy E_0 can travel through thd distance x will be given by

$$p_\gamma(E_0, x) = \int^{E_0} n(E, x)\, dE$$

$n(E, x)$ can be obtained by solving the similar diffusion equation as in the shower theory. This, however, is a very difficult problem especially in the case of the intermediate energy under consideration and we were obliged to simplify the equation under some approximate assumption. The calculation was then performed numerically. The final results were shown in the table for the case of the lead counter of the inner diameter 2 cm.

Table

wall thickness in cm	energy of γ-ray quantum in mc^2				
	12	20	25	30	35
0.20	3.7%	9.7%	13.6%	16.0%	17.7%
0.30	3.5	10.4	15.2	19.1	22.4
0.40	3.4	10.2	15.0	19.8	24.4
0.50	3.2	9.7	14.4	19.6	24.7
0.60	3.1	9.0	13.8	18.8	24.4
0.65	3.0	8.7	13.5	18.3	23.9

1) M. SONODA, J. Phys. Soc. Jap. (in press).
2) B. ROSSI and K. GREISEN, Rev. Mod. Phys. **13**, 240 (1941)

6. Photo-disintegration of Beryllium by the High Energy γ-Rays.

Bunsaku Arakatsu, Masateru Sonda, Yoshiaki Uemura, Shinjiro Yasumi and *Yoshio Saji.*

The photo-disintergration of Beryllium was observed for the γ-rays of energy 17.6 and 6.13 Mev. These γ-rays were obtained by bombarding thick target of Li metal and CaF_2 with protons of energy of 500 Kev and 350 Kev, respectively. The proton beam was unseparated and the intensity was about 30~60 μA. Two proportional counters of methane flow type, were placed near the target, one of which was coated with thick layer of BeO and the other was uncoated. The Be-counter was 6 cm in diameter and 20 cm in length. After being amplified by the respective 4-stage linear amplifier, the pulses from the counters were fed into the deflectors vertical and horizontal respectively, of a Braun-tube oscilloscope, in order to discriminate a spurious pulse due to an accidental electromagnetic induction from the accelerating tube. The output from the Be-counter were also recorded on the printing paper by an electromagnetic oscillograph.

When these counters were irradiated by the γ-rays, many pulses were observed in the Be-counter, but very few in the uncoated counter. Moreover, the number of observed kicks from the Be-counter was seen to follow exactly the γ-ray excitation curves. These facts show that the observed pulses from the Be-counter were definitely due to some processes in Be produced by the γ-rays, but not by the contaminated neutrons. The oscillograph records were analysed and the following disintegration schema were concluded.

1) $Be^9 + 17.6\,\text{Mev}\,\gamma \rightarrow Be^{8*} + n \quad Be^{8*} \rightarrow 2\alpha$ $\quad$ Be^{8*} in 7 Mev excited state.

2) $Be^9 + 17.6\,\text{Mev}\,\gamma \rightarrow Be^8 + n \quad Be^8 \rightarrow 2\alpha$ $\quad$ Be^8 in ground state.

3) $Be^9 + 6.13\,\text{Mev}\,\gamma \rightarrow Be^8 + n \quad Be^8 \rightarrow 2\alpha$

The cross-sections for these three processes were found to be

1) $2.15 \times 10^{-27}\,\text{cm}^2$

2) $5.1 \times 10^{-26}\,\text{cm}^2$

3) $1.62 \times 10^{-27}\,\text{cm}^2$

respectively.

The trend of the excitation curve is entirely different from the theory of E. Guth [1]. Moreover, it seems noticeable that the excited states of Be^{8*} of energy 3.0 Mev and 4.8 Mev do not contribute in these processes.

More decisive experiments using photographic emulsion are now in progress.

1) E. Guth and C. Mullin, Phys. Rev., **76**, 234 (1949)

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7. Some Experiments on P^{32}.

I. Physical Procedures and Measurements.

Sakae Shimizu, Yoshiaki Uemura, Ryutaro Ishiwari,
Osamu Horibe and *Sunao Okamoto.*

We have produced radioactive phosphorus, P^{32}, by the reaction $S^{32}(n, p)P^{32}$. The irradiation of 3.8 liters of CS_2 in a spherical flask with a 50 mg. radium-beryllium neutron source placed at the center of the flask, during about 28 days produced sufficient P^{32} with a high activity sufficient to support some research programs. The extraction procedures of P^{32} from the irradiated CS_2 are described in Part II. The activity of P^{32} obtained was measured by an endwindow (2π-type) G-M counter with a thin mica window (4 mg/cm²). The pulses from the counter were counted by a decade scaler particularly devised for the present experiment.