## 42. On a Stable $2\pi$-type $\beta$-Ray Counter.

*Sakae Shimizu, Yoshiaki Uemura* and *Yoshio Saji.*

The $2\pi$-type $\beta$-ray counter reported in the preceding paper was found to be somewhat unstable for a very large counting rate and long time use. This unstability may be due to the surface charge on the mica window. So we enlarged the distance between the window and the top of central wire. As a result of this modification, we obtained a fairly stable counter. Further, by housing the whole counter in an earthed shield-tube, we succeded in construction of a very stable counter. Using the counter of this type, we obtained a value of $2057 \pm 23.6/2$ min for 8 runs of measurements under continuous irradiation of Ra-$\gamma$ at the rate of $6 \times 10^5$ counts per hour. In this case the inevitable fluctuation of radioactivity was found to be 17.3.

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## 43. Observation of the B $(n, \alpha)$ Li Reactions by the Wilson Cloud Chamber.

*Masateru Sonoda, Jiro Muto* and *Shinjiro Yasumi.*

In order to investigate the $\beta$-disintegration of $Li^8$ nucleus, the B $(n, \alpha)$ Li reaction was studied by the expansion chamber. Methyl alcohol was used as the liquid, which boric acid was thrown into. The neutron source of 50 mg Ra + Be was situated at the distance of 25 cm from the chamber, which was screened from the direct $\gamma$-rays of the source by a lead block of 14 cm thickness.

The tracks were photographed stereoscopically by means of a system consisting of one camera and two vertical mirrors. About 400 sheets of photographs were obtained.

Investigating those photographs by the so-called "reprojecting method", about 30 short tracks probably assignable to the $B^{10}$ $(n, \alpha)$ $Li^7$ reaction were observed, whose ranges were about 10 mm. But the tracks due to the disintegration of the $Li^8$ nucleus, were not obtained.

In order to determine spacial arrangements of the tracks, the reprojecting method was used, in such a way as to replace the developed negatives in the exact position in the camera, where the film occupied at the moment the exposure was made, illuminating the film from behind the camera and reconstructing the contour of the original tracks on the object plane.

About the reprojecting method, the following points would be emphasized:

(i) We used the "mosaic shutter" between the reprojecting light source and

the film, and by shifting it quickly, we get the direct image and mirror image alternately, so that, by those motion, the judgement of the coincidence of the two images are made very easy.

(ii) We made two images of the end points or any distinctive points of the tracks coincide at a point on the white paper, which is freely movable along the $x$, $y$, $z$-axes. Then $x$, $y$, $z$, coordinates of the point were read with the vernier, and from these values the ranges and the spacial arrangements of tracks were determined.

We found these methods were very convenient and accurate.

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## 44. On the Property of the Proportional Counter.

*Masateru Sonoda.*

The counting property of a $CH_4$, $CH_4$–Ar, $C_2H_5OH$, and $C_2H_5OH$–Ar proportional counter was investigated under the intense $\gamma$-ray background and the followings were found.

(1) The plateau was 150V~200V with the rise of about 10 %.

(2) The $\gamma$-ray background became sensitive on the plateau for the higher value of the total pressure. The relatively small pressure (7~10 cm Hg) was found to be most suitable for counting $\alpha$-particle or proton under such intense $\gamma$-ray background.

(3) The increase of Ar decreases the operating voltage of the counter so for as the amount of $CH_4$ or $C_2H_5OH$ is kept greater than a certain lower limit (about 3 cm Hg).

The counter of the $CH_4$ flow type was also investigated and found to be used satisfactorily both for $\alpha$-particle and $\beta$ or $\gamma$-rays. The plateau was about 200V for the $\alpha$-particle and 100V for the $\beta$-particle, with the slope flatter than for the former type in both cases.

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## 45. The Efficiency of the G-M Counter for High Energy γ-quanta.

*Masateru Sonoda.*

The efficiency of the lead counter was calculated theoretically for the $\gamma$-ray of high energy such as emitted by (Li-p) or (F-p) reaction, taking into account the effect of the multiple scattering and the radiation loss of the secondary electrons. The contribution due to the secondary radiation produced by the brems-