

#### 4. Observation of Cosmic Rays with Photographic Emulsions. (II)

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We have been observing photographic emulsions (Eastman Kodak, NTB 8 sheets) exposed to cosmic rays on Mt. Norikura last summer, and the preliminary report was published at the meeting of I. C. R., October, 1949. In this report, more precise results on the cosmic ray stars and the mass of single tracks are discussed.

##### ( i ) Cosmic ray stars.

With careful observation of stars, we found that there were two sorts of stars. One of which is composed of stars whose branches are 20~40 microns, these cannot be distinguished from the stars caused by RdTh or Ra etc. The other is constituted from the stars clearly originated by cosmic rays. In this report, the natures of the former group are discussed. The main part of this group seems to be the stars of radioactive origin, but it is not yet determined how many of them are due to the radioactive contaminations.

##### ( ii ) The mass determination of single tracks

To determine the mass of single tracks observed in the emulsions, we took at first the method of grain counting. We examined more than 40 single tracks, but the results are not precise enough to distinguish the small mass difference, because of the fading effect. Therefore we measured the scattering angles of the tracks by Coulomb's field for the mass determination. For one track which was distinguished as mu-meson by the grain counting method, the mass was estimated to be  $211 m_e$  ( $m_e$ : mass of electron). This value is in good agreement with the other precise measurements. (For example Bishop estimated in 1949 as  $215 \pm 4 m_e$  from  $H\rho$  and range).

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#### 5. The Efficiency of the Geiger-Müller Counter for the High Energy $\gamma$ -Rays.

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In order to calculate the counting efficiency of a  $\gamma$ -ray counter, it is necessary to consider the effects of multiple scattering and bremsstrahlung of secondary electrons. The former effect was treated in the same way as given in the preceding paper<sup>1)</sup>. As to the latter effect, a method similar to the cosmic ray shower theory was applied<sup>2)</sup>.