

III-5-14. Investigation of High-Energy μ -mesons at the Depth of 40 m.w.e.*

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With the aid of an underground device intended for investigations of EAS we conduct measurements of the spectrum of ionization bursts from μ -mesons, produced by μ -mesons in ionization chambers under a lead layer of 15 cm. The chambers' area is 1.75 m². Geiger counters are placed under the chambers.

In connection with the fact that investigations of a μ -meson spectrum presents special interest today some preliminary data are given below.

We have obtained a burst-spectrum in a region equivalent to passage through the chamber of between 100 and 10,000 single particles. The maximum burst recorded exceeds 30,000 particles.

The spectrum obtained may be approximated by the common power law in the entire burst region (150 particles: 10,000 particles) with the spectrum exponent $\gamma = -1.7 \pm 0.15$. The burst spectrum observed is caused by μ -mesons with the energy of E_μ , exceeding, on the average, the energy E_γ transferred into a soft component. Besides, the showers observed are not always in the maximum of development. Account of these circumstances leads to the following expression for the mean energy of a μ -meson which produced a burst in the n -particles: $\bar{E}_\mu = 4 E_{\gamma}^{\min}$, where $E_{\gamma}^{\min}$ is a minimum quantum energy able to produce a burst in n -particles. This means that the spectrum obtained by us is due to the μ -mesons with the energy of $4 \cdot 10^{10} \text{ ev} \leq E_\mu \leq 4 \cdot 10^{12} \text{ ev}$.**

In the energy-region mentioned above, the energy-spectrum of μ -mesons may be represented by a common law. In the figure one can find the data obtained and the spectrum from paper¹⁾. The normalization point is indicated. The spectra coincide in the common part.

References

- 1) F. Ashton: Nature, 4710, **185** 364-366.

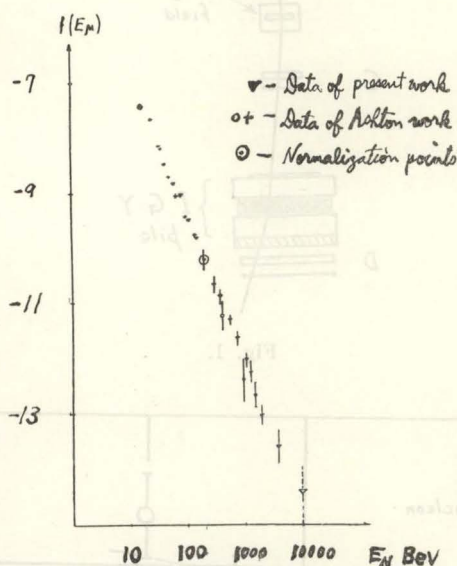


Fig. 1.

* This paper was presented by S. N. Vernov at Extensive Air Shower Session.

** The correction for particles absorption in the chamber walls has not been introduced in to the data on the bursts. Therefore, the presented values the μ -meson energy are a lower estimation.