Proc. 11th Int. Conf. on Cosmic Rays, .Budapest 1969

MULTIPLICITY SPECTRUM OF MUON SHOWERS FAR UNDERGROUND*

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The multiplicity spectrum of muon showers has been observed at depths of 1400-3400 hg/cm^2 underground.

Underground muon showers have been observed by the Utah neutrino detector. The thickness of rock above the apparatus varies from 1400 hg/cm^2 to 3400 hg/cm^2 for the events studied. The zenith angle ranges from 35° to 50°. The average area of the detector for this measurement is 80m^2, varying from 78m^2 to 93m^2, depending on the zenith and azimuth angle of the incoming muons.

The maximum number of muons observed in one event is 13, and the number of showers totals more than 5000. The differential number distribution of the events in which one to seven muons are seen in the detector is expressed in the form of a power law $n_i^{-\tilde{a}}$, with $\tilde{a}$ 5, and there is a weak dependence of the value of $\tilde{a}$ on depth. Hand-scanning may result in a slightly lower $\tilde{a}$. Since the lateral spread of the muon showers is larger than the area of the detector, the power law spectrum obtained experimentally is *not* the same as the multiplicity spectrum of the muon showers. By using the lateral distribution of muons from the accompanying paper [1] to determine the probability of having n_i. muons in the detector if there are m muons in a shower, the shape of the m-distribution and the absolute rates can be derived from the observed n_i-distribution.

Reference

1. R. B. COATS, J. W. KEUFFEL, R. 0. STENERSON, M. 0. LARSON, H. E. BERGESON, This Conference, paper MU-33/3.

*Supported by the National Science Foundation, U.S.A.