Contribution ID: **888** Type: **Oral**

Influence of the initial conditions of interaction on the development of a cascade process.

Monday, 11 October 2021 16:30 (15 minutes)

The energies of cosmic particles have been measured quite accurately for particles with energies E <0.1 TeV. Modern magnetic spectrometers can determine the primary energy with an error of less than 10 percent. However, such devices are limited at energies E> 1 TeV. In the region of 1-100 TeV, there is a lack of measurement methods. In this regard, various space experiments present extremely contradictory energy spectra in the energy range 1-100 TeV.

Today, the best option for measuring the energy of various nuclei in a wide energy range (at E> 1 TeV) is the ionization calorimeter method. In a thin calorimeter, the entire cascade of secondary particles is not recorded, but only the beginning of the cascade is measured. Unfortunately, such measurements usually have errors of more than 50% due to significant fluctuations in the development of the cascade.

To solve this problem, we propose to use so-called correlation curves, which are practically independent of fluctuations in the development of the cascade.

The dependence of the energy release at a certain observation level on the rate of development of the cascade was used as the measured values for plotting the correlation curves.

On the basis of computer simulation, it is shown that the proposed technique allows one to determine the energy of primary particles, the cascades of which have not reached their maximum. Thus, particles of higher energies can be analyzed. In addition, the accuracy of determining the energy of particles with energies of TeV and higher is increased. Measurements"of the modeled cascades based on the proposed approach of correlation curves have errors of less than 10%.

This work was supported by a grant from the Ministry of Education and Science of the Republic of Kazakhstan No. AP09562078.

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Session Classification: High energy physics

Track Classification: High Energy Physics