

On the nature of primary particles producing air showers with energies greater than 5 EeV

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To study the nature of particles with energies greater than 5 EeV, the database of the Yakutsk array was analyzed. The array has been operating continuously for 50 years, and during this time period, unique material has been collected on the main components of air showers: the electron-photon component, muons, Cherenkov and radio emissions. Including the arrival directions of primary cosmic rays that produce cascades of secondary particles of relativistic energies in the atmosphere. Attention is drawn to the time sequence of the air showers arrival within 24 hours of continuous observations at the array. A small-scale variation in showers with an average period of 8 hours was found. Physical characteristics of consecutive showers: energy, zenith and azimuthal angles were in one case close or slightly different in magnitude. In addition very close relative muon number in these showers. For example, there were pairs of showers with a low muon content, i.e. showers “poor in muons”. According to model calculations, these showers are probably produced by primary ultrahigh-energy gamma rays. Therefore, it can be assumed that double showers are formed by primary particles of the same or similar nature of origin.

Keywords

EAS; ultra high energies; cosmic rays; arrival directions; Yakutsk.

Collaboration

other Collaboration

Subcategory

Experimental Results

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