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Mass composition estimation by relative content of muon in air showers with energy greater than 5 EeV

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The paper presents analysis of showers with energy $E = 5-50$ EeV and zenith angle less than 60 degrees. A quantitative estimate was obtained for muons with a threshold greater than 1 GeV at different distances from the shower axis, and the fraction of muons at a distance of 600 m from the axis. An empirical relationship was found between the fraction of muons and the longitudinal development of the shower — with the depth of the development maximum X_{max} . The dependence of the average depth of the maximum of the cascade curve X_{max} on the shower energy E was found. The fluctuations of X_{max} were estimated at fixed energies. Experimental data and calculations by the QGSJETII-04 model for a proton and an iron nucleus were used to estimate the mass composition of cosmic rays of highest energies.

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