VARIOUS METHODS OF ESTIMATION OF ARRIVAL DIRECTIONS OF GIANT AIR SHOWERS

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To estimate the arrival direction of a giant air shower one has to have any model of its space-time structure. The simplest model of the shower time front is a model of the flat front when all particles are located in this front plane. It was shown that possible errors in estimates of the zenith and azimuthal angles which characterize the arrival directions may be as large as 5^o or even more. The χ^2 method gives very large values of χ^2. That means that this model is inconsistent with the data. So the calculated shower time front for both electrons and muons may fit the data and thus provide better accuracy. The standard mathematical procedure to interpret data is the χ^2 method. This method leads to reasonable estimates of the zenith and azimuthal angles. In some cases the minimax procedure may be utilized to interpret data. It was shown,that the possible error in estimates of the zenith and azimuthal angles may be decreased up to 0.5^o. At last the fuzzy uncertain variables and the possibility theory are suggested here to use for interpreting the data. Calculations were carried out in terms of the quark-gluon string model for primary protons and observation level of 1020 g/cm^2. The Landau- Pomeranchuk-Migdal effect and interactions of neutral pions the with nuclei in the atmosphere at high energies are taken into account. The Monte-Carlo method was used for primary protons while cascades from numerous charged pions were considered with the help of cascade equations. Though experimental statistics is very low no evidence is found to prefer any directions. Thus the isotropic distribution of the arrival directions of giant air showers with energies above 10^{19} eV seems to fit data.