

Method of separation between light and heavy groups of primary CR nuclei by LDF of Cherenkov light in the range 300-3000 TeV

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The well-known problem of chemical composition in the range before the knee in the cosmic-ray energy spectrum, 300-3000 TeV, has not yet been solved due to very small statistics collected from direct experiment. For most EAS experiments the region lower than 1000 TeV is below threshold. In the HiSCORE experiment the lateral distribution function (LDF) of Cherenkov light produced by EASs developing in the atmosphere from high energy primary particles (gamma rays, protons, nuclei) at energy more than 300 TeV can be measured in detail for millions of individual events. The shape of LDF is very sensitive to the depth of EAS maximum and as a result to the sort of primary particles. In this report, we developed a method and studied the possibility to separate heavy and light groups of nuclei using the 'knee-like' fitting functions of LDF. We revealed which parameters of fitting functions are the most sensitive to the sort of primary nuclei and showed that the additional fluctuations caused by the procedure of measurement (measurement fluctuation) should be known in detail. We carried out our investigation on CORSIKA- simulated data of LDF and compared it with the experimental data obtained in the HiSCORE array, estimated the measurement fluctuation and showed that at least two groups of particles P+He and CO-Fe can be separated.

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