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Mass composition anisotropy with the TA SD data

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Mass composition anisotropy is predicted by a number of theories describing sources of ultra-high-energy cosmic rays.
Event-by-event determination of a type of a primary cosmic-ray particle is impossible due to large shower-to-shower fluctuations, and the mass composition usually is obtained by averaging over some composition-sensitive observable determined independently for each extensive air shower (EAS) over a large number of events.
In the present study we propose to employ the observable ξ used in the mass composition analysis of the Telescope Array surface detector (TA SD) data for the mass composition anisotropy analysis.
The ξ variable is determined with the use of Boosted Decision Trees (BDT) technique trained with the Monte-Carlo sets, and the ξ value is assigned for each event, where $\xi = 1$ corresponds to an event initiated by the primary iron nuclei and $\xi = -1$ corresponds to a proton event.
Use of ξ distributions obtained for the Monte-Carlo sets allows us to separate proton and iron candidate events from a data set with some given accuracy and study its distributions over the observed part of the sky.
Results for the TA SD 12-year data set mass composition anisotropy will be presented and possible applications for the cosmic-ray source models will be discussed. This presentation contains results we would like to include in a TA highlight talk.

Keywords

Collaboration

Telescope Array

other Collaboration

Subcategory

Experimental Results

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