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A study of analysis method for the identification of UHECR source type

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The autocorrelation analysis using the arrival direction of Ultra High Energy Cosmic Rays (UHECRs) has been previously reported by the Telescope Array (TA) experiment. It is expected that the autocorrelation function reflects the source distribution. We simulate the expected arrival direction distribution of the cosmic rays using the catalogs of candidate sources. We take into account random deflection in the magnetic fields, with the magnitude of deflection determined by the charge and energy of the cosmic rays, coherence length and magnitude of the extragalactic magnetic field, and by distance to source. In addition, in order to compare with the results of TA, we consider the TA exposure. We compare the autocorrelation of the arrival directions corresponding to different source catalogs with the isotropic distribution. We calculate the autocorrelation function for each type of source candidates using this procedure. We will discuss the ability of this method to identify the source type of UHECRs.

Keywords

UHECR, anisotropy, EGMF, radio galaxy, autocorrelation

Collaboration

Telescope Array

other Collaboration

Subcategory

Experimental Methods & Instrumentation

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