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The study of the Cherenkov light distribution for LACT

The Large Array of Imaging Atmospheric Cherenkov Telescopes (LACT), comprising 32 telescopes, is currently under construction at the LHAASO site. The array will cover an area of nearly 1 km² and provide a unique platform for measuring the lateral distribution of Cherenkov light from extensive air showers. This paper systematically investigates the characteristics of this lateral distribution using CORSIKA simulation data. We analyzed the lateral distribution properties of gamma-ray showers across a range of energies and incident angles. Traditional fitting functions are found to be inadequate for accurately modeling the far-region distribution beyond 600 meters. To address this, we developed a multi-segment piecewise function that achieves precise fitting over a large dynamic range, significantly improving the accuracy of lateral distribution modeling in both near-core and far-region areas. A multidimensional parameter analysis further revealed intrinsic correlations between the fitting parameters and key physical quantities, such as the shower maximum position and primary particle energy. These findings lay the groundwork for future developments, including the creation of a novel energy reconstruction method for gamma-ray showers based on the improved lateral distribution fitting.

Keywords: LACT, Gamma-rays, lateral distribution fitting, energy reconstruction.

Collaboration(s)

LACT

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