

Estimation of the atmospheric transmission profile with the IACT background data

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We present a novel method to determine the atmospheric transmission profile from the isotropic background events detected by the Imaging Atmospheric Cherenkov Telescopes. We construct a longitudinal distribution of the observed Cherenkov light by relating its emission height to a specific pixel in the camera. For this, we use a simple geometric model based on the parameters of the air shower. By comparing this distribution between cloudless and cloudy atmospheres, we are able to obtain the transmission profile during data acquisition.

Using Monte Carlo simulations of a subarray of four Large-Sized Telescopes of the upcoming Cherenkov Telescope Array Observatory, we have evaluated the performance of the proposed method and tested a number of possible systematic errors that could influence the method. The proposed method achieves typical systematic accuracy within a few per cent. The aggregated profiles of the observed Cherenkov light can be reconstructed with a statistical accuracy of *less than* 5% with only a 5-minute exposure.

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