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Muon-based Gamma/Proton Discrimination Study with LACT-KM2A Joint Observation

The Large Array of Imaging Atmospheric Cherenkov Telescopes (LACT) is an array of imaging atmospheric Cherenkov telescopes, while the Muon Detector (MD) of the square kilometer array (KM2A) measures the muon component of extensive air showers. Both are located at the LHAASO site. KM2A has demonstrated significant gamma/proton discrimination power, ranging from $\sim 10^2$ to $\sim 10^5$ at energies above several tens of TeV, particularly when the shower core is positioned within its boundaries. In the joint observations conducted by LACT and KM2A, LACT provides high-resolution measurements of the core position and shower direction, especially for events where the core lies outside the KM2A area. This capability significantly extends the effective detection area and enhances angular resolution. The gamma/proton discrimination ability, as determined by the muon component detected by the MD for events with cores positioned outside the KM2A, is a crucial focus of this study. This work aims to explore the gamma/proton discrimination capability for events observed by both LACT and KM2A, showcasing the effective detection area and the associated gamma/proton discrimination capabilities.

Collaboration(s)

LHAASO collaborations

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