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Reconstruction of coincident EAS events between LHAASO and ENDA

In the investigation of the "knee" region within the cosmic ray energy spectrum, energy determination and composition separation are of paramount importance. Electron - Neutron Detector Array (ENDA) is designed to detect not only electrons in the proximity of extensive air shower (EAS) core, but also thermal neutrons generated in the ground by hadrons which constitute the "backbone" of EAS and carry vital information regarding the primary cosmic rays. ENDA-64 consisting of 64 detectors is employed inside Large High Altitude Air Shower Observatory (LHAASO). Hybrid detection of EAS by using LHAASO and ENDA can provide a full secondary particle measurement of EAS including electrons, muons, atmospheric Cherenkov light and hadrons, exhibiting the unique capacity for separating primary components and accurately measuring energy. ENDA-64 is constituted by 4 clusters and a cluster consisting of 16 detectors is configured in a 4×4 matrix layout. The inter - detector distance is approximately 4.5 m. The inter - detector distance of Electromagnetic component detectors (ED) of LHAASO-KM2A is 15 m. Besides, ENDA-64 can measure electrons at higher dynamic range than ED. In practical implementation, by selecting EAS events with cores falling inside ENDA, a comprehensive analysis of coincident events between LHAASO-KM2A (further from EAS cores) and ENDA (close to EAS cores) is performed to obtain EAS parameters. This methodological approach enables us to comprehensively acquire the full lateral distribution of electrons, with the ultimate objective of enhancing the precision in the reconstruction of parameters such as core position, size and age.

Collaboration(s)

on behalf of LHAASO collaboration

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