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Gamma Hadron Separation using Pairwise Compactness Method with HAWC

Saturday 1 August 2015 15:30 (1 hour)

The High-Altitude Water Cherenkov (HAWC) Observatory is a ground based air shower array deployed on the slopes of Volcan Sierra Negra in the state of Puebla, Mexico. While HAWC is optimized for the detection of gamma-ray induced air showers, the background flux of hadronic cosmic-rays is 4 orders of magnitude greater, making background rejection paramount for gamma-ray observations. On average, gamma-ray and cosmic-ray showers are characterized by different spatial distributions of charge at ground level. We will present a method to identify the primary particle type in an air shower that uses the spatial relationship of triggered PMTS (or "hits") in the detector. For a given event hit-pattern on the HAWC array, we calculate the mean separation distance of the hits for a subset of hit pairs weighted by their charges. By comparing the mean charge and mean separation distance for the selected hits, we infer the identity of the primary particle. We will report on the efficiency for identifying gamma-rays and the performance of the technique with data, specifically the resulting observed signal of the Crab Nebula.

Collaboration

HAWC

Registration number following "ICRC2015-I"

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