Contribution ID: **9** Type: **not specified**

Enhancing Pierre Auger Observatory's Neutral Particle Detection Capabilities

Thursday 27 June 2024 09:20 (20 minutes)

The main goal of this work is to enhance the Pierre Auger Observatory's neutral particle detection capabilities. This will be achieved through the introduction of two distinct methods, both currently based solely on simulated data.

The first method aims to improve gamma/hadron discrimination by employing a novel variable that exploits the disparity in the spatial and temporal distribution of particle clusters between hadronic and electromagnetic/neutral showers.

The second method involves separating an event's signal into its electromagnetic and muonic components, followed by the application of simple cuts. The main objective of this procedure is to expand the Pierre Auger Observatory's field of view to include vertical electron neutrinos.

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Session Classification: Astroparticle Physics