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Calibration and Performance of the Surface Scintillator Detector of the Pierre Auger Observatory

The Pierre Auger Observatory has led to significant advances in our understanding of ultra-high-energy cosmic rays. These new insights have driven a major upgrade of the Observatory, known as AugerPrime, through which the experiment has entered its Phase-II, a new period of data collection. A key part of the upgrade is adding surface scintillator detectors (SSD) on top of the existing water-Cherenkov detectors (WCD). The main goal is to leverage their different responses to the electromagnetic and muonic shower components, enhancing the reconstruction of the primary cosmic-ray mass. In this contribution, we present the methods that involve analyzing peak and charge distributions of atmospheric muons for accurate calibration during extensive air-shower event reconstruction, along with the development of a rate-based algorithm for independent calibration. We also show the performance of the SSDs with Phase-II data, including PMT reliability and stability of key parameters, such as gain and signal-to-noise ratio.

Collaboration(s)

The Pierre Auger Collaboration

Author: CONTE, Matteo Presenter: CONTE, Matteo Session Classification: PO-1

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