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Zenith Angle Distribution of Incoherent Cosmic Ray Muon Flux Using CREDO Smartphones

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The Cosmic-Ray Extremely Distributed Observatory (CREDO) was established to detect and study ultra high-energy cosmic ray particles. In addition to making use of traditional methods for finding rare and extended cosmic ray events such as professional-grade EAS arrays, as well as educational 'class-room'detectors, CREDO also makes use of cameras in smartphones as particle detectors. Beyond the primary scientific goal of the CREDO project, to detect Cosmic Ray Ensembles, is the equally important educational goal of the project. To use smartphones for EAS detection, it is necessary to demonstrate that they are capable of effectively registering relativistic charged particles.
In this paper we have shown that the distribution of the zenith angle of particles responsible for the emergence of tracks in the smartphone captured images is in agreement with the expected distribution of the zenith angle of single, incoherent, cosmic ray muons. It is difficult, if not impossible, to imagine different mechanisms leading to such a distribution, and we believe it clearly demonstrates the suitability of smartphone-based detectors in supporting the more traditional cosmic ray detectors. We confirm the idea that smartphones can operate in practice as 'particle pocket detectors', sensitive to charged relativistic cosmic particles and hence can be used effectively by the CREDO Project and other similar initiatives.

Keywords

particle detection, incoherent muons, zenith angle distribution

other Collaboration

Cosmic Ray Extremely Distributed Observatory (CREDO) Collaboration

Collaboration

Subcategory

Experimental Methods & Instrumentation

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