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Event rates of UHE photons cascading in the geomagnetic field at CTA-North

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Photons in the EeV range and beyond are expected from top-down models of UHECR production and from the GZK effect. As they reach the Earth, they have a non-zero probability of converting into an electron/positron pair in the geomagnetic field and producing an electromagnetic shower above the atmosphere. In this paper, we present a new method to search for cascading UHE photons with gamma-ray telescopes based on Monte-Carlo simulations and multivariate analyses. Considering the future CTA-North experiment in La Palma, Spain, we show that such a method provides an efficient cosmic-ray background rejection with little loss of cascading UHE photon events. We also estimate that if gamma-ray bursts photon emission extends to the EeV regime, the number of expected events in 30 hours of observation time can go up to 0.17.

Keywords

cosmic ray ensembles; ultra-high energy photon; CTA; GRB

other Collaboration

Cosmic Ray Extremely Distributed Observatory (CREDO) Collaboration

Collaboration

other (fill field below)

Subcategory

Experimental Methods & Instrumentation

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