

Kevin Almeida Cheminant / Search for ultra-high energy photons through the preshower effect with CTA telescopes

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As ultra-high energy photons (EeV and beyond) propagate from their sources of production to Earth, radiation-matter interactions can occur, leading to an effective screening of the incident flux. In the ultra-high energy domain, photons can undergo e^+ / e^- pair production when interacting with surrounding geomagnetic field, which in turn can produce cascade of electromagnetic particles called preshower. Such cascade can initiate air showers in the Earth's atmosphere that gamma-ray telescopes, such as the next-generation gamma-ray observatory Cherenkov Telescope Array, can detect through Cherenkov emission. We study the feasibility of detecting such phenomena using Monte-Carlo simulations of nearly horizontal air showers for the example of the La Palma site of the Cherenkov Telescope Array. We investigate the efficiency of multivariate analysis in correctly identifying preshower events and cosmic ray dominated background. The effective area for such kind of events are also investigated and event rate predictions related to different ultra-high energy photons production models are presented.