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Cosmic-Ray Events as Background in Imaging Atmospheric Cherenkov Telescopes

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Abstract content

The dominant background for observations of gamma-rays in the energy region above 50 GeV with Imaging Atmospheric Cherenkov telescopes are cosmic-ray events. The images of most of the cosmic ray showers look significantly different from those of gamma-rays and are therefore easily discriminated. However, a small fraction of events seems to be indistinguishable from gamma-rays. This constitutes an irreducible background to the observation of high-energy gamma-ray sources, and limits the sensitivity achievable with a given instrument. Here, a Monte Carlo study of gamma-like cosmic-ray events is presented. The nature of gamma-like cosmic-ray events, the shower particles that are responsible for the gamma-like appearance, and the dependence of these results on the choice of the hadronic interaction model are investigated. Most of the gamma-like cosmic ray events are characterised by the production of high-energy pi0 early in the shower development which dump most of the shower energy into electromagnetic sub-showers. Also Cherenkov light from single muons can mimic gamma-rays in close-by pairs of telescopes. Differences of up to 25% in the collection area for gamma-like proton showers between QGSJet/FLUKA and Sibyll/FLUKA simulations have been found.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 597-600

Primary author(s) : Dr. MAIER, Gernot (McGill University, Montreal)

Co-author(s) : Dr. KNAPP, Johannes (University of Leeds)

Presenter(s) : Dr. MAIER, Gernot (McGill University, Montreal)

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