



Cosmic-Ray Events as Background in Imaging Atmospheric Cherenkov Telescopes

G.MAIER¹, J.KNAPP²

¹ *McGill University, 3600 University Street, H3A 2T8 Montreal, QC, Canada,*

² *University of Leeds, LS2 9JT Leeds, United Kingdom*

maierg@physics.mcgill.ca

Abstract: 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 π^0 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.