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Particle Identification for Cosmic Rays at the CONDOR Observatory

The CONDOR (COmpact Network of Detectors with Orbital Range) project aims to establish the highest-altitude observatory for cosmic rays at the Atacama Astronomical Park in northern Chile. Positioned at 5.300 meters, CONDOR will provide unique sensitivity to low-energy cosmic ray (CR) particles, particularly from ˜100 GeV, contributing to our understanding of cosmic rays and their interactions with Earth's atmosphere. We develop a particle identification tagger using advanced statistical analysis techniques to classify cosmic rays detected by the observatory as either Protons or Photons. Leveraging Monte Carlo simulations from CORSIKA and statistical fitting applied. Our tagger distinguishes between particle showers induced by different types of CR. Preliminary results show high classification accuracy, enhancing our ability to differentiate proton and photon showers. This capability is crucial for studying astrophysical sources such as gamma-ray bursts and active galactic nuclei and understanding cosmic ray composition at high energies. Our work will improve data quality and particle identification at CONDOR, providing an essential tool for future analyses in astroparticle physics.

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