

Arrival time distribution of muons from extensive air showers

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The upgraded surface detectors of the Pierre Auger Observatory will provide data that enables the separation of signals due to the muonic component of extensive air showers. Such information permits the application of new event reconstruction methods, that will contribute to composition studies of high-energy cosmic rays and the understanding of their origin. Considering the idea of using the muonic signals from the upgraded surface detectors, we studied the characterisation of muon distributions in extensive air showers using CORSIKA simulations of showers initiated by protons and calcium nuclei with energy of 10^{19} eV and QGSJet-04 as the model of hadronic interaction for high-energies. We analysed the time distribution of muons arriving at the observation level for different radial distances to the shower core. The results were compared with analytical expressions, and agreement was found. The understating of such distributions is crucial for the development of reconstruction methods that can be applied to data from the upgraded Auger Observatory.

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