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Simulation of a Water Cherenkov Detector Response tothe Background of Cosmic Rays at Pamplona Norte de Santander altitude (2300 m a.s.l.)for the LAGO Collaboration

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KEYWORDS:
Cosmic Rays, Water Cherenkov Detector, Monte Carlo Simulations.

ABSTRACT:

The studies of cosmic rays (CR) is mainly performed by using detectors installed at theground; this detectors registered the secondary radiation produced by the interaction ofCR with Earth atmosphere. Since 2010 Colombia is an active member of the large scaleobservatory LAGO (Latin American Giant Observatory). This observatory operated anarray of Water Cherenkov Detectors (WCDs) spanned over Latin America in a wide rangeof latitudes. The installation of a new WCD requires the perform of a series of simulation,from the calculation of the flux of primaries that arrive to the Pamplona atmosphere untilthe WCD response to the secondary radiation. Here we show the signal expected atPamplona, Norte de Santander city. For this we have use the AGO's toolkit ARTI, aframework of computational techniques and codes (CORSIKA, GEANT4, C++, Python) toestimated the WCD signals produced by cosmic radiation at ground. As main results, thespectrum of secondaries here calculated fits with the expected and the WCD responseallows to us to separate the signal deposited by muons from the electrons/positron ones. Inparticular, our calculations shows the muon signal far away from the noise signal, so weexpected that a WCD installed at Pamplona can works as a muon counting. As a finalresults, we have checked the capability of the WCD simulated to measured the muon halflife time, this implies that a WCD deployed at the University of Pamplona can be used asLab equipment to teach particle physics.

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