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Influence of Simultaneous particles on the LAGO's Water Cherenkov Detectors

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The Latin American Giant Observatory (LAGO), operates an extensive network of Water Cherenkov Detectors (WCD) by a non-centralized and collaborative network of Universities and Research Institutes in Iberoamerica. To estimate the charge distribution produced by secondaries particles interacting with WCDs, LAGO developed a simulation framework (ARTI). ARTI comprises a chain of simulations that starts with the well known primary flux of galactic cosmic rays that reach Earth and finish estimating the expected WCDs signals at any site on ground.

Based on the first stage of ARTI, that uses COSIKA to simulate the expected flux of secondaries that reach LAGO sites, we re-analyze this flux searching for simultaneous particles reaching the detectors. We perform a spatial analysis of CORSIKA's simulated air showers in the field of view of four typical WCD in extreme sites of the LAGO network and in time windows of the electronic acquisition system.

We have found that simultaneous particles reaching the WCD modify the deposited energy distribution into the detector even for low energy range and low altitude sites, compared with the previous single-particle approach. This result impacts the WCD's calibration and could play an important role in discriminating primaries and defining observables for GRBs detection at high altitude LAGO sites.

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LAGO; WCD; secondary cosmic rays

Collaboration

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Experimental Methods & Instrumentation

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