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A New Method for noise rejection in the Water Cherenkov Detectors of the LAGO project through Muon Decay measurement

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The Latin American Giant Observatory (LAGO) project consists of an extensive non-centralized network of Water Cherenkov Detectors (WCD) operated by a collaborative network of Universities and Research Institutes in Iberoamerica. The detectors of the network are built on the basis of commercial water containers, so they could have different geometries (but mostly cylindricals), different water purification methods, and different electronic-background sources. All these features generate distinctive profiles in the response to air shower particles measured by our detectors.

The most common sources of noise in the LAGO WCD detectors are related to the photomultiplier tube operation and detector aging. Noise is characterized for very short pulses at the LAGO data acquisition system level, imposing several challenges for its detection and correction. In this work we show a new noise rejection method based on the implementation of a secondary trigger validated through the calculation of the muon decay lifetime and the Michel's secondary electron spectrum. Energy calibration of the Michel's spectrum is supported by a dedicated instance of the LAGO ARTI framework to estimate the expected flux of secondary particles at each detector site and an implementation of each WCD in the Meiga framework, a new Geant4-based flexible simulator used in this case to estimate the WCDs response to the air shower particles flux.

Poster fallback option for rejected abstracts for parallel oral presentations

Does not apply

Authors: TABOADA, Alvaro (ITeDA, CNEA); FAUTH, Anderson (State University of Campinas); CASTROMONTE FLORES, CESAR M. (Universidad Nacional de Ingeniería); ASOREY, Hernan (Comision Nacional de Energia Atomica); SIDELNIK, Ivan (CONICET (Consejo Nacional de Investigaciones Cientificas y Técnicas) - Centro Atómico Bariloche - Argentina); OTINIANO, Luis

Co-author: FOR THE LAGO COLLABORATION (The LAGO Collaboration, see the complete list of authors and institutions at https://lagoproject.net/collab.html)

Presenter: CASTROMONTE FLORES, CESAR M. (Universidad Nacional de Ingeniería)

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