Contribution ID: **4**

Type: **Talk (in-person)**

New tools for better characterizing astroparticle physics sites and detectors for the Latin American Giant Observatory

Tuesday 6 September 2022 09:00 (20 minutes)

The Latin American Giant Observatory (LAGO) is an extended astroparticle observatory, consisting of a synchronised network of water Cherenkov detectors operating in Latin America and covering a wide range of altitudes above sea level and geomagnetic rigidity cut-offs[1]. LAGO is operated by the LAGO Collaboration, a highly collaborative organization with 100 members from more than 30 Iberoamerican institutions. LAGO research objectives are focused on studying of high-energy astrophysical and space weather and climate phenomena, by indirectly measuring the temporal evolution of the flux of galactic cosmic rays from ground level[2].
The interaction of such cosmic rays with the atmosphere produces a large number of secondary particles via radiative and decay processes. These true cascades of particles, collectively known as Extensive Air Showers, could reach up to 10^{11} particles at the instant of their maximum development.
To accomplish these tasks we have developed several computational tools[3]; that take advantage of the increasing computational capabilities available at high-performance computing facilities and in cloud-based computing environments, such as the European Open Scientific Cloud (EOSC)[4]. With these tools, we can calculate the expected particle flux at any place in the World, including real-time atmospheric and geomagnetic effects, reproducing the expected signals in different types of detectors. We can also calculate the impact in the expected flux due to the occurrence of transient astrophysical phenomena, such as those related to Solar Activity[5] or the high energy component of Gamma-Ray Bursts[6].
In this contribution, we will show how this very complex sequence of simulations is helping us to characterize new sites for our Observatory and to design new and improved astroparticle detectors for the LAGO detection network.

Primary authors: RUBIO MONTERO, Antonio Juan (CIEMAT (Research Centre for Energy, Environment and Technology)); PAGÁN-MUÑOZ, Raúl (CIEMAT); PARDO-DÍAZ, Alfonso (CETA-CIEMAT); SIDELNIK, Ivan (CONICET (Consejo Nacional de Investigaciones Cientifícas y Técnicas) - Centro Atómico Bariloche - Argentina); MAYO-GARCÍA, Rafael (CIEMAT); ASOREY, Hernán

Co-author: FOR THE LAGO COLLABORATION (LAGO)

Presenter: ASOREY, Hernán