XV Latin American Regional IAU Meeting (Cartagena de Indias, Colombia, 3-7 October 2016)
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MUON TELESCOPE (MUTE): A FIRST STUDY USING GEANT4

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Muon tomography is based on recording the difference of absorption of muons by matter, as ordinary radiography does for using X-rays. The interaction of cosmic rays with the atmosphere produces extensive air showers which provides an abundant source for atmospheric muons, benefiting various applications of muon tomography, particularly the study of the inner structure of volcanoes. The MuTe (for Muon Telescope) is a hybrid detector composed of scintillation bars and a water Cherenkov detector designed to measure cosmic muon flux crossing volcanic edifices. This detector consists of two scintillator plates (1.44 m^2 with 30 x 30 pixels), with a maximum distance of 2.0m of separation. In this work we report the first simulation of the MuTe using GEANT4 –set of simulation tools, based in C++ – that provides information about the interaction between radiation and matter. This computational tool allows us to know the energy deposited by the muons and modeling the response of the scintillators and the water cherenkov detector to the passage of radiation which is crucial to compare to our data analysis.

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ASTROCLIMATE, A CITIZEN SCIENCE CLIMATE AWARENESS

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Exploration and searching for life in other stellar systems have shown that its development and sustainability depend of very specific environment conditions. Due to that, preservation of the equilibrium of this conditions in our planet is very important, because small changes on it can generate high repercussions in its habitability. This work shows some preliminary results from an environmental monitoring network (RACIMO, Red Ambiental Ciudadana de Monitoreo) conformed by automatic meteorologic stations located on seven high-schools at metropolitan zone of Bucaramanga, Colombia. Data recorded by monitoring network are stored in an open web repository which can be accessed by citizens from any place with internet connection. These stations called UVAs, were developed under creative commons license, that is to say, software, hardware and data free, besides these can be built by students due to its flexibility. The UVAs are modular and reprogrammable, that is, any sensor can be added to the stations and then re-configure its firmware remotely. Besides, UVAs work in automatic way, after the first setup, they will be self-sufficient and won't depend of human intervention. The data, of each UVA, are recorded with a temporal synchrony and then are upload at central repository by means of WiFi, ethernet or GSM connection. The stations can be power supplied by a solar system or the electrical grid. Currently, UVA record variables such as: pressure, temperature, humidity, irradiance, iluminance, ambient noise, rain, cloudiness, CO2 and NO2 concentration, lighting, seismic movements and its geographic position. On other hand, a calibration system has been developed to validate the data recorded by RACIMO. This project, started from an astroclimate an exoplanets habitability conditions, became an independent citizen science project to rise awareness about the very particular conditions enjoyed in our Earth planet.

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