On the scientific motivation for a wide field-of-view TeV gamma-ray observatory in the Southern Hemisphere

Miguel Mostafá for the HAWC Collaboration and any scientist of good will that wants to join

February 27, 2017

Abstract

Observations of high energy gamma rays are an essential probe of the cosmic-ray acceleration mechanisms because they are created by cosmic rays interacting near their origin. The characteristics of the gamma-ray flux variability and spectra constrain the acceleration mechanisms and the environment of the accelerator. Detection of the highest energy gamma rays and the shortest timescales of variability are key considerations when designing the next generation of gamma-ray experiments.

Instruments with a wide field of view and large duty cycle are capable of continuously surveying the very high energy gamma-ray sky, mapping the diffuse emission, detecting emission from very extended regions, and observing transient events such as gamma-ray bursts. They also have the potential for discovering electromagnetic counterparts to gravitational waves and astrophysical neutrinos. I will present the scientific motivation for a next-generation water-Cherenkov observatory located at very high altitude in South America.