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All-particle cosmic-ray energy spectrum for TeV events measured with HAWC

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Content

In the past, due to the technological limitations of direct and indirect cosmic ray detectors, the observations made on the energy interval from 10 TeV to 1 PeV of the all-particle cosmic-ray energy spectrum have poor statistics and are dominated by large systematics errors. Nowadays, a new generation of instruments have taken the mission of studying this energy region, among them, the High Altitude Water Cherenkov (HAWC) observatory, which is an air shower detector built with the aim of monitoring the sky in search for gamma rays (E = 100 GeV - 100 TeV) and cosmic rays (from 100 GeV up to 1 PeV). The observatory is located at 4100 m a.s.l. at the Pico de Orizaba Volcano in Puebla, Mexico and consists of an array of 300 water Cherenkov detectors that covers 62% of a flat surface of 22,000 m^2. Due to its design and its high altitude, HAWC can provide high statistic measurements of the all-particle energy spectrum of TeV cosmic rays, this way, providing a bridge between the data from cosmic ray direct and indirect detectors. In this work, it is shown preliminary results on the total spectrum of cosmic rays between 10 TeV and 1 PeV obtained with HAWC data. The energy spectrum was reconstructed by applying the Unfolding Bayesian method on a subsample of events taken during the period of January, 2018.

Summary

Primary author(s) : Mr. MORALES SOTO, Jorge Antonio (Universidad Michoacana de San Nicolás de Hidalgo); Dr. ARTEAGA VELAZQUEZ, Juan Carlos (Instituto de Física y Matemáticas, Universidad Michoacana)

Co-author(s) : COLLABORATION, HAWC (Mexico and USA)

Presenter(s) : Mr. MORALES SOTO, Jorge Antonio (Universidad Michoacana de San Nicolás de Hidalgo)