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Studying Cosmic Ray Composition with IceTop using Muon and Electromagnetic Lateral Distributions

Thursday 30 July 2015 15:30 (1 hour)

In this contribution we will consider the methods at our disposal to estimate the mass of primary cosmic rays on an event-by-event basis using IceTop, the surface component of the IceCube detector at the geographical South Pole. We reconstruct the events using two lateral distribution functions, one for the muon component and one for the electrons and gamma rays. This results in a few parameters that are sensitive to primary mass: the muon density at large lateral distances and the steepness of the lateral distribution of the electromagnetic component of the air shower. This approach is complementary to the technique already used in IceCube, whereby one can get a mass sensitive parameter using the air shower size in IceTop together with several observables from the deep portion of the detector. Most importantly, this approach allows the study of composition-dependent anisotropy, since the zenith angle range is not constrained by the requirement of detecting the air shower in the deep detector.

Collaboration

IceCube

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Author: GONZALEZ, Javier (Bartol Research Institute, Univ Delaware)

Presenter: GONZALEZ, Javier (Bartol Research Institute, Univ Delaware)

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