

Contribution ID: 1111

Type: Poster

Sensitivity of seasonal variations of the muon energy spectrum in air showers to hadronic interaction models and the cosmic-ray mass composition

The energy spectrum of muons produced in air showers depends not only on the properties of the primary particle, but also on the atmosphere. This is because of the competition between decay and interaction of the parent mesons, which depends on the atmospheric density. As a result, the number of muons at ground shows a seasonal variation, with the strength of the variation depending on the primary cosmic-ray energy, mass, as well as the energy of the detected muons. In this contribution, we study the variations of the muon energy spectrum in air showers using MCEq, a numerical solver of the cascade equations. In particular, we show how the amplitude of the seasonal variations of the number of high-energy (O(TeV)) muons in the shower depends on the primary energy, mass, as well as the assumed hadronic interaction model. A measurement of these variations is possible with the combination of a surface air-shower array and a deep underground detector, which provide a simultaneous measurement of the primary energy and the high-energy muon multiplicity, and may provide a new way to probe the cosmic-ray mass composition and hadronic interaction models.

Collaboration(s)

Authors: VERPOEST, Stef; CATALAN OLAIS, Marisol (University of Delaware); SCHROEDER, Frank (Bartol Research Institute, Department of Physics and Astronomy, University of Delaware)

Presenter: VERPOEST, Stef

Session Classification: PO-1

Track Classification: Cosmic-Ray Indirect