

Contribution ID: 166

Type: Talk

Unfolding the Atmospheric Muon Flux with IceCube: Investigating Stopping Muons and High-Energy Prompt Contributions

Thursday 17 July 2025 15:50 (15 minutes)

Atmospheric muons produced in cosmic-ray air showers are classified as conventional muons from pion and kaon decays and prompt muons from heavy hadron decays. Conventional muons dominate at lower energies, and the prompt component becomes more significant at PeV energies and above. Precisely measuring the atmospheric muon flux from a few GeV to several PeV is valuable for advancing our understanding of cosmic-ray interactions and testing hadronic interaction models. Low-energy muons that stop within the IceCube in-ice array provide valuable information about the energy spectrum of muons from a few 100 GeV up to 10 TeV.

Machine learning techniques are employed to enhance event reconstruction and selection to provide insights into the conventional and prompt components. This contribution presents the unfolding of the energy spectrum of stopping muons in IceCube as well as the unfolding of high-energy muons to probe the prompt component.

Collaboration(s)

IceCube

Author: GUTJAHR, Pascal (TU Dortmund University)
Co-author: WITTHAUS, Lucas (TU Dortmund University)
Presenter: GUTJAHR, Pascal (TU Dortmund University)
Session Classification: CRI

Track Classification: Cosmic-Ray Indirect