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Parameterization of muon production profiles in the atmosphere

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Production of high-energy muons in cosmic-ray air showers, relevant for deep underground detectors, depends on the properties of the primary cosmic ray as well as the atmospheric temperature through the competition between decay and re-interaction of charged pions and kaons. We present a parameterization of muon production profiles based on simulations as a function of the primary cosmic-ray energy, mass and zenith angle, the minimum energy for a muon to reach the detector and an atmospheric temperature profile. We illustrate how this can be used to calculate muon bundle properties such as multiplicity and transverse size and their seasonal variations in the context of underground measurements in coincidence with a surface detector which fixes the primary cosmic-ray energy.

Keywords

Muons; Multiplicity; Underground; Seasonal variation; Cosmic rays; Air showers

Collaboration

other Collaboration

Subcategory

Theoretical Methods

Primary authors: VERPOEST, Stef (Ghent University); GAISSER, Thomas (University of Delaware)

Presenter: VERPOEST, Stef (Ghent University)

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