

SEMINAR TEILCHENPHYSIK

Thema

New multiparticle production variables: bridging the gap between air-shower observables and accelerator measurements

Abstract

Ultra-high-energy cosmic rays (UHECRs) interact with atmospheric nuclei at centre-of-mass energies reaching hundreds of TeV, initiating cascades of secondary particles known as Extensive Air Showers (EAS). These interactions offer a unique window into hadronic particle production in regions of phase space beyond the reach of current particle accelerators. This seminar focuses on two key observables of EAS: the atmospheric depth of the shower maximum ($X_{\max}$) and the number of muons at ground level (N_{μ}). For proton-induced EAS, a probabilistic model is developed to connect these observables with production variables built from the energy spectra of secondary hadrons of the initial UHECR-air interaction. Crucially, this connection enables the probing of hadronic interactions using air-shower data, independently of the hadronic interaction model. Since collider experiments can access similar secondary spectra, our framework bridges high-energy particle physics and astroparticle physics in a unified framework.

Vortragender

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Zeit

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im Auftrag:

Dr. Maik Becker