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A complete model of the signal in surface detector arrays and its application for the reconstruction of mass-sensitive observables.

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The principle of Air Shower Universality yields a method of understanding Extensive Air Showers of UHECRs as a superposition of different particle components whose spatial and temporal distributions follow individual analytical profile functions. We present a model of the expected densities of particles in time and space that uses the depth of the shower maximum,
$X_{\max}$, and the relative muonic content of the shower, R_μ, as input parameters. The model is fine-tuned and tested with simulated showers using different hadronic interaction models. Furthermore, we present results for the reconstruction of $X_{\max}$ and R_μ that allow for an event-by-event estimation of the mass of the primary particle, based on the responses of the water-Cherenkov and scintillator surface detectors of the Auger Observatory.

Keywords

Air Shower Universality; Pierre Auger; Auger; Air Showers; UHECR

Collaboration

other Collaboration

Subcategory

Theoretical Methods

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