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Sub-TeV hadronic interaction model differences and their impact on air-showers

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In the sub-TeV regime, the most widely used hadronic interaction models disagree significantly in their predictions for post-first interaction and ground-level particle spectra from cosmic ray induced air showers. These differences generate an important source of systematic uncertainty in their experimental use. We investigate the nature and impact of model uncertainties through a simultaneous analysis of ground level particles and first interaction scenarios. We focus on air shower primaries with energies close to the transition between high and low energy hadronic interaction models, where the dissimilarities have been shown to be the largest and well within the range of accelerator measurements. Interaction models are shown to diverge as several shower scenarios are compared, reflecting intrinsic differences in the model theoretical frameworks. Finally, we discuss the importance of interactions in the model switching energy regime (< 1 TeV) and the model choice effect in the number of hadronic interactions within cosmic ray induced air showers of higher energies.

Keywords

Hadronic models; CORSIKA; Monte Carlo generators; Systematic Uncertainties

Collaboration

other Collaboration

Subcategory

Theoretical Results

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