

Review of model predictions for extensive air showers

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In detailed air shower simulations, the uncertainty in the prediction of shower observable for different primary particles and energies is currently dominated by differences between hadronic interaction models. With the results of the first run of the LHC, the difference between post-LHC model predictions has been reduced at the same level than experimental uncertainties of cosmic ray experiments. At the same time new type of air shower observable, like the muon production depth, has been measured adding new constraints on hadronic models. Currently no model is able to reproduce consistently all mass composition measurement possible within the Pierre Auger Observatory for instance. We will review the current model prediction for various particle production observables and their link with air shower observables and discuss the future possible improvements.

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