Project Proposal

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Abstract

Different interaction models influence the development of hadronic showers in the atmosphere. However, it is tough to correctly model the interactions at the high energies in forward direction of the particles which are present in the extensive air showers since no experimental data exists. Therefore, data from particle accelerators need to be extrapolated to such energies, which, of course, gives rise to some uncertainties. Among all the post-LHC models available, mainly three can be considered for this project: EPOS LHC (Pierog & Werner 2009; Werner et al. 2006), SIBYLL 2.3d (Ahn et al. 2009; Engel 1999; Fletcher et al. 1994) and QGSJET II-04 (Ostapchenko 2011, 2014).

Since we do not have until now a clear comparison between data and interaction models, a new approach to this topic would consist in comparing the available data from IACTs with the most commonly used post-LHC models. This can be done by generating simulations resembling the existing offruns data publicly available from H.E.S.S and taking into account chemical contamination. From the comparisons between data and simulations of quantity like the atmospheric depth of the shower maximum (X_{max}), the size distributions and the final instrument response function (IRF), one can infer the systematics deriving from each model. Different energy ranges can be analyzed for testing different features of the models as well as exploiting better data quality.