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Modified Hadronic Interactions in CORSIKA 7

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Ulrich et al. have shown already in 2011 that changing the cross-section, elasticity and multiplicity of hadronic interactions at very high energies with respect to the standard hadronic interaction models has a direct impact on predicted depths of the shower maxima and numbers of muons at ground. We have expanded this work from the original 1D implementation in CONEX to full 3D simulations in CORSIKA, allowing us to quantify the effects of the modified interactions on other observables. We find that satisfying the latest constraints from the Pierre Auger Observatory on the number of muons at 1000 meters from the shower axis and depth of shower maximum simultaneously is challenging, but possible within a reasonable space of modifications.

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