Air shower genealogy for muon production

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What is this contribution about?

We study the ancestry of muons in UHECR (10^{17} ... 10^{19} eV) air shower simulations with CORSIKA 8 in order to quantify the importance/relevance of certain phase space regions of hadronic interactions for muon production.

Why is it relevant / interesting?

It is important to assess which “knobs to tune” in models of hadronic interactions and which phase-space is worthy to study with accelerator measurements.

What have we done?

We study the number of generations of muons and to what degree certain projectile species and energies contribute to it. Additionally we apply a “muon weighting technique“ to quantify the importance of pseudorapidity distributions.

What is the result?

We quantitatively confirm basic predictions of the Heitler-Matthews model but also show its limits, especially concerning the lateral spread of the muons.