



News from EM shower call (2021-04-29)

Jean-Marco Alameddine 2021-05-06



Installation / Status of MR !327

- MR !327 will introduce major changes in PROPOSAL for CORSIKA
 - → Improved interpolation routine, minor bugfixes, new installation process using conan
- CORSIKA will be fetching a released/tagged version of PROPOSAL
- Work on this MR has been essentially finished...
- ... but after rebasing to master, a new error occured when running the em_shower script
- This is related to changes in the handling of floating point exceptions in CORSIKA
- We made a PROPOSAL patch release to fix this issue
- \rightarrow MR !327 should be ready for merge (hopefully, this time for real...)



Particle cut - Energy loss cut (MR !345)

- This merge request introduces a (particle-dependent) threshold: Particles can only produce secondary particles with an energy above this threshold
- Everything below this threshold is treated as a continuous loss
- A good choice of this parameter can significantly decrease the runtime of CORSIKA
- The proposed name for this parameter is energy_resolution, better suggestions would be welcome
- Is has been discussed whether this threshold should always be the same as the particle cut
 - This is only well-defined if we use kinetic energies instead of total energies
 - Having a particle cut and the energy_resolution as separate options could be confusing and lead to mistakes by users



Photonuclear Secondaries (issue 411)

- Two types of hadronic interactions are possible for electromagnetic particles and muons:
 - $\blacksquare~e^-/\mu^-+Z \to e^-/\mu^- + {\rm hadronic}$
 - ${\color{black}\bullet} \ \gamma + Z \rightarrow {\color{black}\mathsf{hadronic}}$
- Interactions are negligible for electrons, but highly relevant for muons
- PROPOSAL is unable to produce explicit secondary particles for these interactions
- We discussed physical and technical details on how to handle these processes:
 - ightarrow Code-wise, a corresponding hadronic module should be called directly from the PROPOSAL interface
 - $\rightarrow\,$ As a first approximation, we could use a $\rho\text{-meson}$ as a approximation for the result of photohadronic interactions
 - ightarrow For more precise modeling, we probably need to use other, specific codes (SOPHIA, DPMJet, FLUKA, ...)



First steps in analyzing lateral shower profiles

- Lars started to analyze lateral profiles of EM showers
- First example: 1 TeV shower with 10 MeV particle cut



Observation height 4.1 km

- Plots still show unphysical artifacts which need to be investigated
- We believe these might come from the plotting



Longitudinal Profile Comparisons

 Juan presented comparisons of EM showers between CORSIKA 8 (using the new PROPOSAL interface) with AIRES 19.04



- Increasingly better agreement for the longitudinal profiles and charge excess
- Shift in maximum maybe due to slight differences in crosssections



Longitudinal Profile Comparisons

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- Using a different parametrization in AIRES has an impact on the profiles
- We need to investigate possible differences in processes, corrections and crosssections in more detail