

Merge requests important for EM showers

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Overview of current PR

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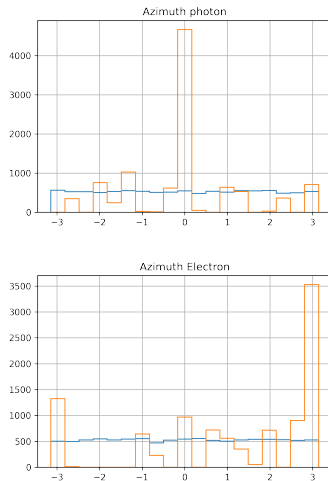
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Draft: Resolve "LongitudinalWriter fails in non vertical showers" !434 · created 1 day ago by Nikos Karastathis Bug Output	  1 updated 22 hours ago
Fix treatment of energy cut settings in ProposalProcessBase.hpp !433 · created 1 week ago by Jean-Marco Alameddine EM	  0 updated 6 days ago
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Resolve "Connection between PROPOSAL and hadronic interaction models" !430 · created 1 month ago by Felix Riehn Code Review Finished Discussion EM Hadronic Physics	    1  60 updated 1 week ago
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Draft: Resolve "upgrade pythia to version 8.3xx" !427 · created 2 months ago by Maximilian Reininghaus  First full release: CORSIKA 8.0.0 Development	  1  0 updated 1 month ago
Draft: Resolve "Cascade: Problems with Multiple Scattering (in combination with tracking)" !426 · created 2 months ago by Maximilian Reininghaus Bug Discussion EM Tracking	  1  0 updated 2 months ago

PR !432: bump proposal to version 7.3.1

- New patch release of PROPOSAL (27.04.2022)
- Full PROPOSAL release notes: [Here](#)
- Release includes some fixes that might improve the stability of PROPOSAL within CORSIKA 8:
 - Catch negative dNdx values (PR #277)
 - Catch calculation that can become nan in `Highland::CalculateTheta0` (PR #282)
- Fixes bug in sampling the azimuth angle in Compton scattering
 - Reason: A random number has not been correctly initialized
 - This lead to unphysical artifacts in the azimuthal distribution
 - However, [a first analysis by Nikos](#) showed that this doesn't change the bipolar structure in the radio pulses

⇒ PR only changes the PROPOSAL version in `conanfile.txt` and is "ready for review"



PR !430: Resolve "Connection between PROPOSAL and hadronic interaction models"

- Felix Riehn wrote an interface between hadronic energy losses in PROPOSAL and a hadronic event generator (currently: SIBYLL)
 - If a photon or a lepton interacts via a hadronic interaction, a ρ_0 with the corresponding energy is passed to the hadronic interaction model
 - Particles with an energy below an (adaptable) threshold and particles interacting with Argon are currently discarded (issues #497 & #498)
- The PR adds some basic UnitTests
- There has been some discussion in the PR about diffractive interactions
 - *"...for now what we have is good enough and short of what is done for SIBYLL the implementation is consistent with corsika7"* - Felix Riehn

⇒ I reviewed the PR positively. Apart from the discussion about the diffractive interactions, this should be ready to be merged. The muon/hadron numbers also show that the interface produces reasonable results.

PR !433: Fix treatment of energy cut settings in ProposalProcessBase.hpp

- In CORSIKA 8, before PR !345 has been merged, there has only been one "energy cut setting"
 - Particles were removed from the stack if their energy has been below the cut
 - PROPOSAL produced energy losses that were above 50 % of this cut
- Now, we have two separate settings:
 - **energy_propagation_threshold**: Particles with an energy below this threshold are removed from the stack
 - **energy_production_threshold**: PROPOSAL only produces secondary particles with an energy above this threshold
- However, PROPOSAL still uses 50 % of the energy set with **energy_production_threshold** as a threshold
 - This is basically a bug that is fixed with this PR
 - The simulation can now be optimized much better

⇒ We might want to improve/rethink the interface of these settings at some point. Still, this PR should be ready for review/discussion.

PR !426: Draft: Resolve "Cascade: Problems with Multiple Scattering (in combination with tracking)"

- Current issues due to the structure of `Cascade.inl`:
 - Multiple scattering by PROPOSAL is ignored / not correctly calculated
 - Energies at the beginning and end of steps are inconsistently communicated to PROPOSAL
 - Crosssections are not (always) evaluated at the correct energies
- The issue is being worked in my Maximilian Reininghaus
 - New interface for continuous processes
 - Redistributing the information on track and particle
 - No (public) commits on GitLab so far