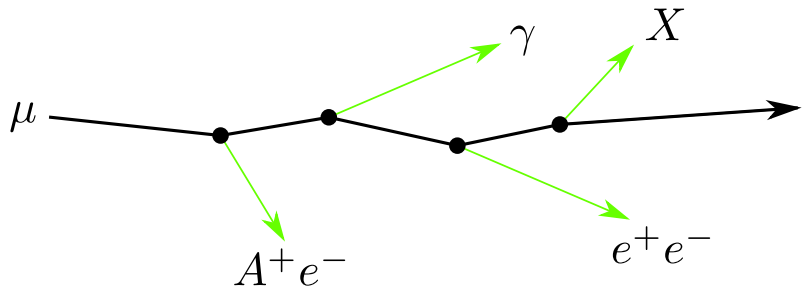


Update on EM particle distributions

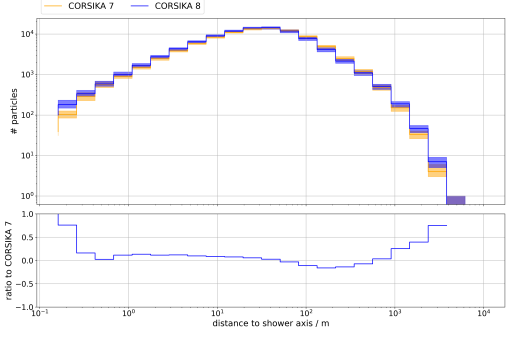
Jean-Marco Alameddine

2022-10-27

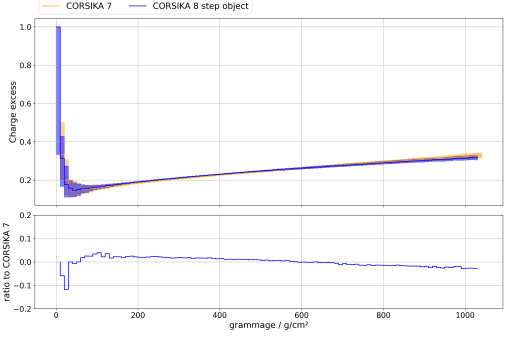
- Merged PR 426 has been merged (step branch) 🎉
  - → We now expect better lateral profiles "out of the box"
  - → Radio simulations already show promising results

100 TeV showers, 500 keV particle cut

- Simulation of 100 TeV electron-induced showers, particle cut of 500 keV
- These are the settings that have been used for some of the latest radio simulations



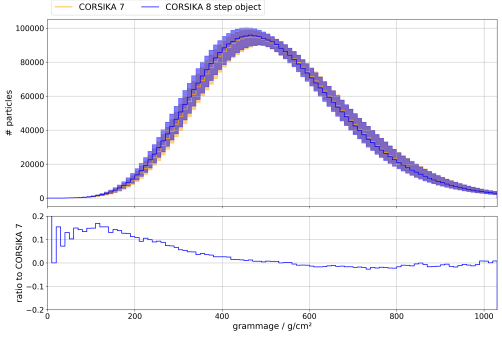
Lateral profile of charged particles around X_{max}



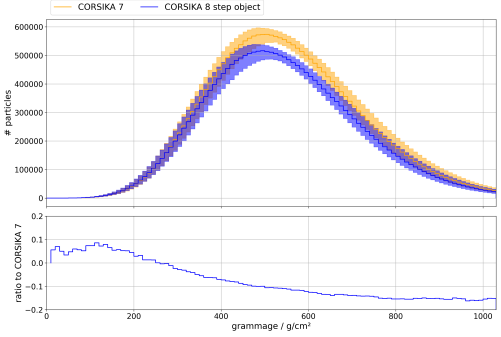
Charge excess

→ Better lateral profiles, charges excess also looking quite good! 👍

- Simulation of 100 TeV electron-induced showers, particle cut of 500 keV



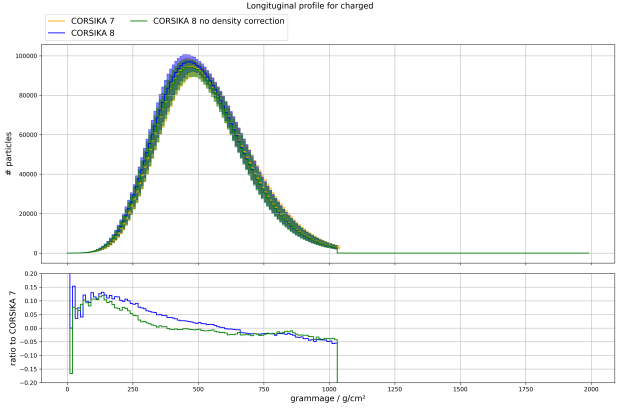
Longitudinal profile for charged particles



Longitudinal profiles for photons

→ Longitudinal profiles are still not perfect 😕

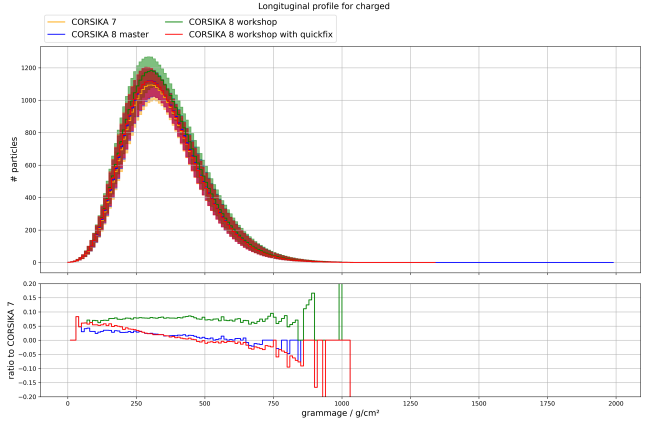
- Simulation of 100 TeV electron-induced showers, particle cut of 500 keV
- Comparison of simulations when enabling or disabling the ionization density correction in PROPOSAL
  - → When comparing PROPOSAL and EGS4 crosssections, we found out that this is one the major differences



→ Difference in the longitudinal profiles is visible

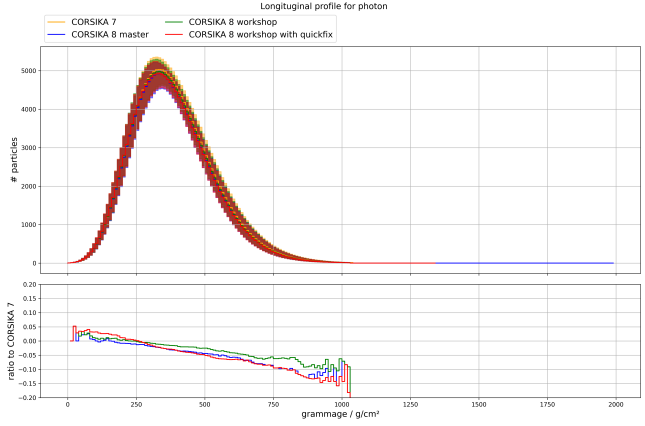
1 TeV showers, 2 MeV particle cut

- Comparisons of 1 TeV showers (particle cut 2 MeV) with results from the Heidelberg workshop
  - → Note: One out of 5000 showers got "stuck" during simulation (seed 2497)?!



→ Results agree within a few percent

- Comparisons of 1 TeV showers (particle cut 2 MeV) with results from the Heidelberg workshop
  - → Note: One out of 5000 showers got "stuck" during simulation (seed 2497)?!



→ Consistent "slope" in ratio for all CORSIKA 8 versions

- Comparisons of 1 TeV showers (particle cut 2 MeV) with results from the Heidelberg workshop
  - → Note: One out of 5000 showers got ”stuck” during simulation (seed 2497)?!