technische universität
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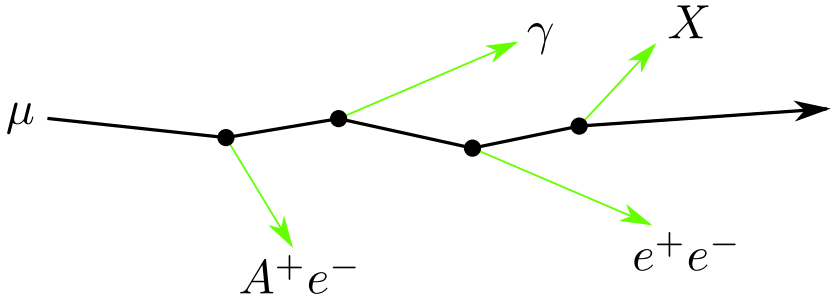

Updates from E.M. shower simulations

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C8 2021, Oct 21

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PROPOSAL 7.1.0 Release

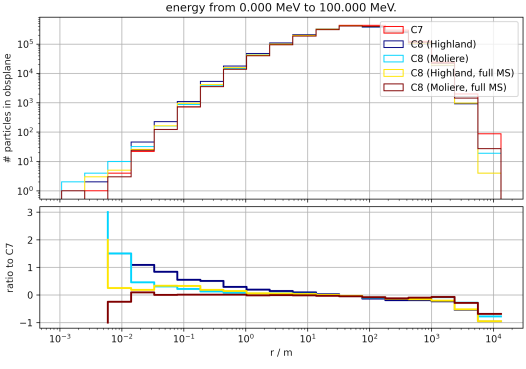
- fix interpolation issue
- fix bug in bremsstrahlung
- fix bug in photonuclear interaction (of an incident electron)
- different pair production (of an incident photon) parametrization (Tsai -> KochMotz), the one used in EGS4
- stochastic deflection:
  - in bremsstrahlung
  - in ionization
- add liquid Argon

CORSIKA 7/8 Differences

	CORSIKA 7	CORSIKA 8 (ICRC)	CORSIKA 8 (!396)
Bremsstrahlung	✓	(✓)	✓
LPM	✓	×	×
Ionization	✓	✓	✓
Pair Production (electron)	×	✓	✓
Photonuclear	×	×	(✓)
Annihilation	✓	✓	✓
Pair Production (photon)	✓	(✓)	✓
Muon Pair Production (photon)	✓	×	×
Photohadronic	✓	×	×
Photoelectric	✓	×	×
Rayleigh Scattering	✓	×	×
Compton Scattering	✓	✓	✓
Multiple Scattering	✓	(✓)	✓
Bremsstrahlung Deflection	✓	×	✓
Ionization deflection	✓	×	✓
Pair production (electron) deflection	×	×	×
Photonuclear deflection	×	×	×

Multiple Scattering

- Change from Highland parametrization (Gaussian approximation of Highland) to more exact Moliere theory
- Replacing the Endpoints according to Multiple scattering, instead of just changing the direction seems to solve the remaining lateral distribution differences
- However, combining this with a magnetic field is non-trivial



Argon

- Adding Argon to the atmosphere (not included until now in CORIKSA 8) changes the longitudinal profile significantly (in the right direction)