Technical discussion: The C8 roadmap and what to do from the EM side

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- Most important issues in developing CORSI KA8
- Mandatory homework for EM people:
  - Photohadronic interaction, interface to hadronic interaction models (Sibyll etc.)
  - LPM effect
  - Validation of e & μ multiple scattering
  - Validation of EM showers
- Possible homework for EM people:
  - Ionization (and pair production) losses for hadrons
  - Photoeffect for low-energy photons

Photohadronic interaction

- Photohadronic interaction: $\gamma N \rightarrow X$
- Photonuclear interaction: $\mu A \rightarrow \mu X$ (similar process, but with virtual photons)
- Currently, PROPOSAL in both cases returns a pseudoparticle to the stack, which is further on ignored
- Issue: AirShowerPhysics/corsika#411

LPM effect

- Suppression of bremsstrahlung and pair production at very high energies
- PROPOSAL has this implemented for charged leptons in media with homogeneous density since almost forever
- CORSIKA 7 contains an approximate treatment of the LPM effect in inhomogeneous media (Brief description)
- To do:
  - Implement LPM suppression for photon-induced pair production
  - Implement C7 treatment in PROPOSAL
  - Compare results of both methods in homogeneous medium
  - Compare VHE shower characteristics in C7 and C8

What can we do on our own, where do we depend on other modules

- LPM effect depends on fixing cascade.inl
  - The Neumann rejection can be implemented in the Propagator inside PROPOSAL as a cross-check (and to make inhomogeneous LPM available to other PROPOSAL users), but CORSIKA does not use the Propagator
  - Once cascade.inl is fixed, we estimate about two months for implementation and testing

What can we do on our own, where do we depend on other modules

- Photohadronic interaction depends on calling hadronic interaction modules
  - Intercepting the pseudoparticle and redirecting it to Sibyll etc. requires close interaction with other modules (and presumably fixing cascade.inl)
  - Felix Riehn estimated that this can be done in about two months

What can we do on our own, where do we depend on other modules

- Implementing the photoeffect can be done completely inside PROPOSAL
  - Implementation of the approximate formula presented earlier should be a matter of not more than a couple of weeks
  - Implementing more accurate tables of photoelectric effect would be significantly more complicated and medium-dependent; presumably this degree of sophistication is not necessary