

Photohadronic interactions in C8

C8 call, Jan 26, 2023

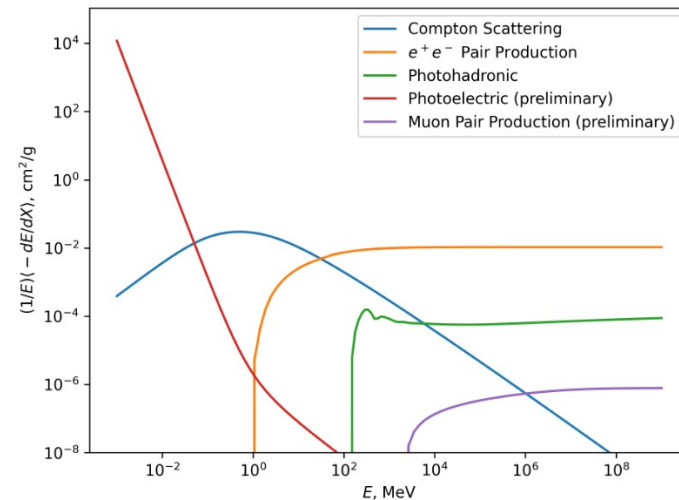
- * photon + nucleus \rightarrow hadrons
- * lepton + nucleus (photon* + nucleus) \rightarrow lepton + hadrons

Status in C8 (MR !465):

- part of PROPOSAL module (HadronicPhotonModel)
- cross section: PROPOSAL (pion threshold to HE)
- secondaries:
 - + any HE hadronic interaction model (Elab>80GeV)
 - + LE photon + nucleon interactions w SOPHIA
- SOPHIA is NOT a stand-alone process

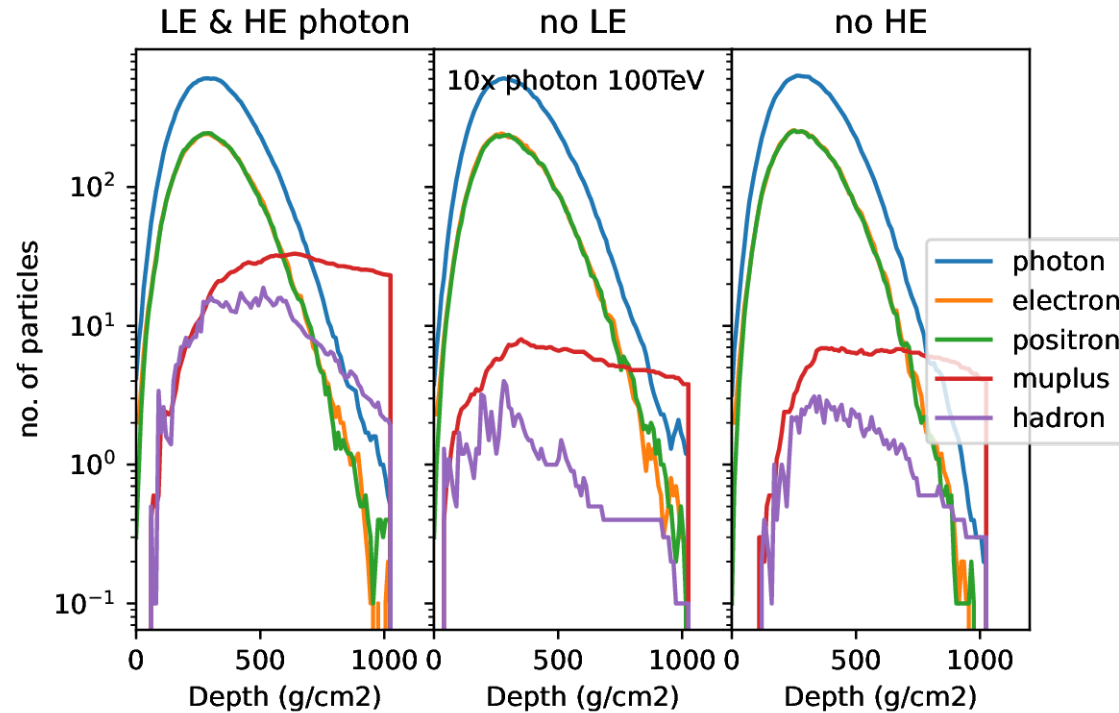
```
// energy threshold for high energy hadronic model. Affects LE/HE switch for
// hadron interactions and the hadronic photon model in proposal
HEPEnergyType heHadronModelThreshold = 80_GeV;
corsika::proposal::Interaction emCascade(
| | env, sophia, sibyll.getHadronInteractionModel(), heHadronModelThreshold);
// NOT available for PROPOSAL due to interaction threshold
```

PROPOSAL



A. Sandrock EM-meeting 03.02.2022

Effect of LE photohadronic



- 10 x 100 TeV photon
- vertical
- Fixed interaction
- Bethe-Bloch continuous
- 500MeV Ecut
- 80GeV HE threshold

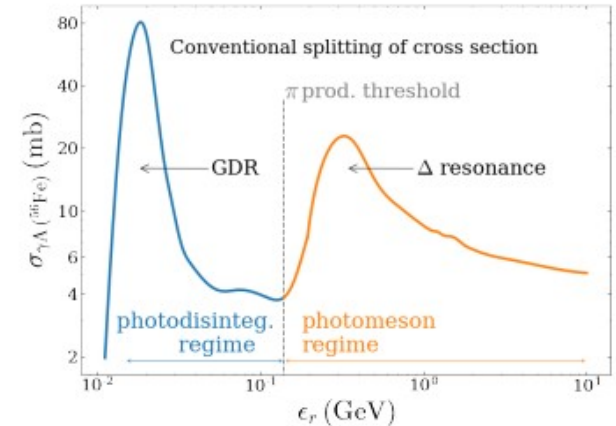
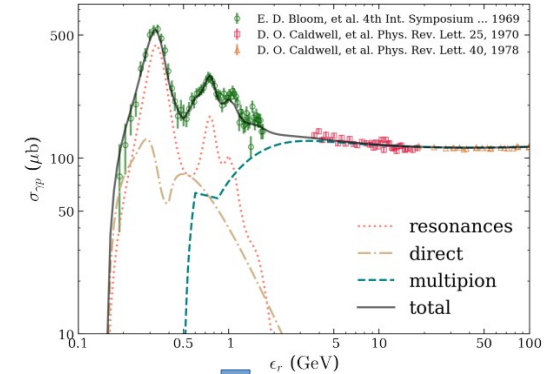
==> about the same contribution to muons from LE & HE interactions

What is missing ?

Fedynitch et al. JCAP 11 (2019) 007

Missing:

- Photon + nucleus interaction!
 - Final state interactions
 - Fermi broadening
- Photo-disintegration (~MeV: nucleus resonances!)
- intra-nuclear cascade



ToDo:

- * LE interactions play role for muons in HE showers ?
- * Effect of nuclear effects ?