Hadronic Showers in Geant4 **11.2.ref04**

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CERN EP-SFT Simulation meeting, 14 May 2024

Main Hadronic Changes in G4 11.2.ref04 *vs.* ref03

- *hadronic/models/abla/*
  - Added array extension for super-heavy nuclei. Code clean-up
- *hadronic/models/inclxx/*
  - *G4INCLInteractionAvatar* : do not use local energy for all antibaryons
- *hadronic/models/lend/ , particle_hp/*
  - Technical fixes to avoid compilation warnings/errors
- *hadronic/models/radioactive_decay/*
  - *G4BetaMinusDecay , G4BetaPlusDecay* : fixed rare cases of negative kinetic energy of the neutrino
    - In case that the Q-value is bigger than the mass difference, electron/positron in the tail of the spectrum may have more energy than residual free energy.
      To minimize the non-conservation of 4-momentum, in such cases neutrino and daughter nucleus are given 1 eV kinetic energy, leading to non-conservation of momentum because momentum of electron/positron is not counterbalanced.

Crashes & Warnings

- No crashes
- No infinite loops
- No new or more frequent warnings

Reproducibility

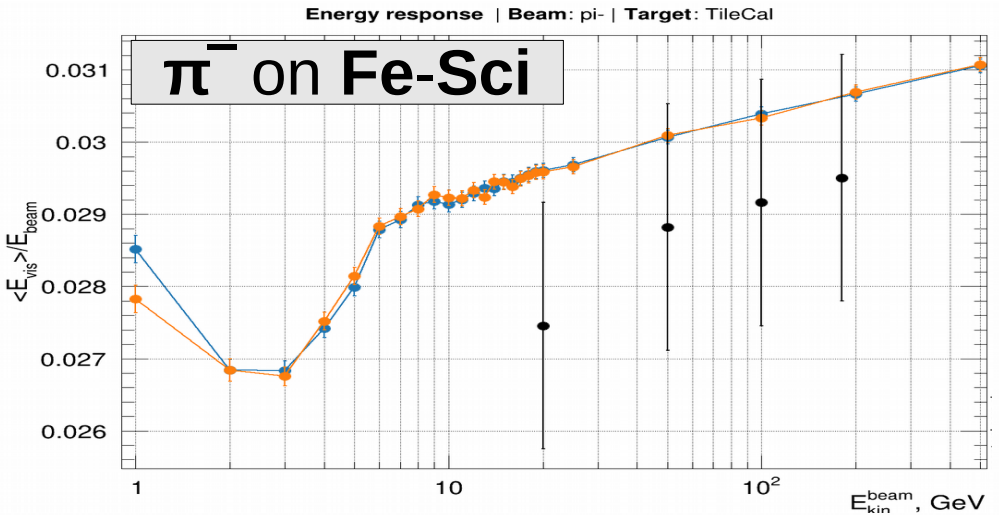
- OK in all cases

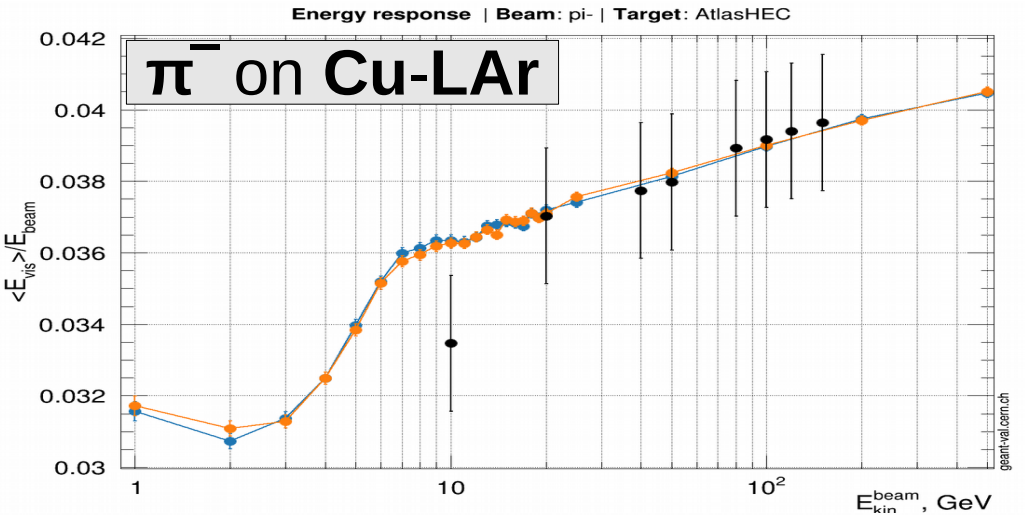
Pion- showers: FTFP_BERT

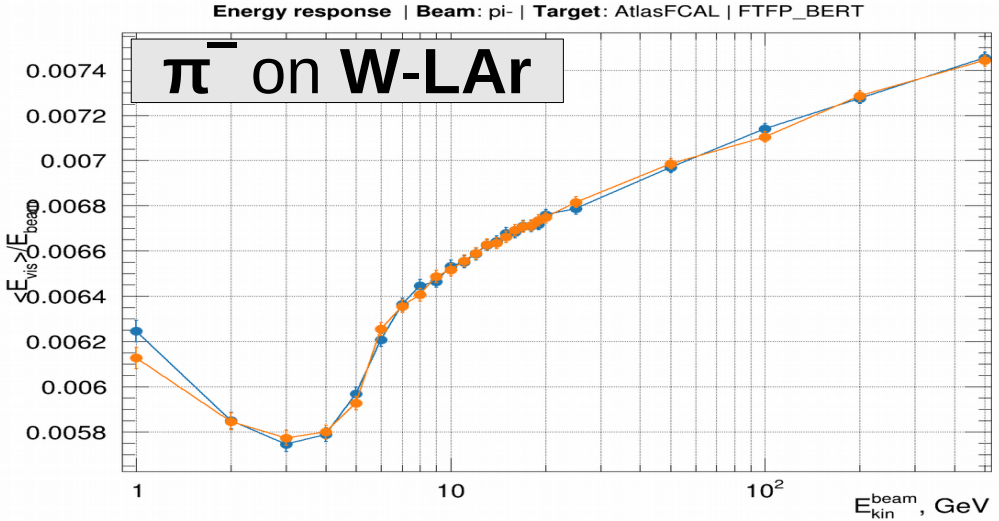
G4 11.2.ref03
G4 11.2.ref04

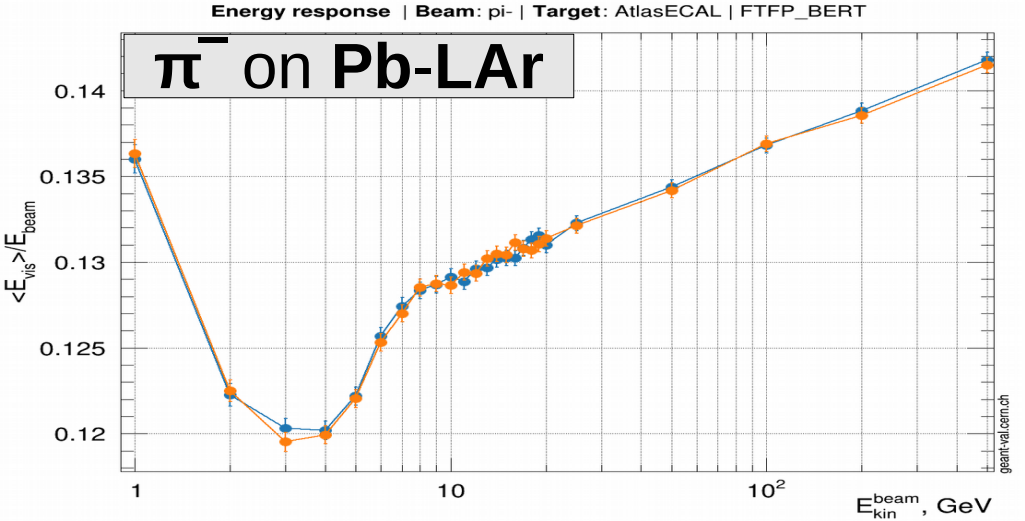
Note : conventional Birks treatment
(easier and no experimental h/e to fit !)

Energy Response

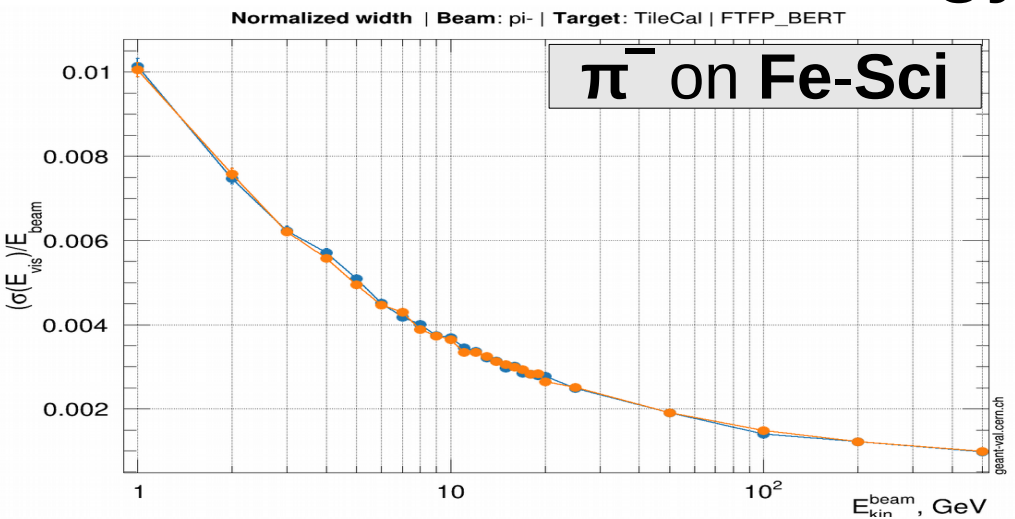


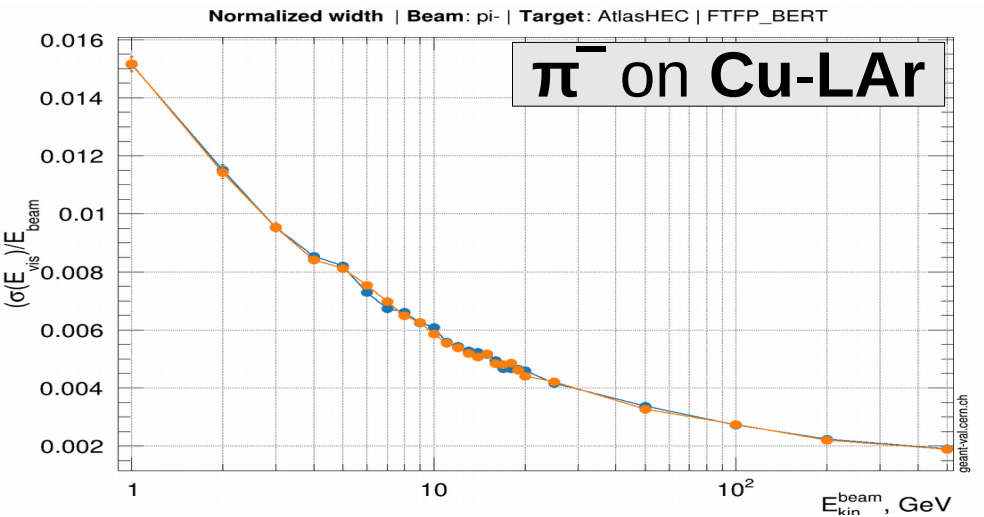


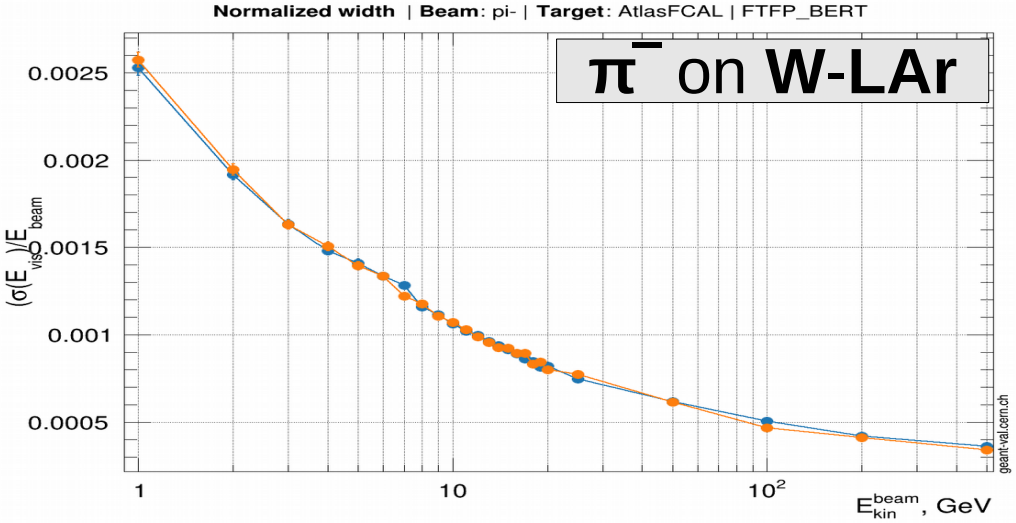


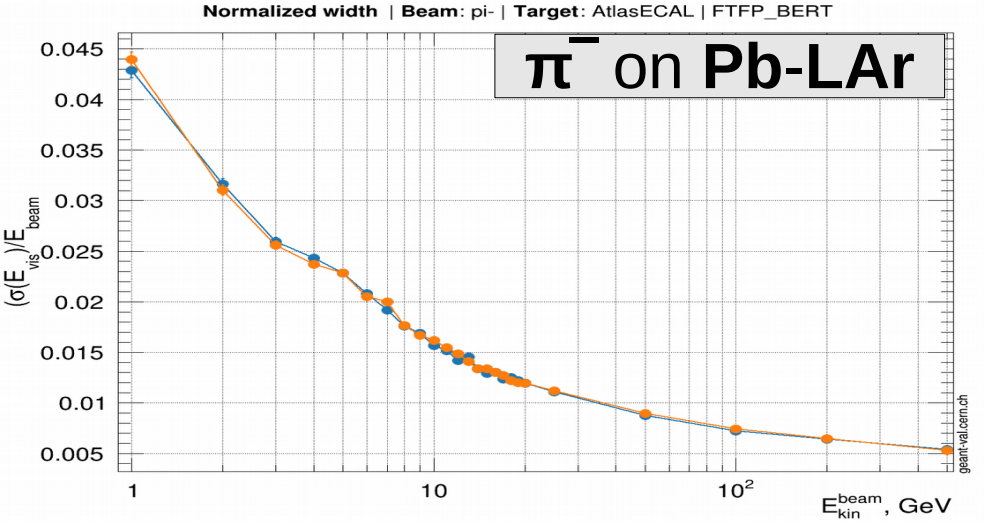


Energy Width

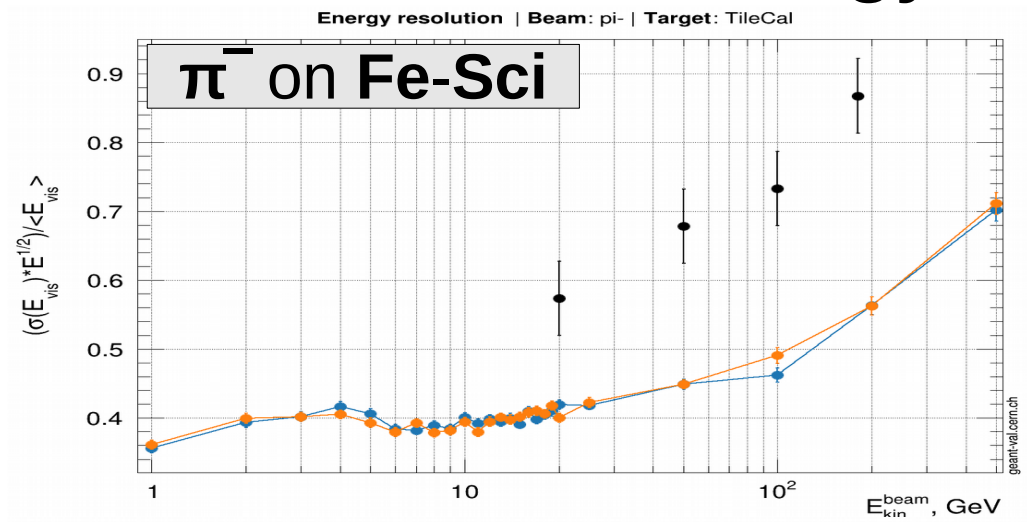


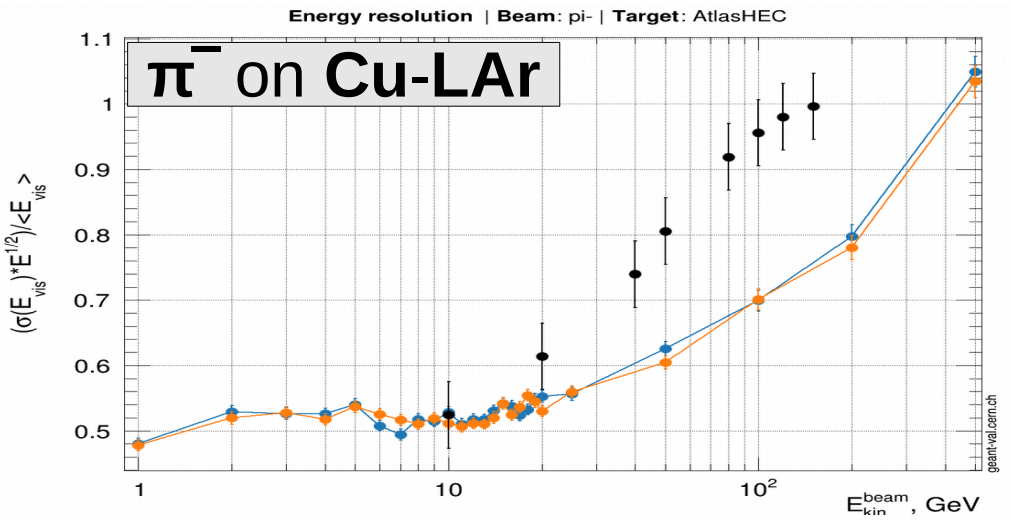


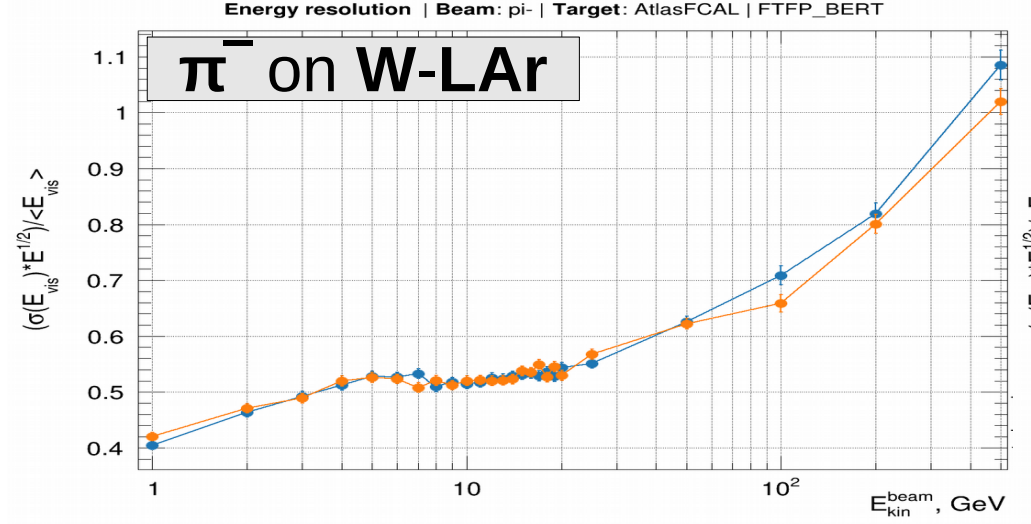


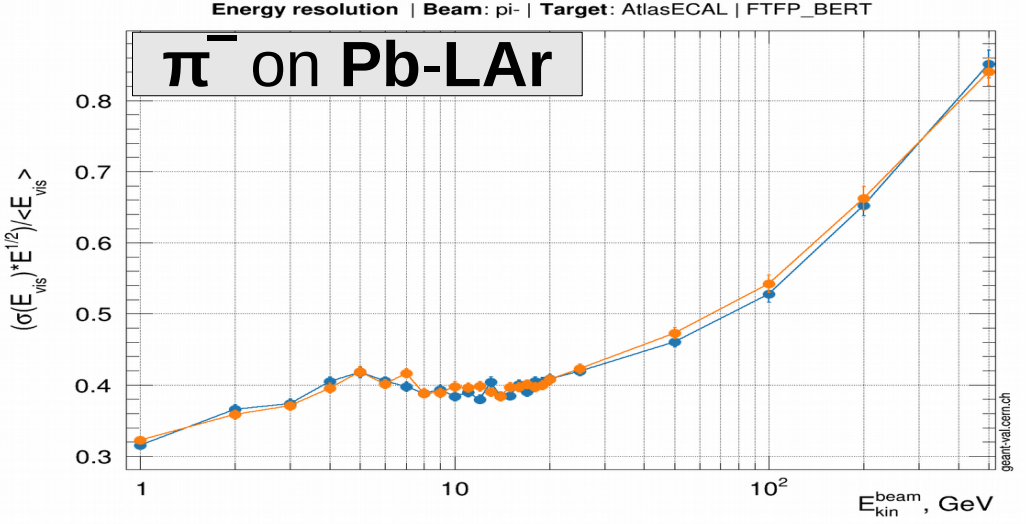


Energy Resolution

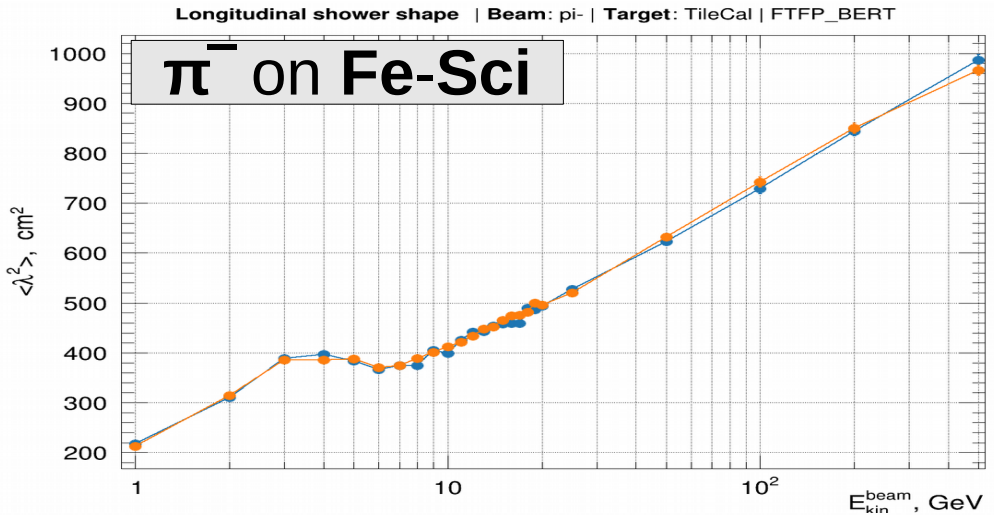


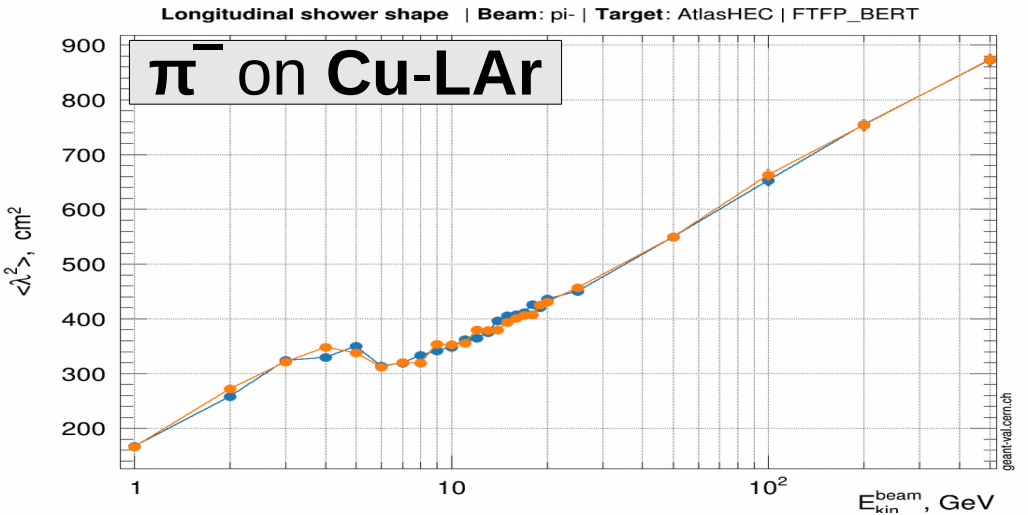


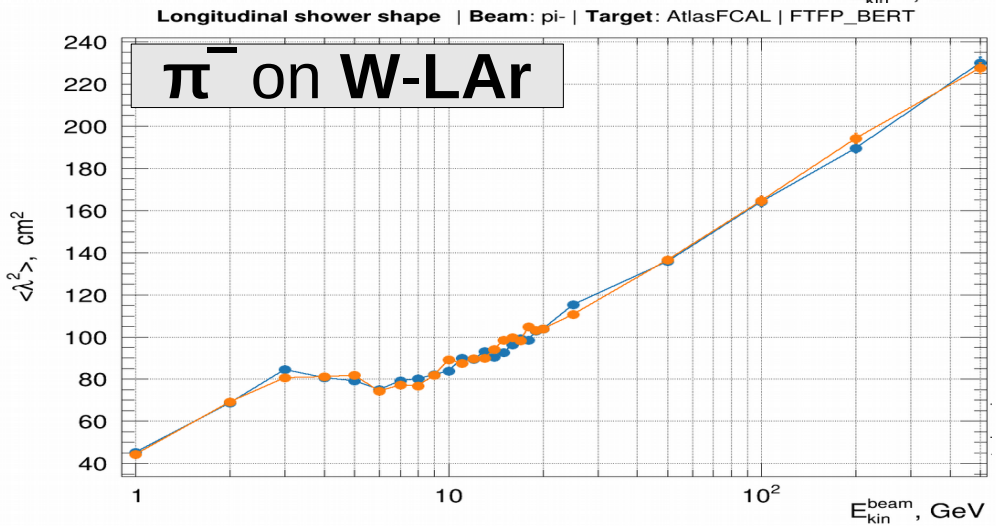


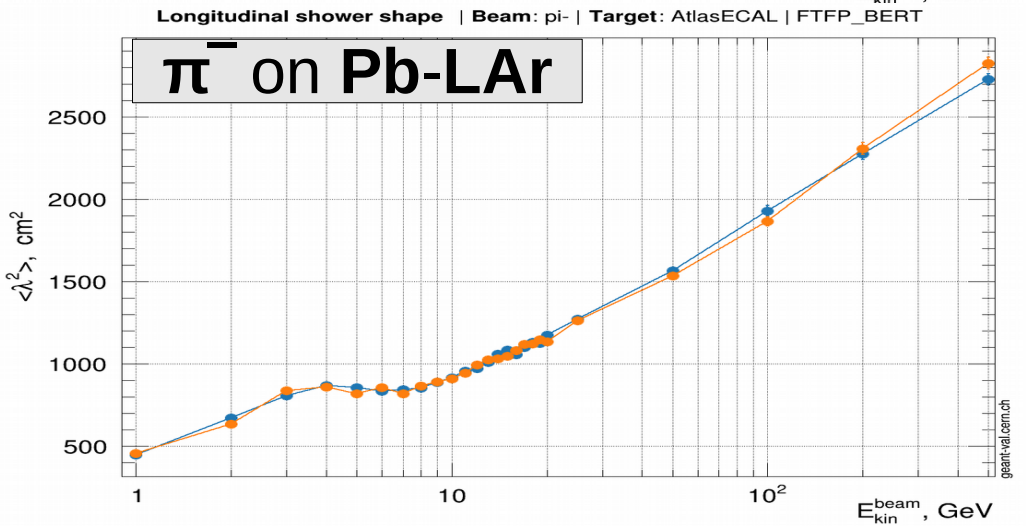


Longitudinal Shape



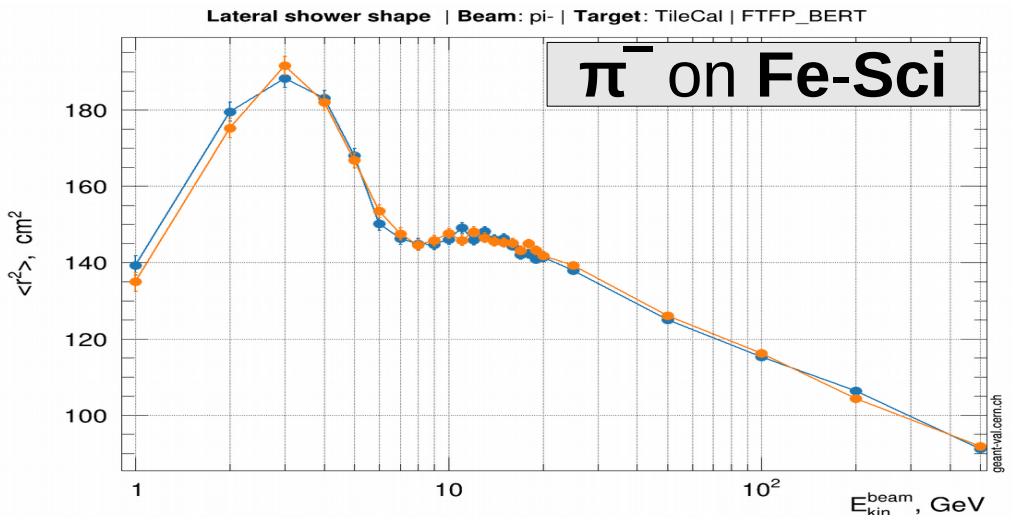


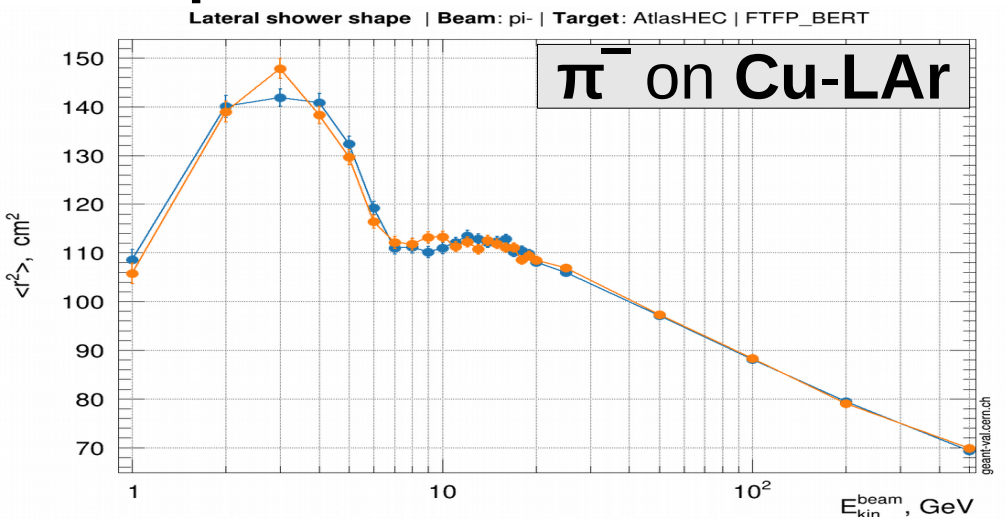


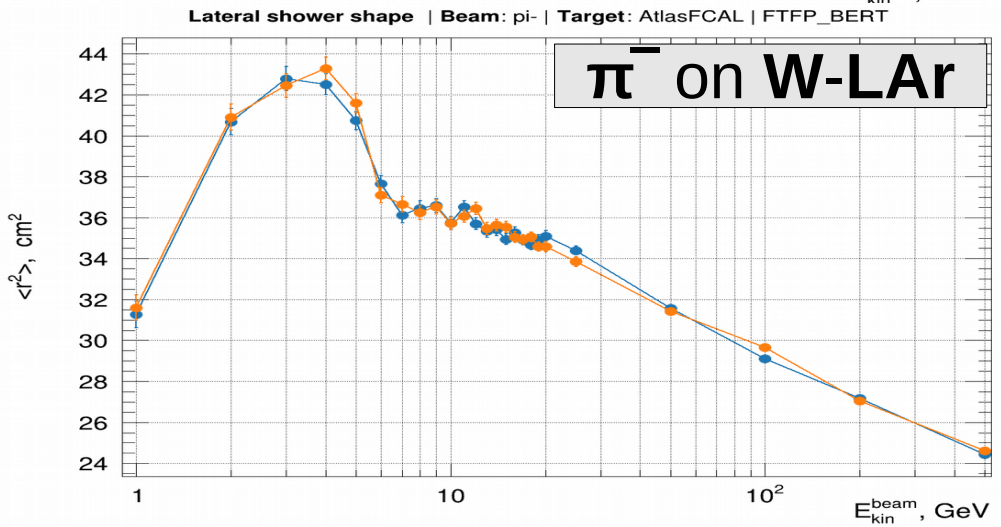


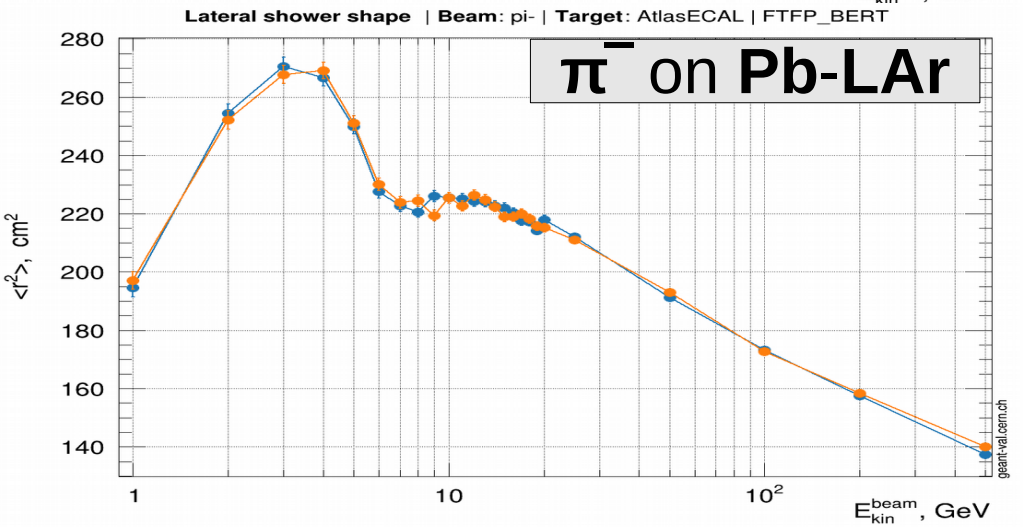
11.2.ref03 11.2.ref04 11.2.ref03 11.2.ref04

Lateral Shape









Conclusions

- **G4 11.2.ref04**
  - No crashes, no new or more-frequent warnings, and no infinite loops
  - Reproducibility fine in all cases
  - Hadron showers similar to those of G4 11.2.ref03 for all physics lists