



GEANT4
A SIMULATION TOOLKIT

Hadronic Showers in Geant4 **11.1.ref01**

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Main Changes in Hadronics vs. G4 11.1.ref00

- physics_list / constructors / decay
 - *G4RadioactiveDecayPhysics* : assigned *RadioactiveDecay* to *G4Triton*
 - This is the only light ion that can decay. Before, triton did not have beta decay (i.e. it was wrongly treated as stable even when radioactive decay physics was enabled; anti-triton did not, and still does not, have beta decay (because *RadioactiveDecay* does not handle anti-ions)...
- hadronic / processes /
 - *G4HadronElasticProcess* : added forgotten integral approach for charged particles
- hadronic / processes /
 - *G4NeutronGeneralProcess* : code optimizations

Crashes & Warnings

- No crashes
- No infinite loops
- No new warnings

Reproducibility

- All OK
 - Both usual tests and the new ones for tasking

Pion- showers: FTFP_BERT

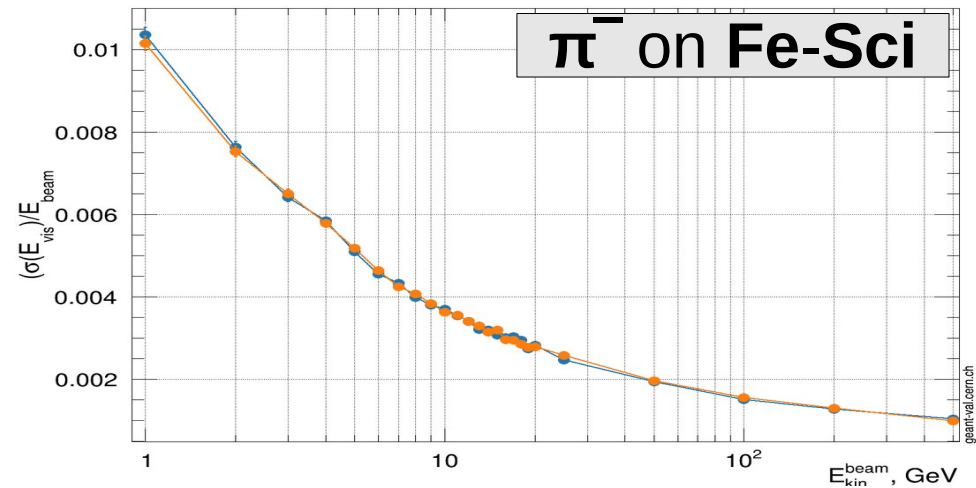
G4 [11.1.ref00](#)

G4 [11.1.ref01](#)

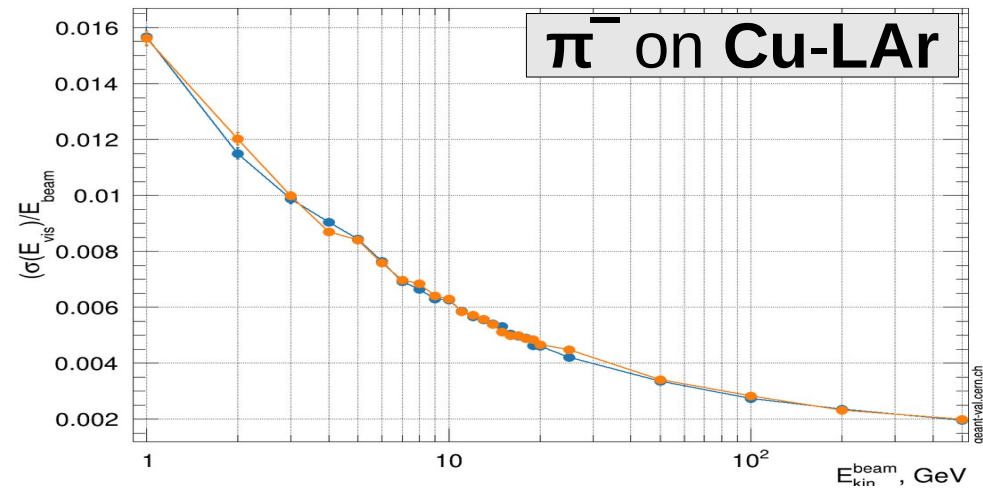
*Note : conventional Birks treatment
(easier and no experimental h/e to fit !)*

FTFP_BERT : Energy Width

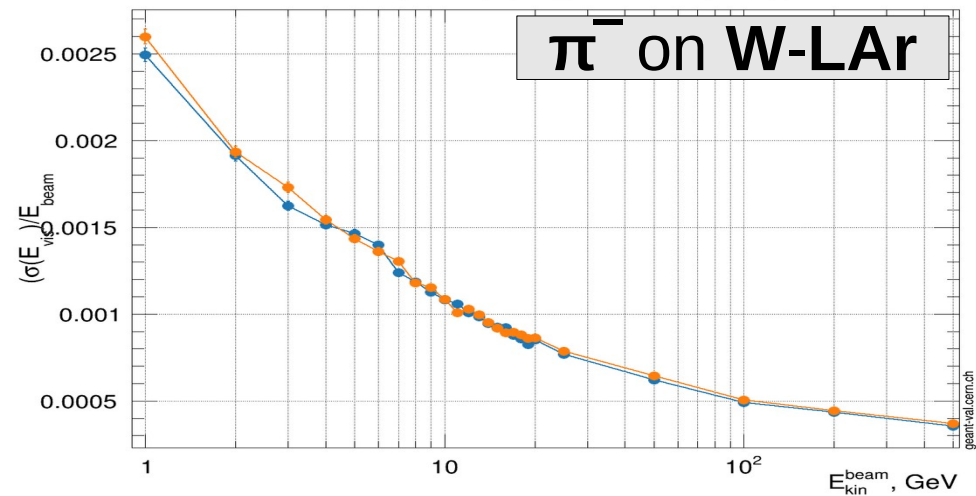
Normalized width | Beam: pi- | Target: TileCal | FTFP_BERT



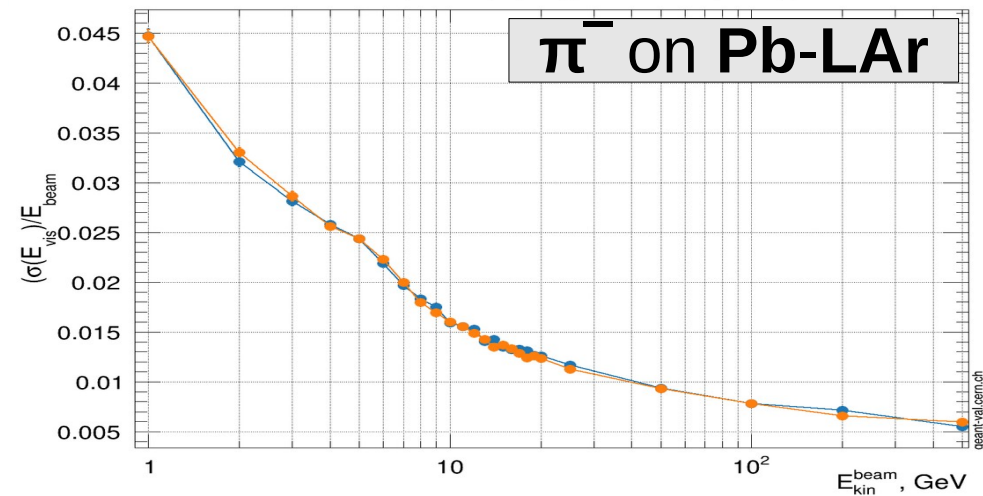
Normalized width | Beam: pi- | Target: AtlasHEC | FTFP_BERT



Normalized width | Beam: pi- | Target: AtlasFCAL | FTFP_BERT

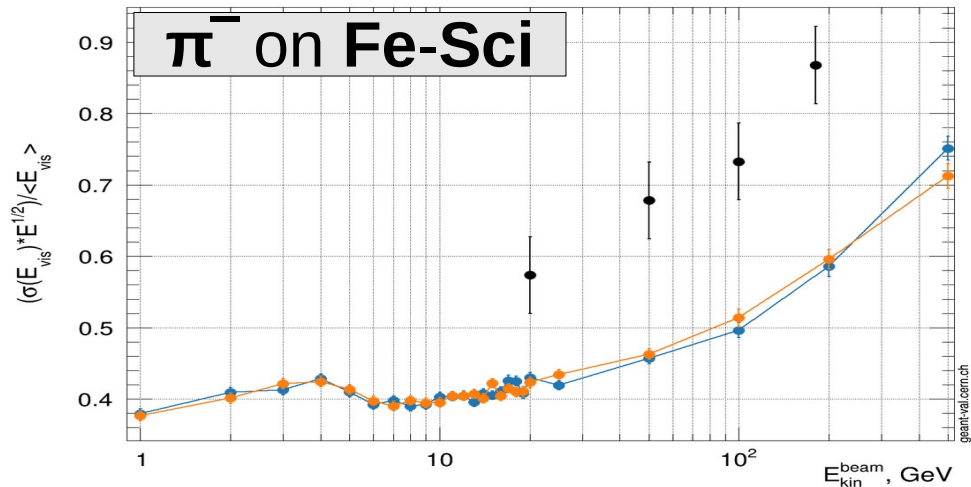


Normalized width | Beam: pi- | Target: AtlasECAL | FTFP_BERT

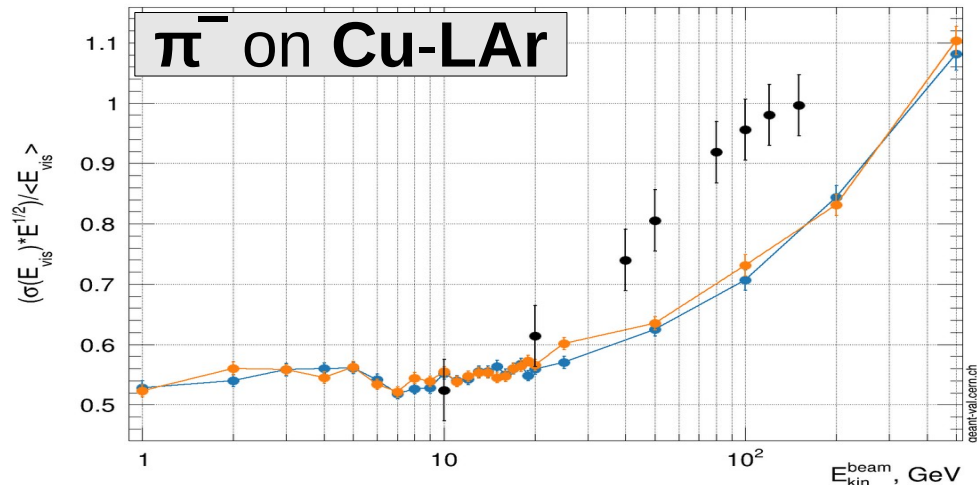


FTFP_BERT : Energy Resolution

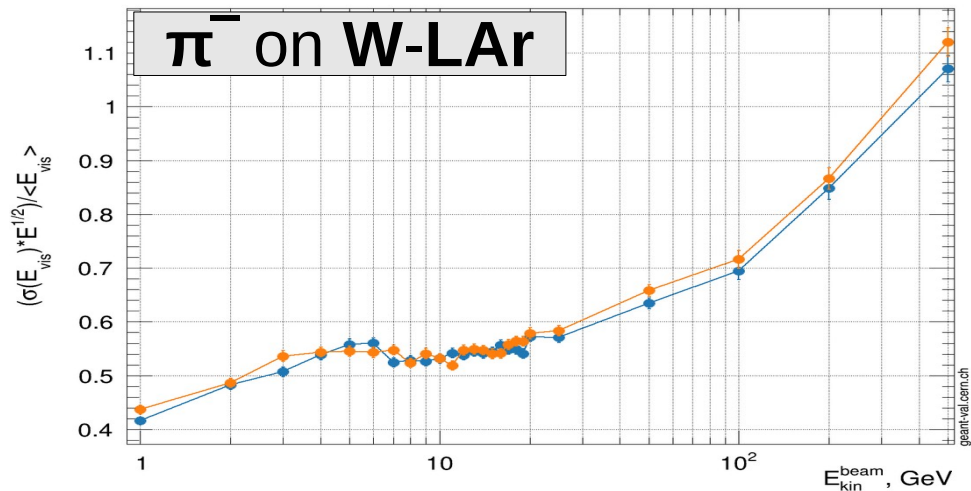
Energy resolution | Beam: pi- | Target: TileCal



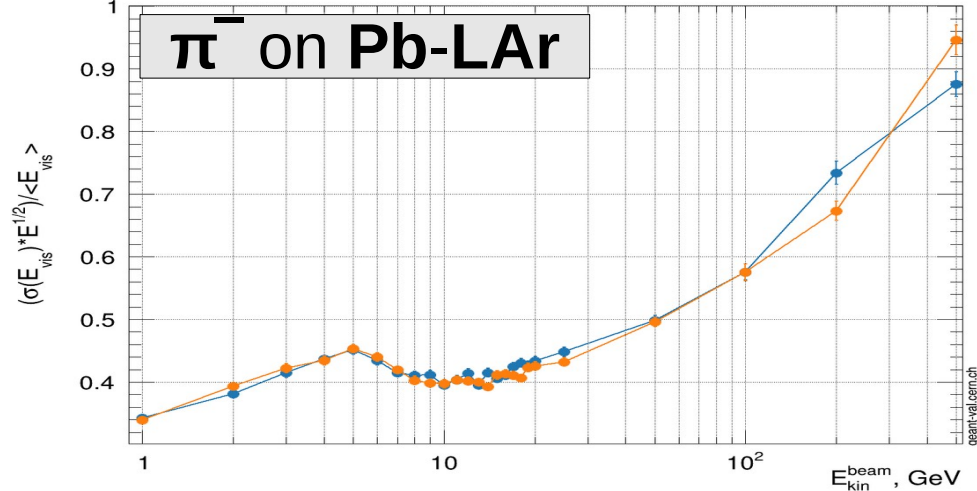
Energy resolution | Beam: pi- | Target: AtlasHEC



Energy resolution | Beam: pi- | Target: AtlasFCAL | FTFP_BERT

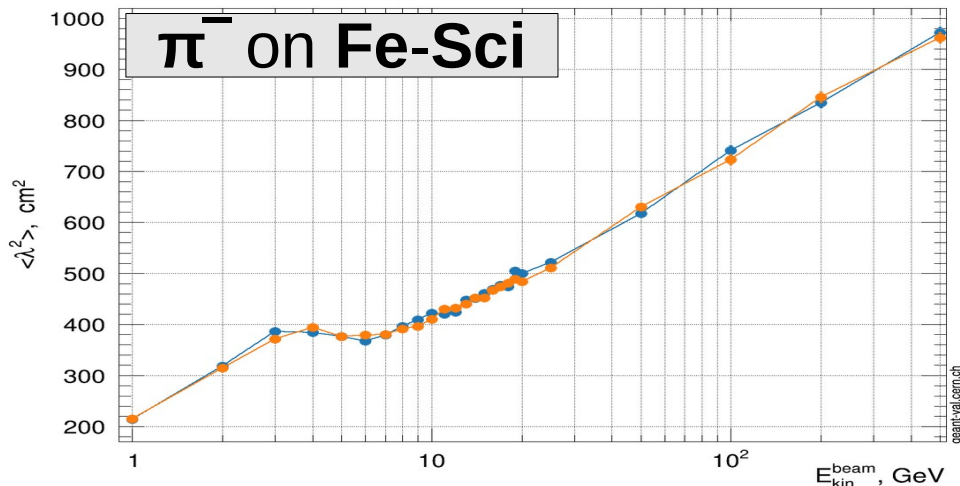


Energy resolution | Beam: pi- | Target: AtlasECAL | FTFP_BERT

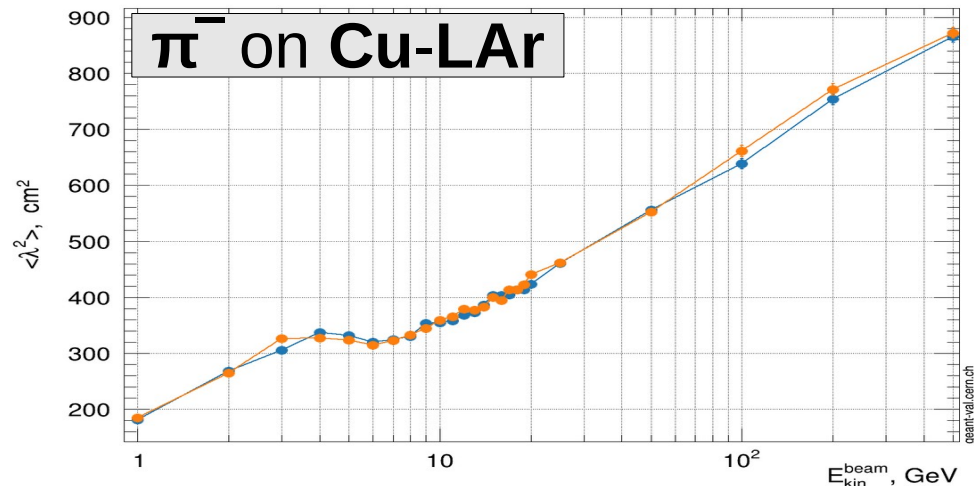


FTFP_BERT : Longitudinal Shape

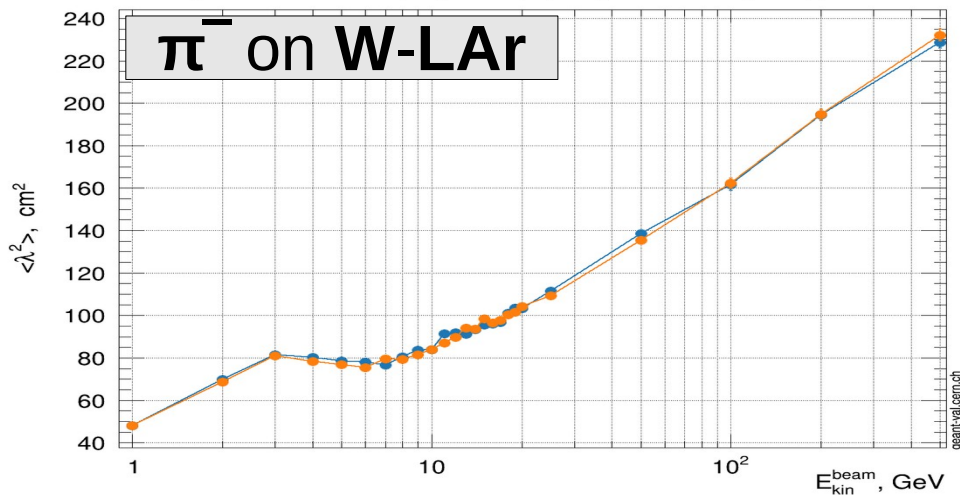
Longitudinal shower shape | Beam: pi- | Target: TileCal | FTFP_BERT



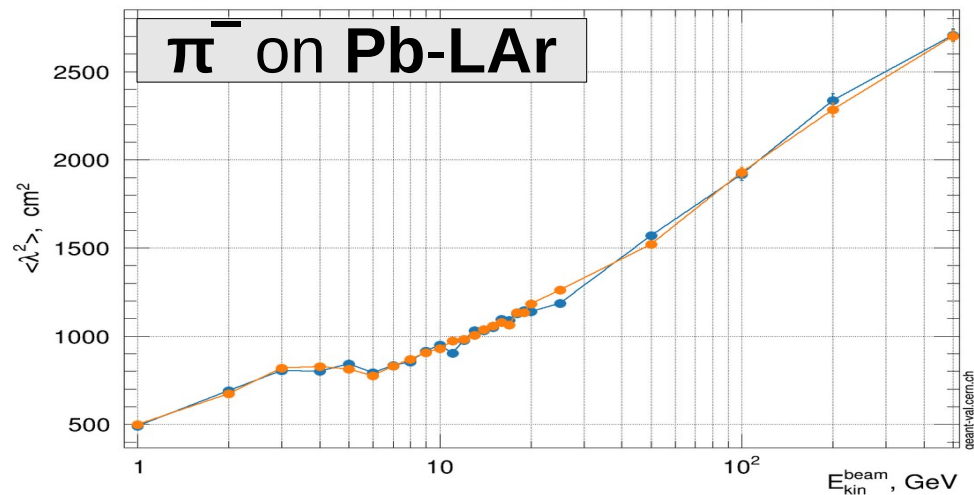
Longitudinal shower shape | Beam: pi- | Target: AtlasHEC | FTFP_BERT



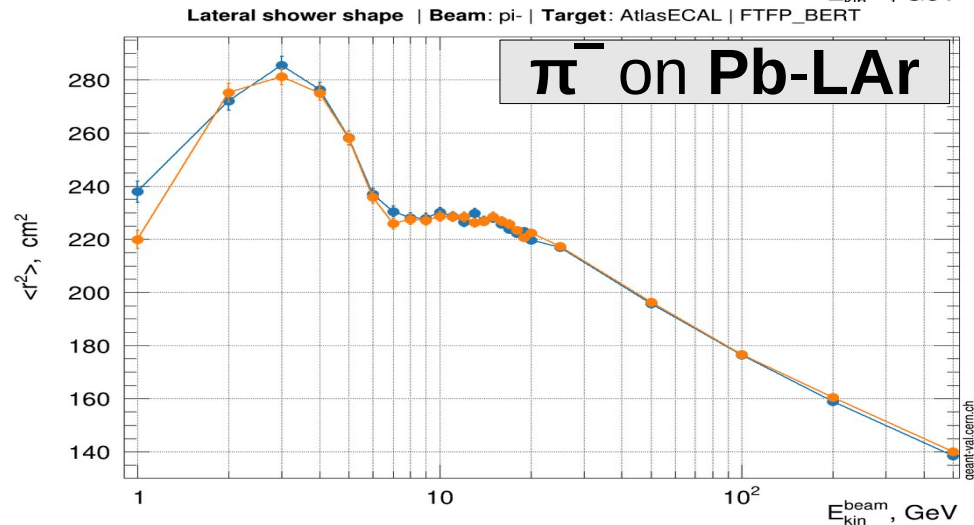
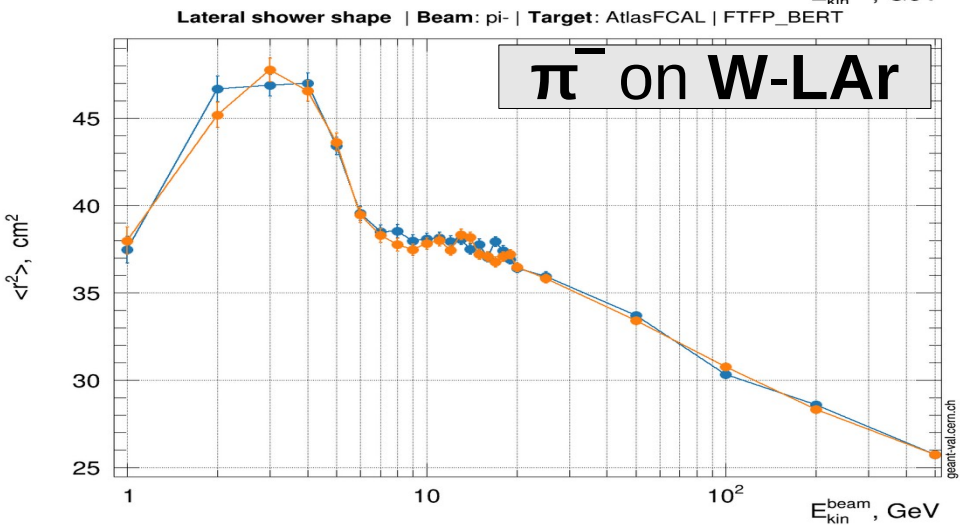
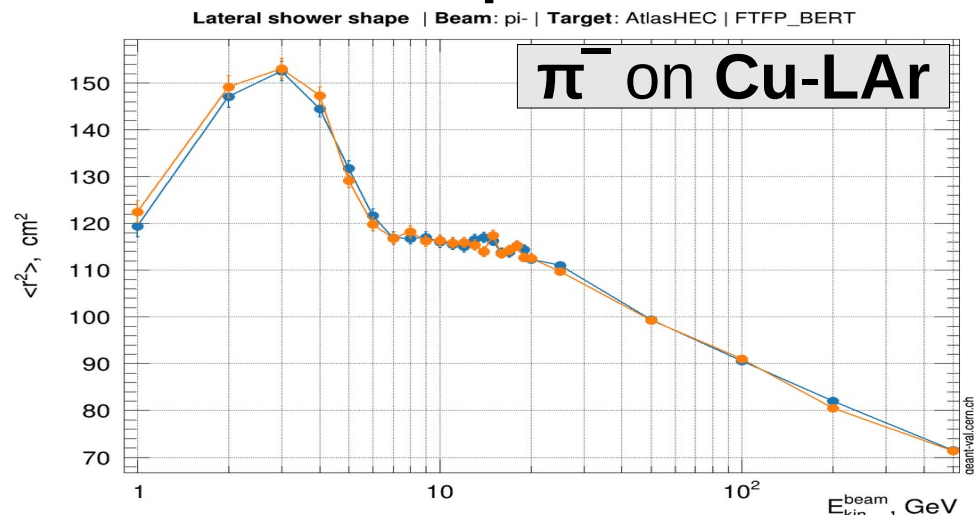
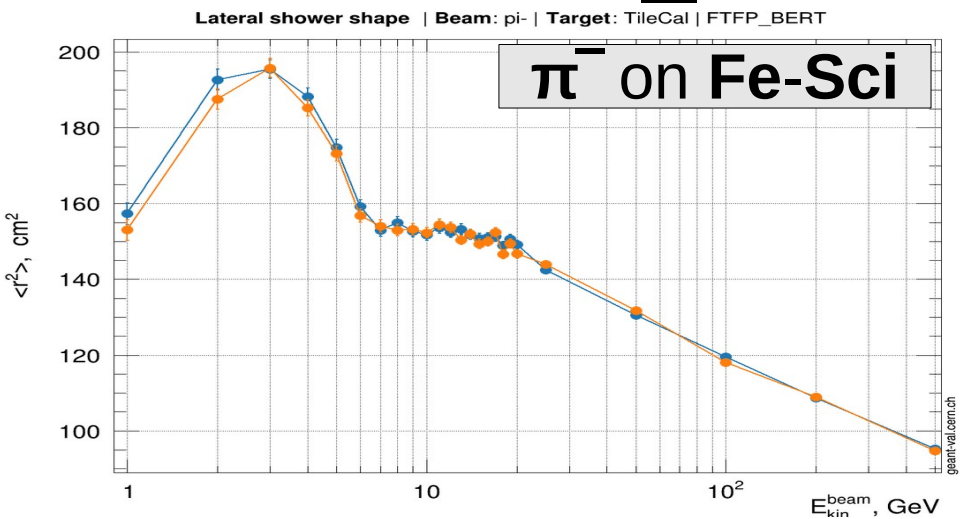
Longitudinal shower shape | Beam: pi- | Target: AtlasFCAL | FTFP_BERT



Longitudinal shower shape | Beam: pi- | Target: AtlasECAL | FTFP_BERT



FTFP_BERT : Lateral Shape



Conclusions

- **G4 11.1.ref01**
 - No crashes, no infinite loops, no new warnings
 - Reproducibility OK
 - Hadron showers
 - No changes with respect to G4 11.1.ref00