

Hadronic Showers in G4 10.6.ref02

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Main Changes in Hadronics vs. 10.6.ref01

No changes in BIC, INCLXX, Pre-equilibrium, *etc.*

- **FTF , QGS , Quasi-elastic , Stopping , P.L. builders** : technical changes to be able to delete properly all objects at the end of the session
- **Bertini** : improved sub-threshold gamma-nuclear reactions
 - Sub-threshold reactions are now treated as having a "non-interaction" final state, *i.e.* the initial particles are simply copied to the final state
 - Eliminates the warnings seen in G4 10.6.p01
- **Radioactive Decay** : fixed verbosity treatment
 - Eliminates residual warnings seen in G4 10.6.ref01 and 10.6.p01
- **ParticleHP** : two bug-fixes
- **De-excitation** : introduced a flag for the isomer production
 - Useful to fix a bug reported recently by NA61

Crashes & Warnings

- No crashes or infinite loops
- No new warnings
 - Disappeared previous warnings from Radioactive Decay and BERT

Reproducibility

- All OK

Pion- showers: FTFP_BERT

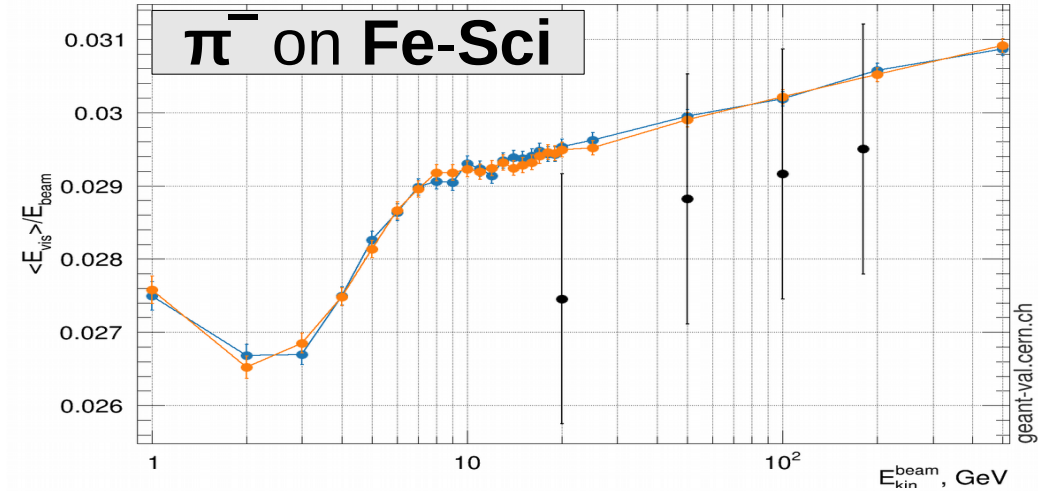
G4 10.6.ref02

G4 10.6.ref01

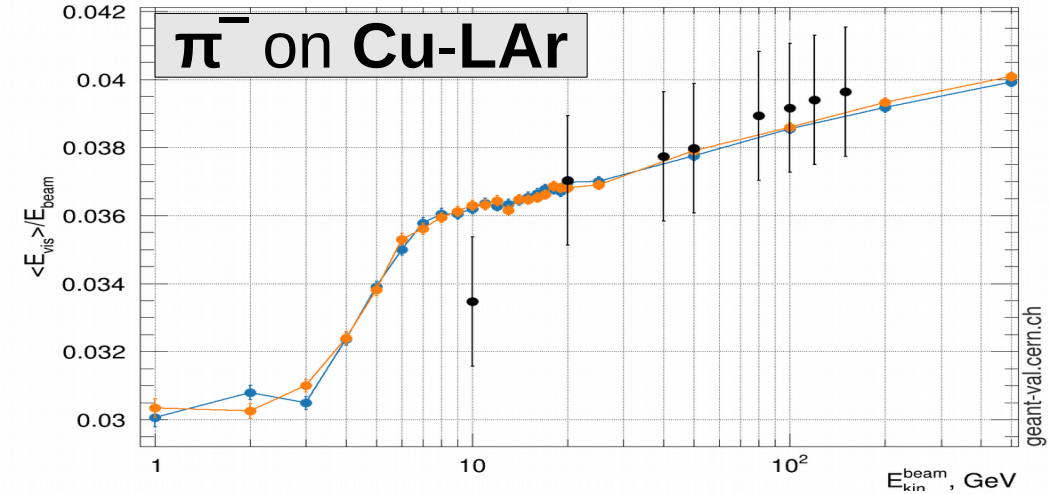
*Note : conventional Birks treatment
(easier and no experimental h/e to fit !)*

FTFP_BERT : Energy Response

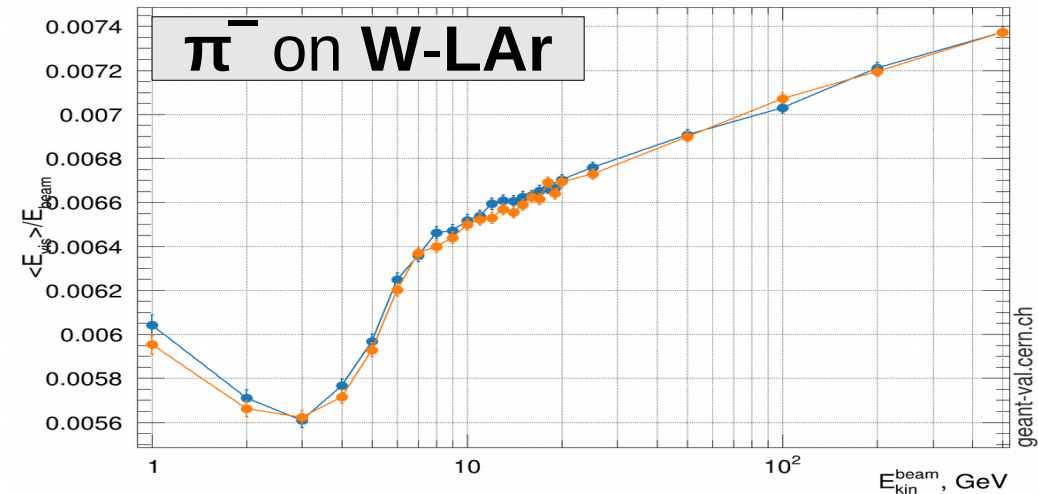
Energy response | Beam: pi- | Target: TileCal



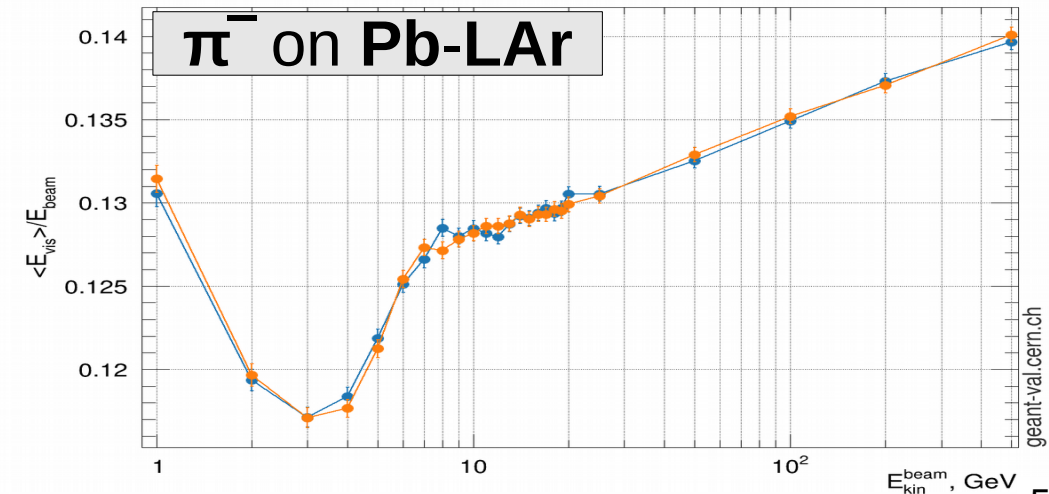
Energy response | Beam: pi- | Target: AtlasHEC



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



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



10.6.ref02

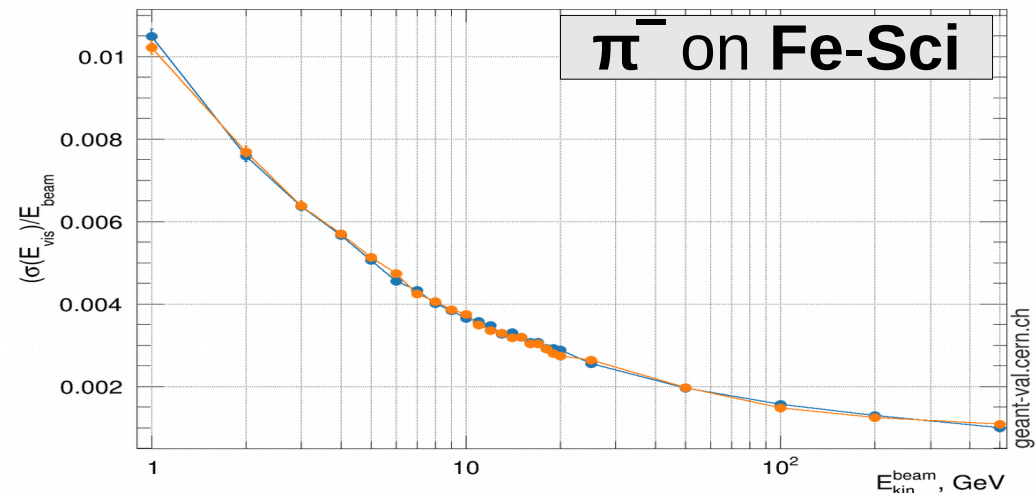
10.6.ref01

10.6.ref02

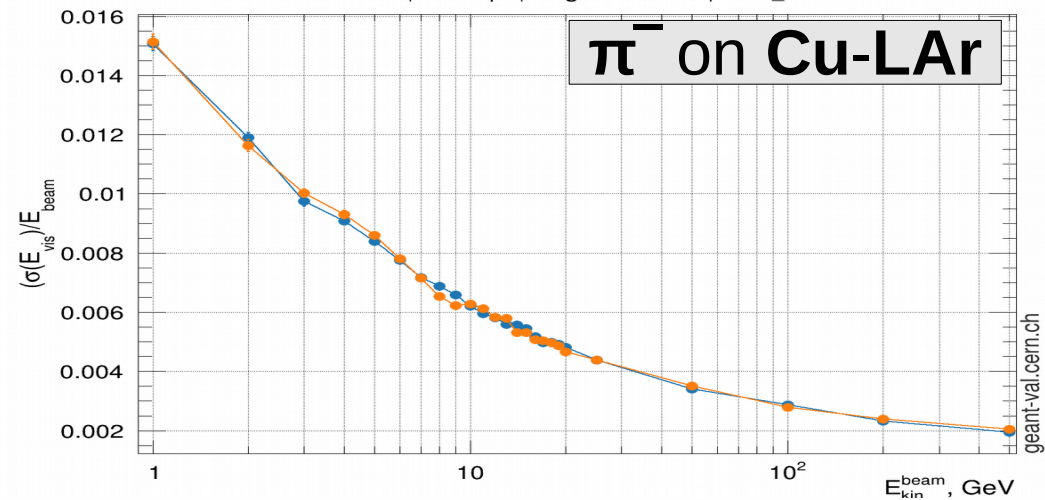
10.6.ref01

FTFP_BERT : Energy Width

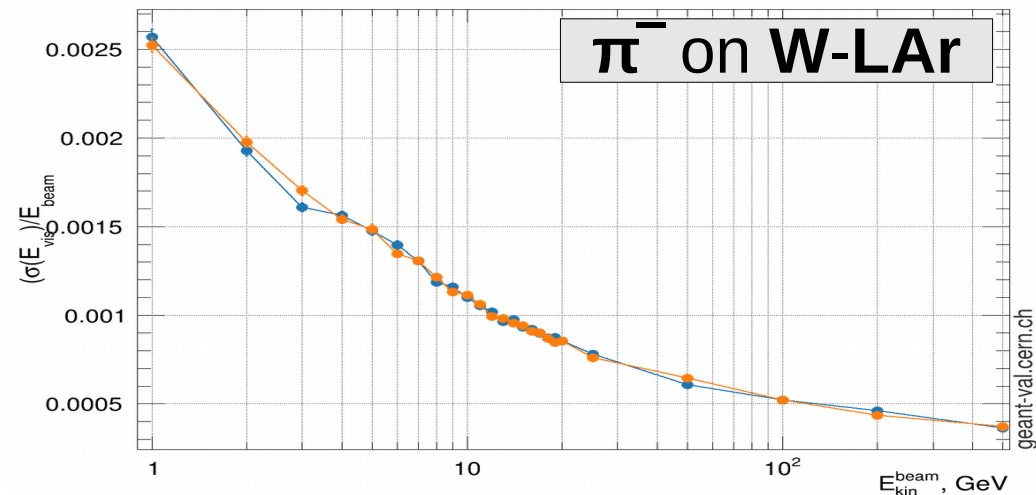
Normalized width | Beam: pi- | Target: TileCal | FTFP_BERT



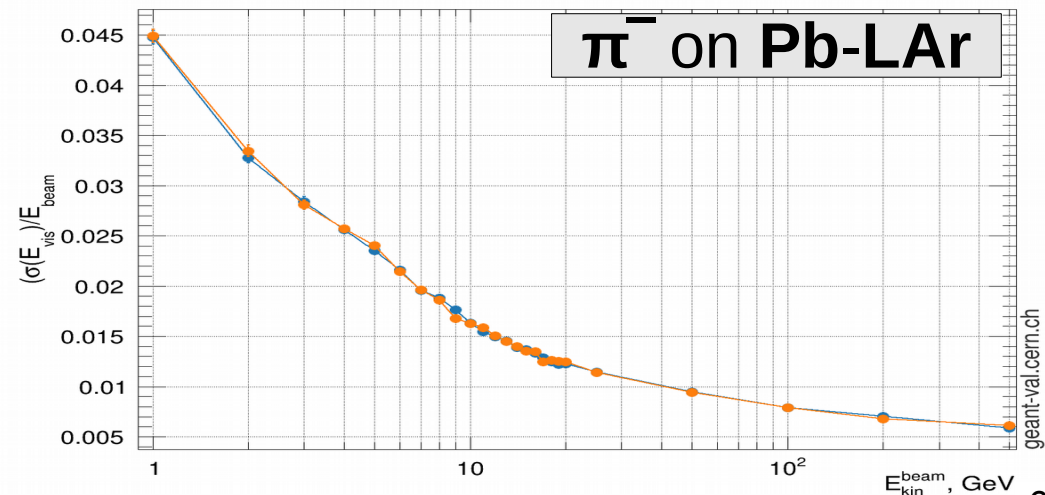
Normalized width | Beam: pi- | Target: AtlasHEC | FTFP_BERT



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

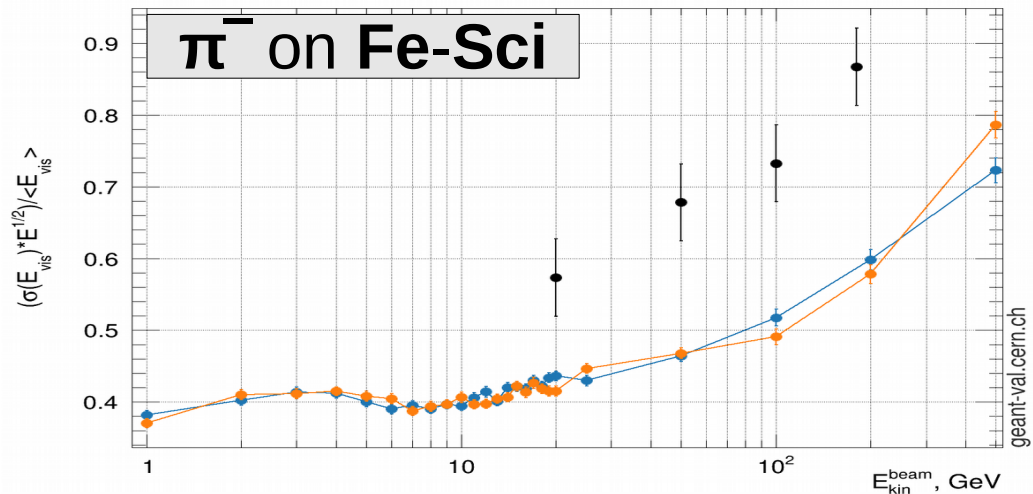


Normalized width | Beam: pi- | Target: AtlasECAL | FTFP_BERT

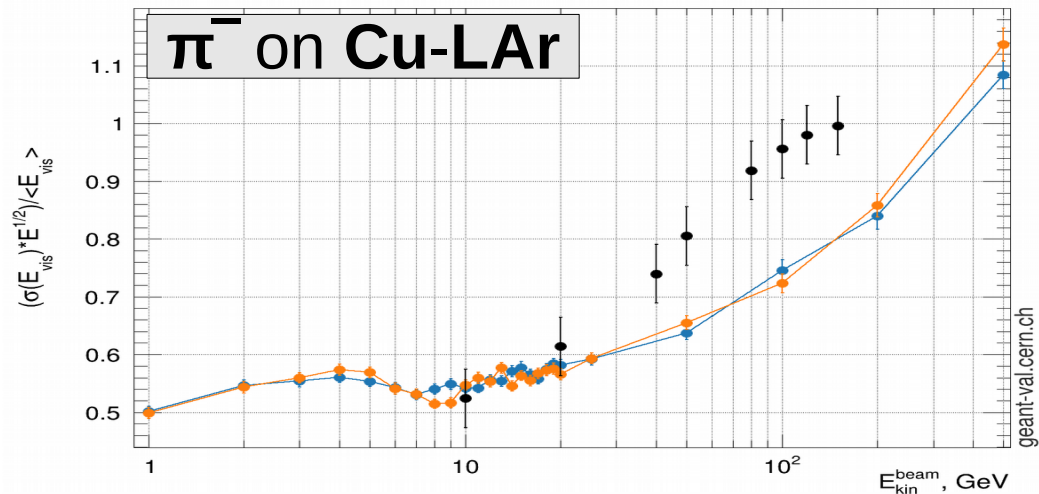


FTFP_BERT : Energy Resolution

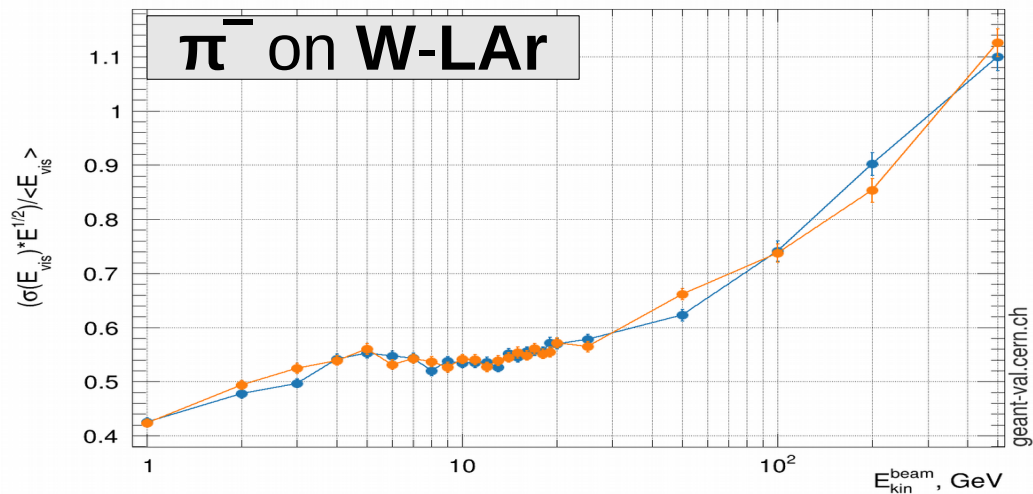
Energy resolution | Beam: pi- | Target: TileCal



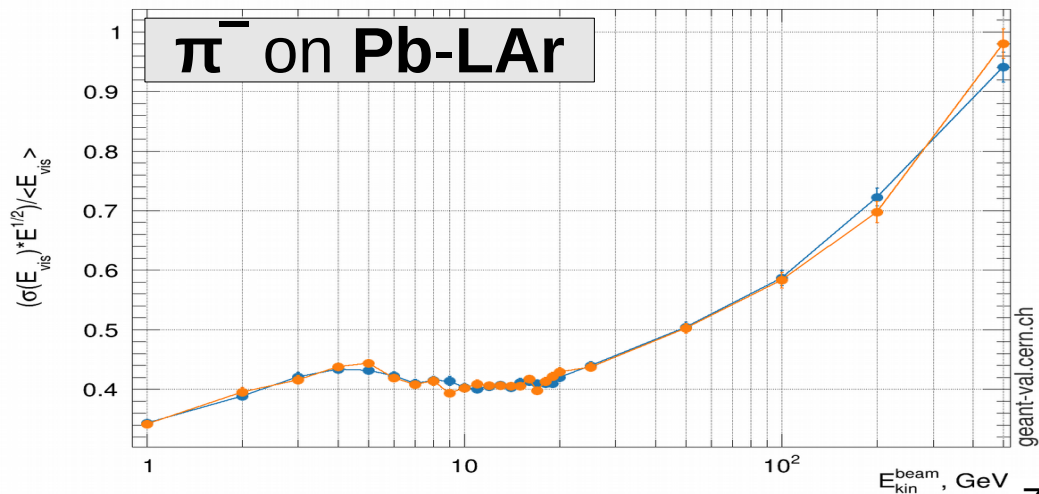
Energy resolution | Beam: pi- | Target: AtlasHEC



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



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



10.6.ref02

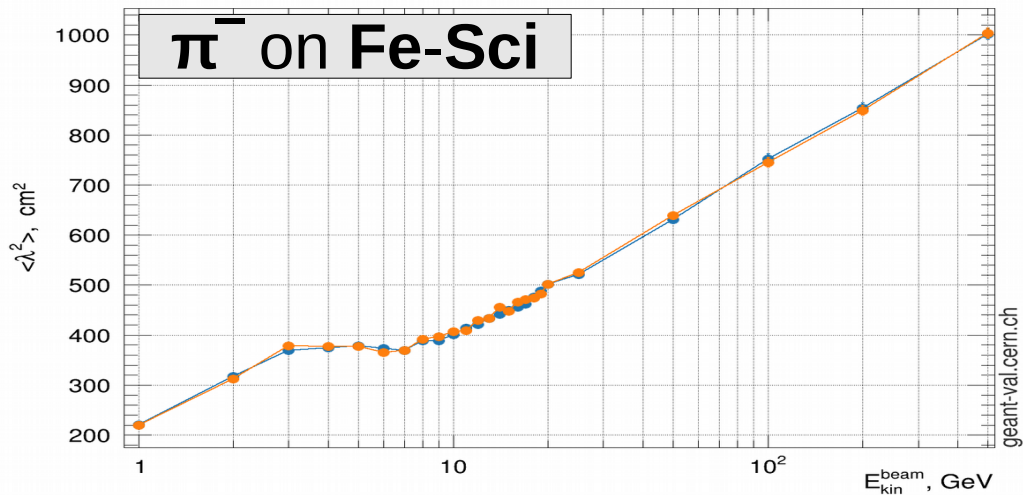
10.6.ref01

10.6.ref02

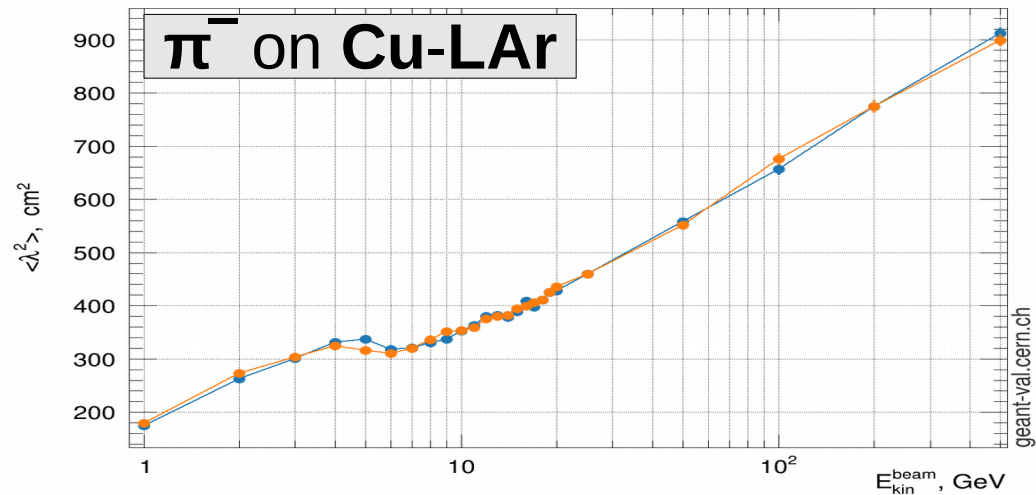
10.6.ref01

FTFP_BERT : Longitudinal Shape

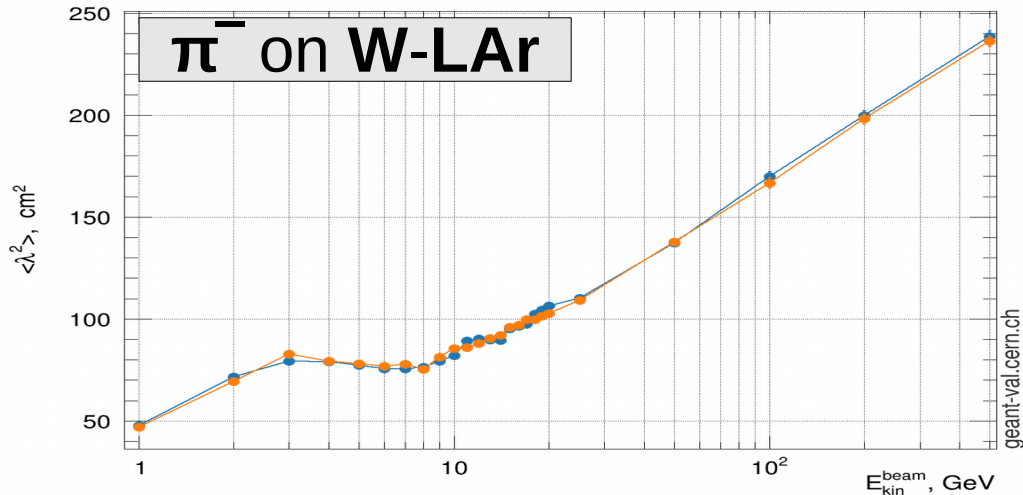
Longitudinal shower shape | Beam: pi- | Target: TileCal | FTFP_BERT



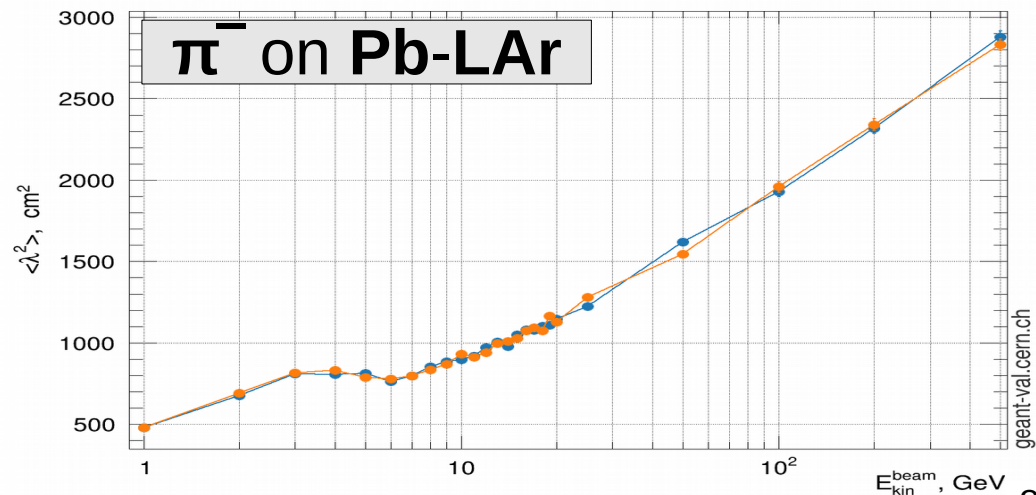
Longitudinal shower shape | Beam: pi- | Target: AtlasHEC | FTFP_BERT



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



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



10.6.ref02

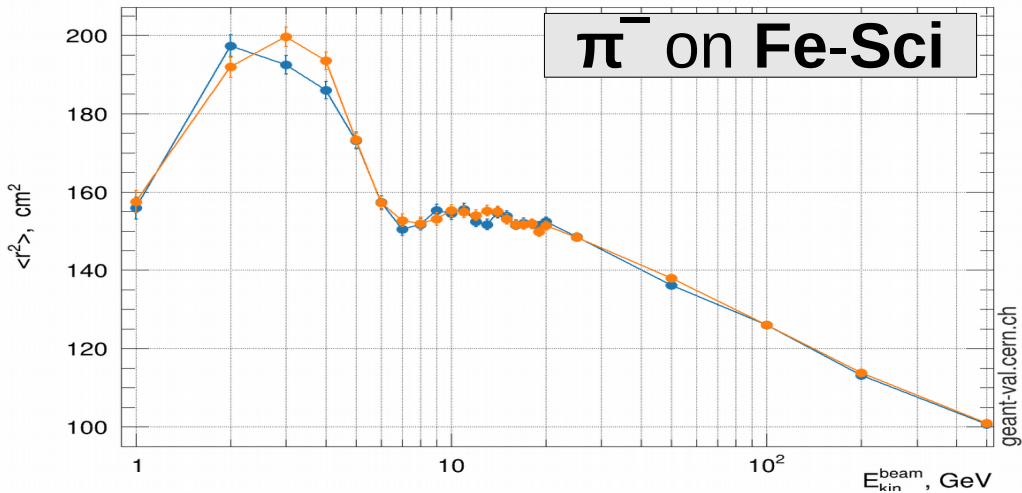
10.6.ref01

10.6.ref02

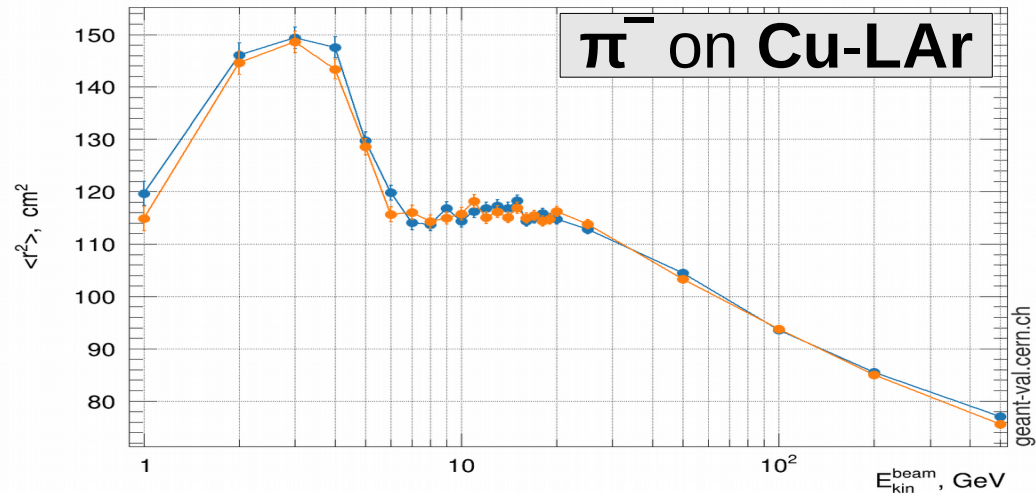
10.6.ref01

FTFP_BERT : Lateral Shape

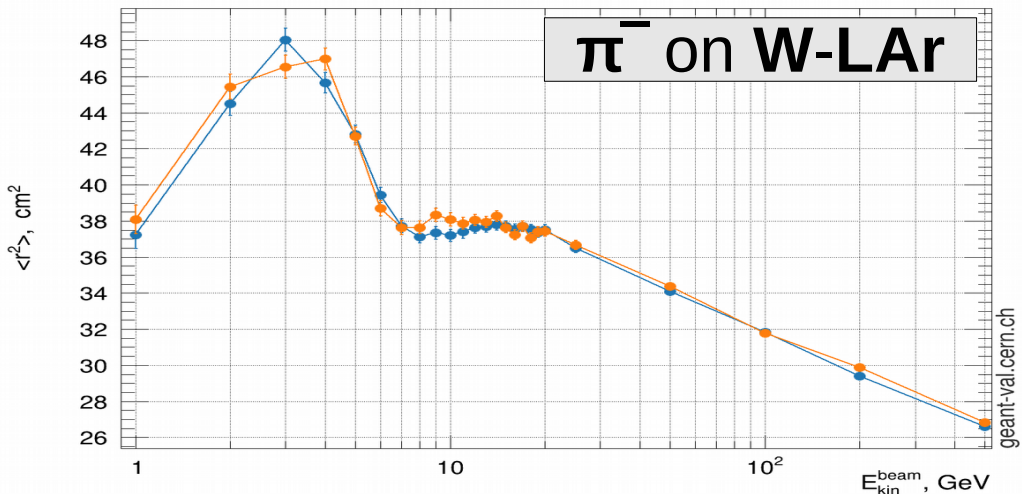
Lateral shower shape | Beam: pi- | Target: TileCal | FTFP_BERT



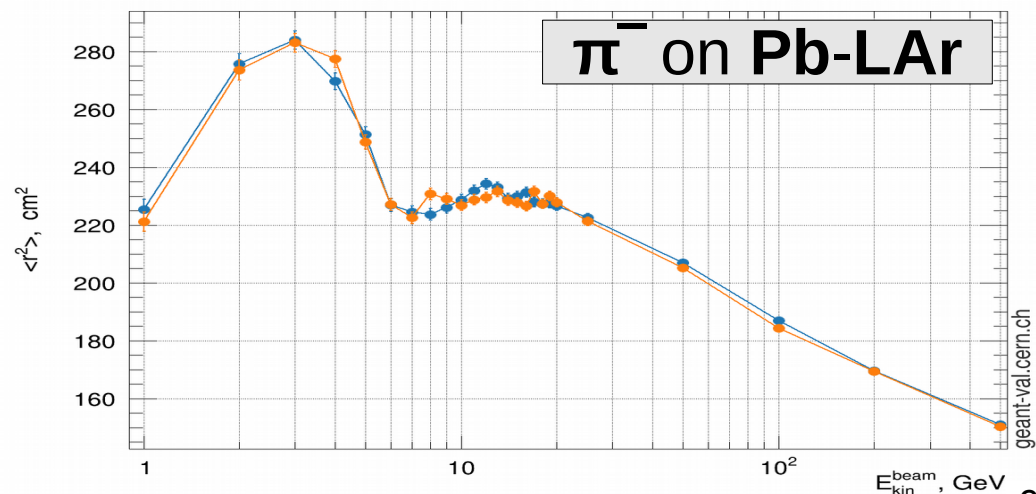
Lateral shower shape | Beam: pi- | Target: AtlasHEC | FTFP_BERT



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



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



Pion- showers: QGSP_BIC

G4 10.6.ref02

G4 10.6.ref01

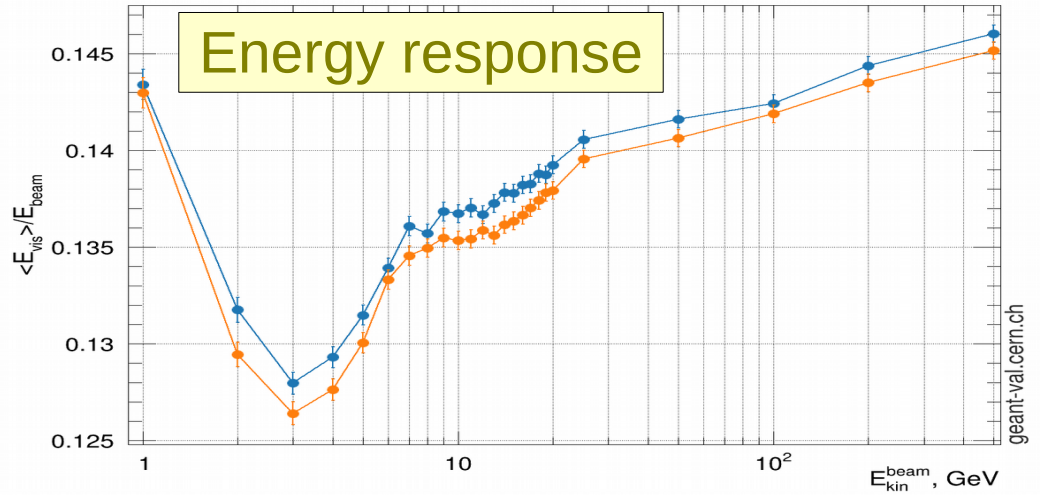
*Note : conventional Birks treatment
(easier and no experimental h/e to fit !)*

**Seen some changes in Lead !
(not for the longitudinal shape)**

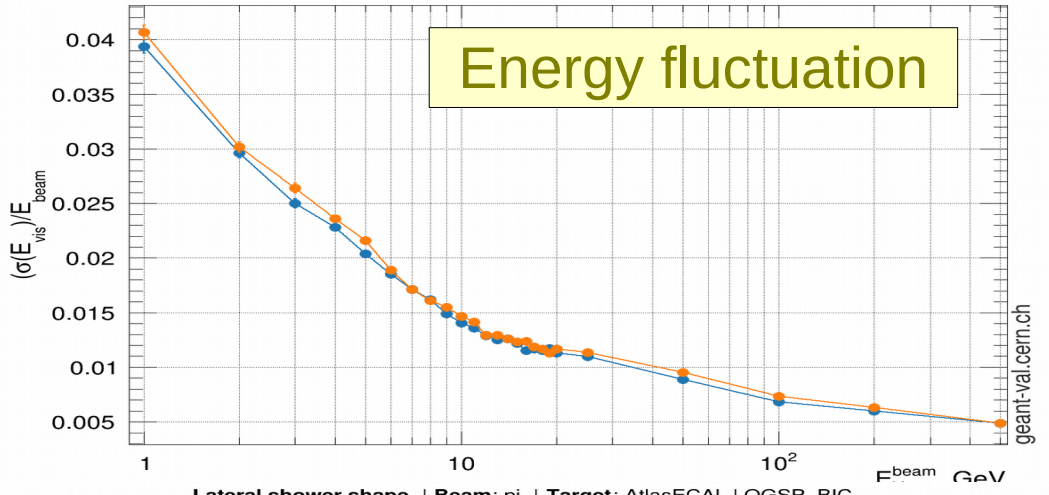
QGSP_BIC

π^- on Pb-LAr

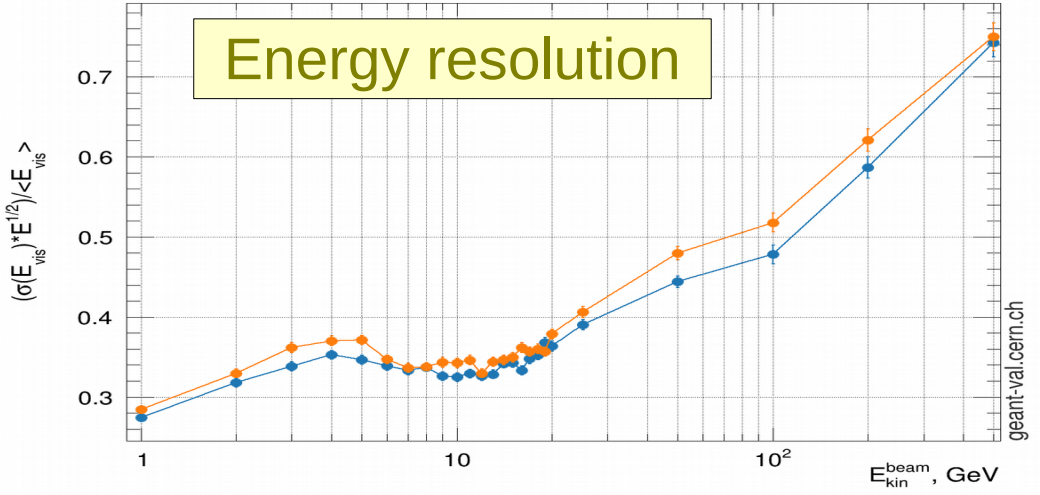
Energy response | Beam: pi- | Target: AtlasECAL | QGSP_BIC



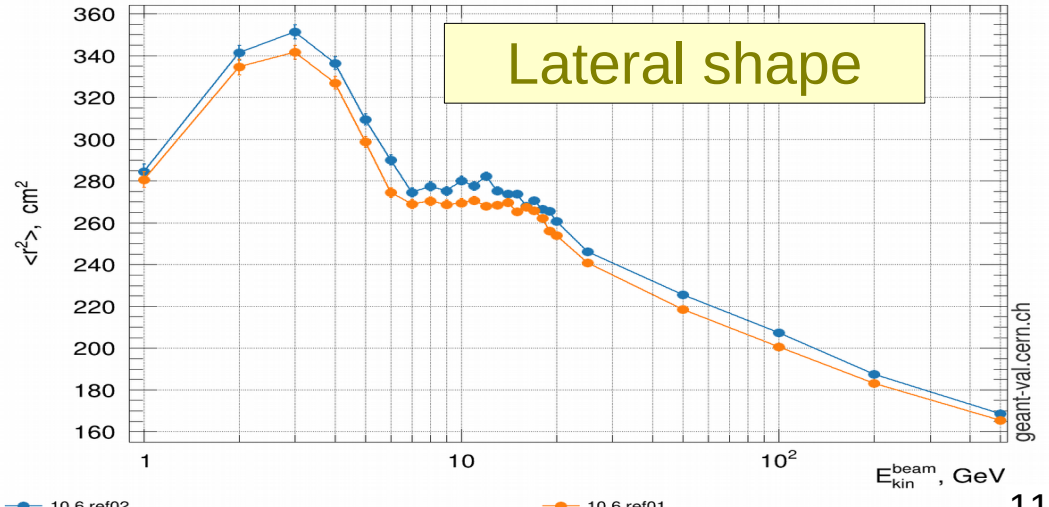
Normalized width | Beam: pi- | Target: AtlasECAL | QGSP_BIC



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



Lateral shower shape | Beam: pi- | Target: AtlasECAL | QGSP_BIC



Conclusions

- **G4 10.6.ref02**
 - No crashes
 - No new warnings
 - And disappeared the ones seen in Ref01 and Patch-01 due to Radioactive Decay and BERT
 - Reproducibility OK
 - Hadron showers
 - Similar to those of G4 10.6.ref{00, 01}
 - Except for QGSP_BIC in Pb
 - Could be due to the change in Urban multiple scattering...