



First results of the SDHCAL 2015 TB

CALICE Collaboration meeting at Kyushu University
7-9 March 2016

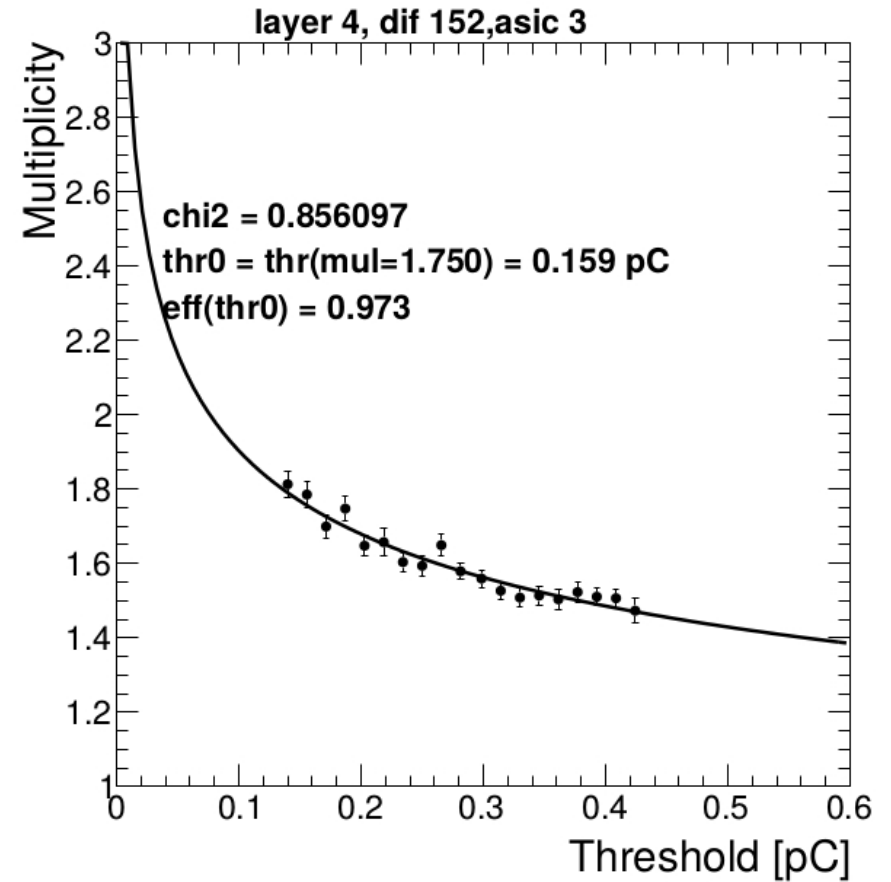
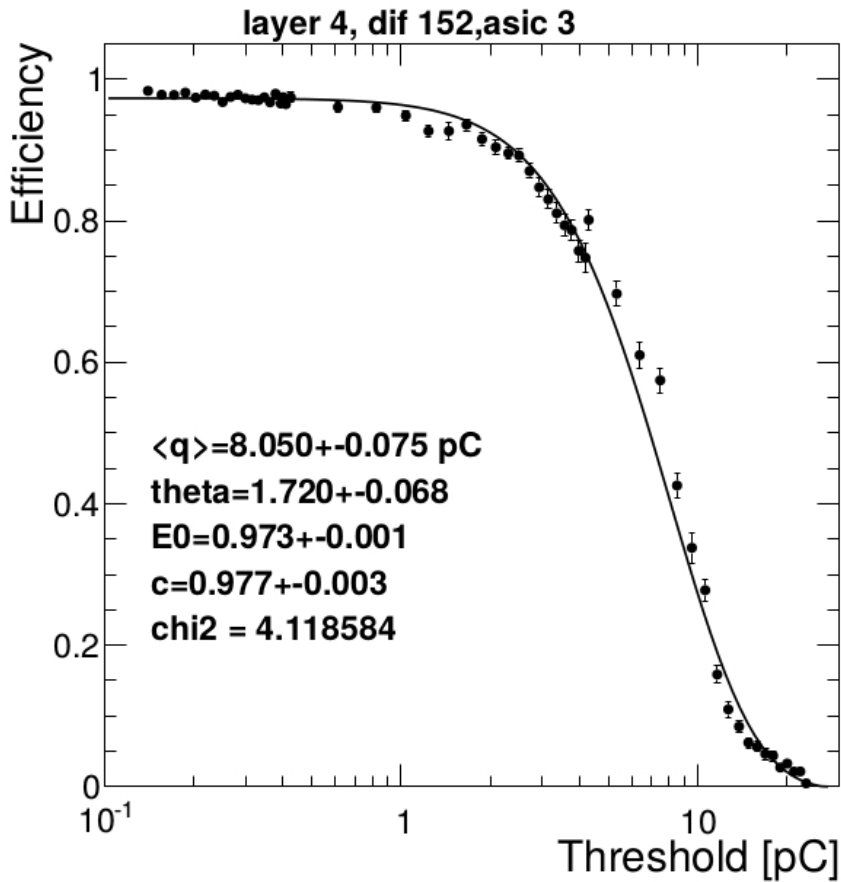
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Outline

- **Homogenization of detector's response**
- **Simulation**
 - Data / Simulation comparison
 - Geant4 10 FTF-based lists

Homogenization of detector's response

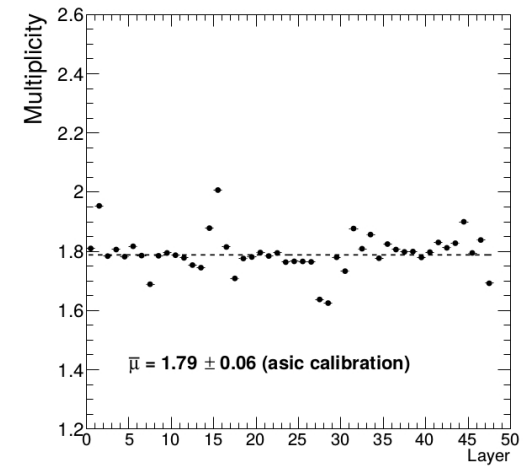
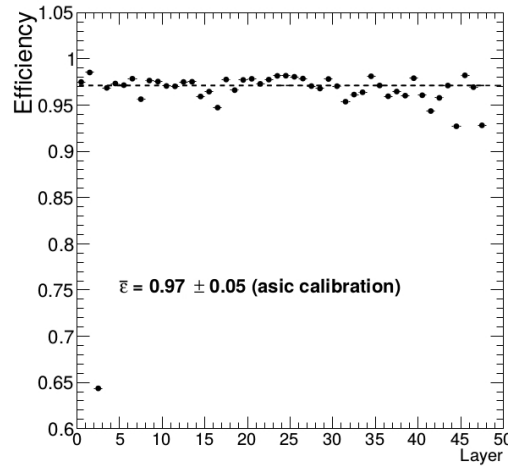
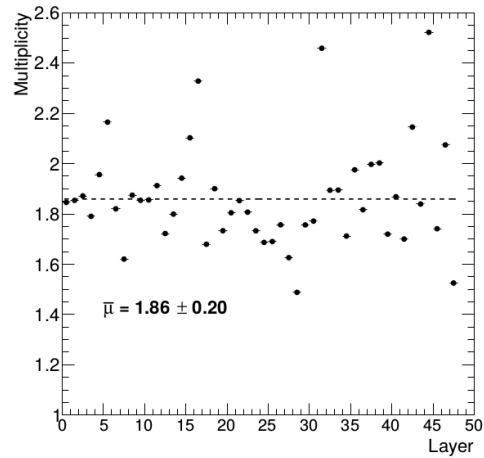
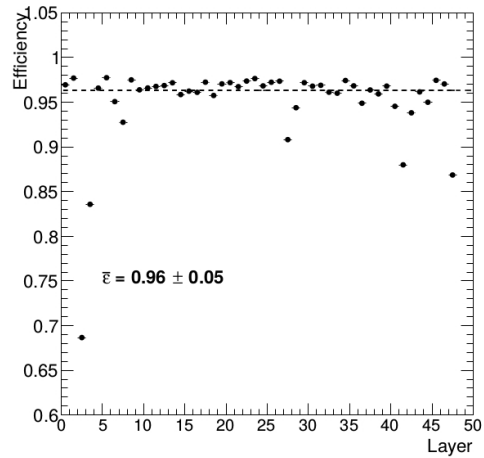
- Homogenization of multiplicity by adjusting threshold values per ASIC



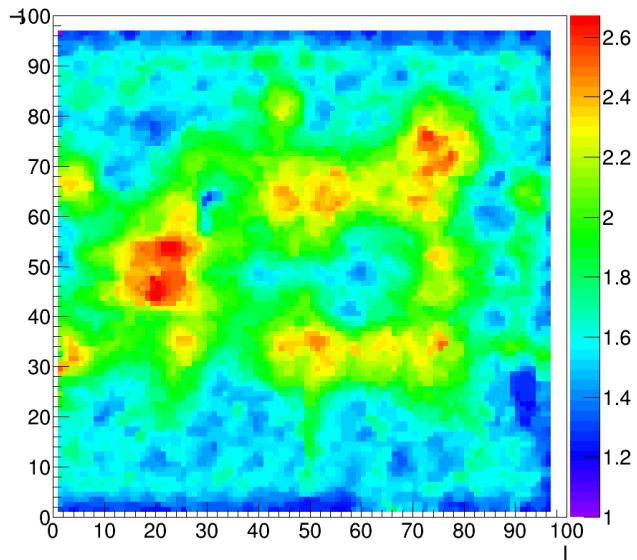
Homogenization of detector's response

- Before calibration

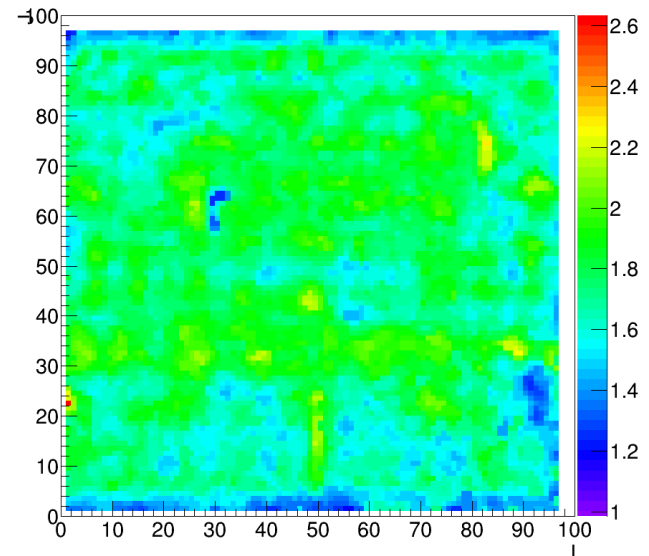
- After calibration



Multiplicity Layer 13



Multiplicity Layer 13

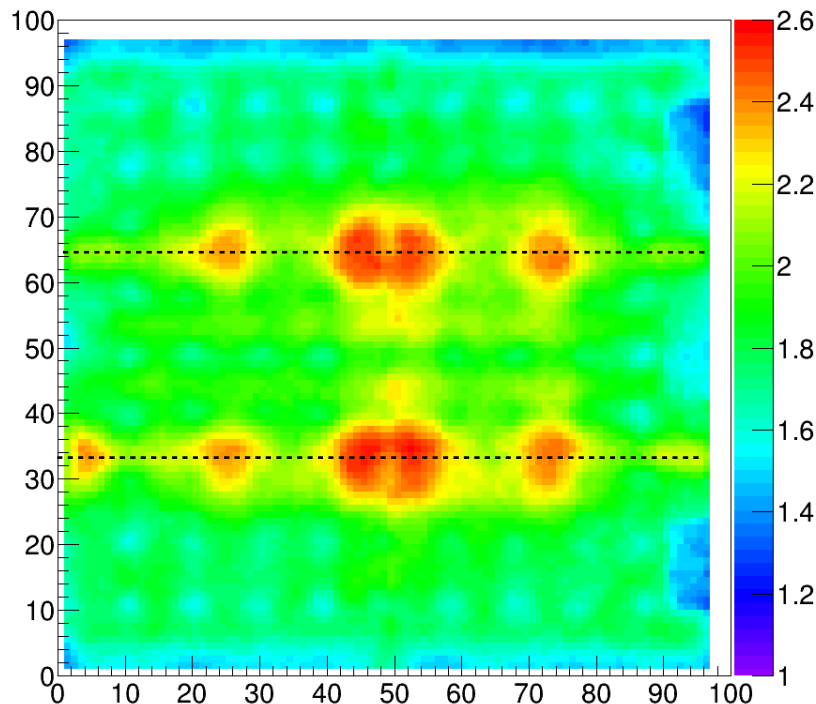


Homogenization of detector's response

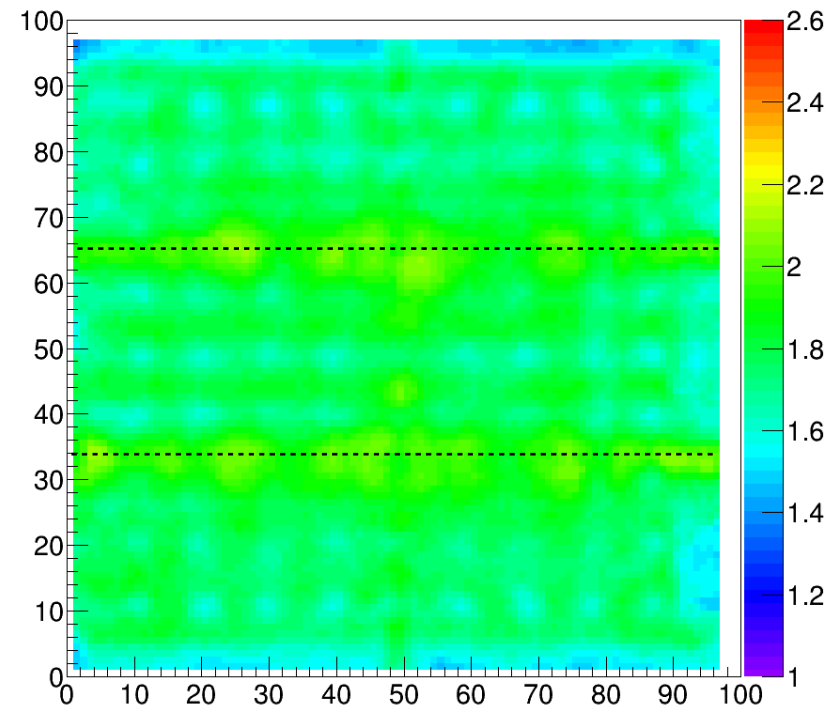
- The multiplicity is higher along the welding line between the slabs
 - Up to 2.6 locally
- Multiplicity seems more homogeneous after calibration

Average multiplicity for all layers

- Before calibration

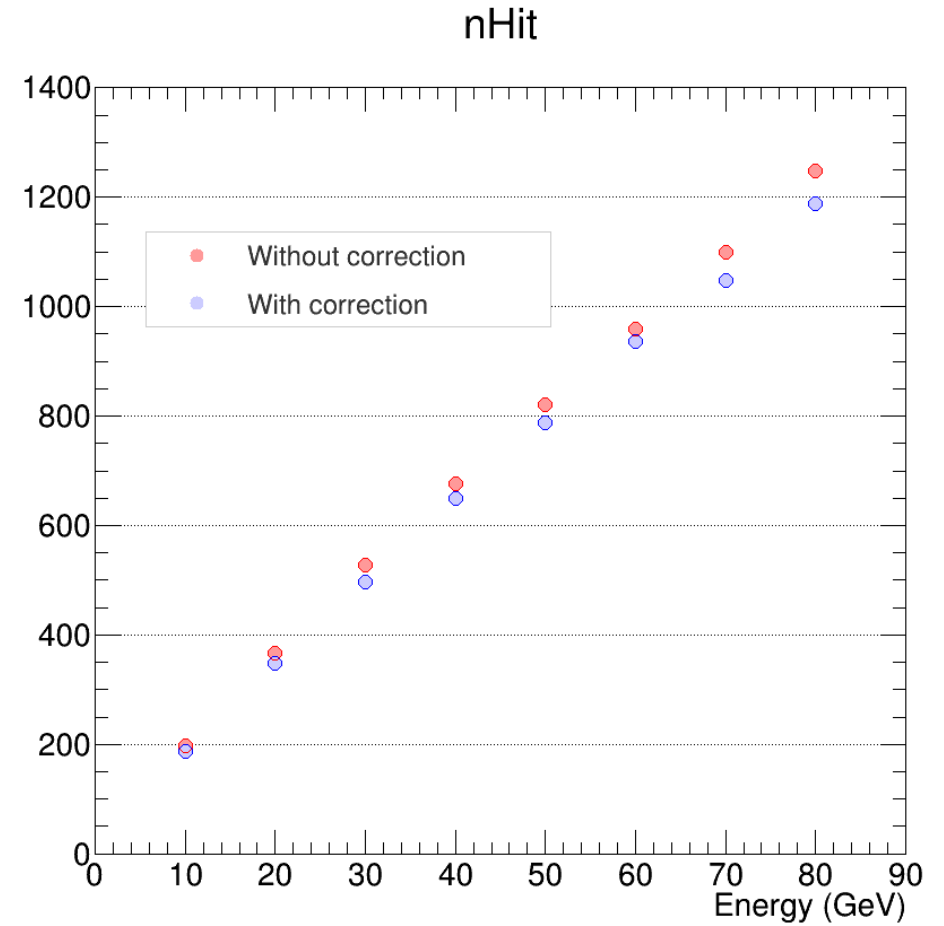


- After calibration

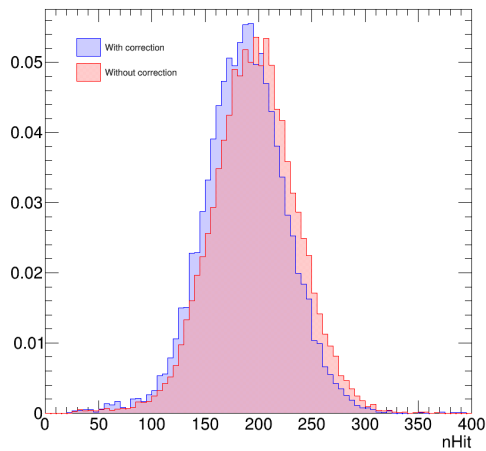


Homogenization of detector's response

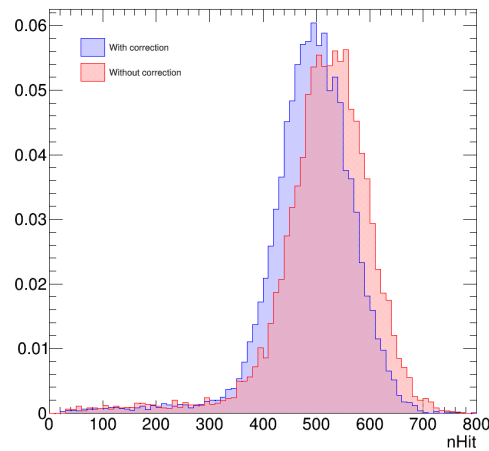
- H2-SPS beam test in October 2015
 - π^- beam 10-80 GeV
- Narrower distributions after calibration



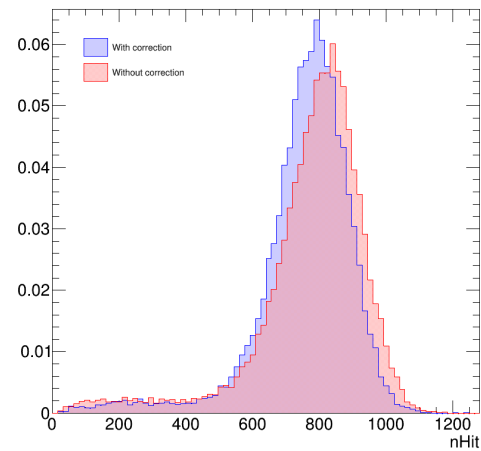
nHit 10 GeV



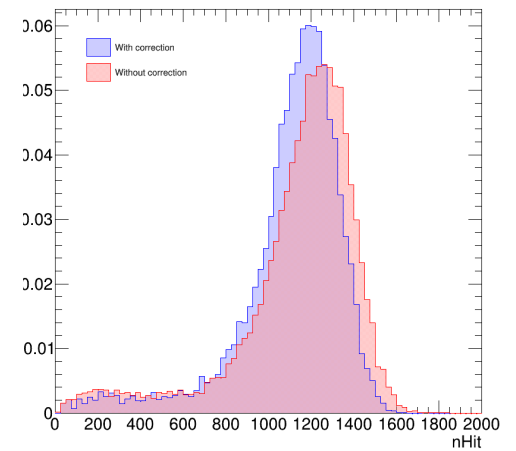
nHit 30 GeV



nHit 50 GeV

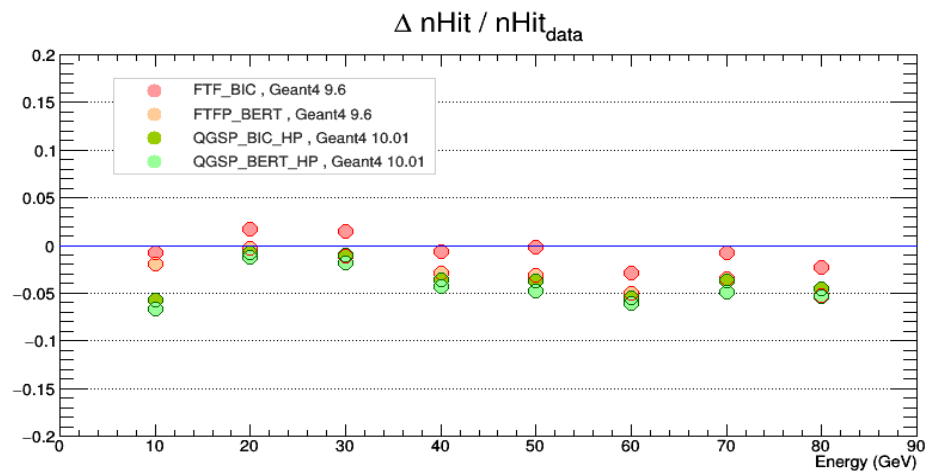
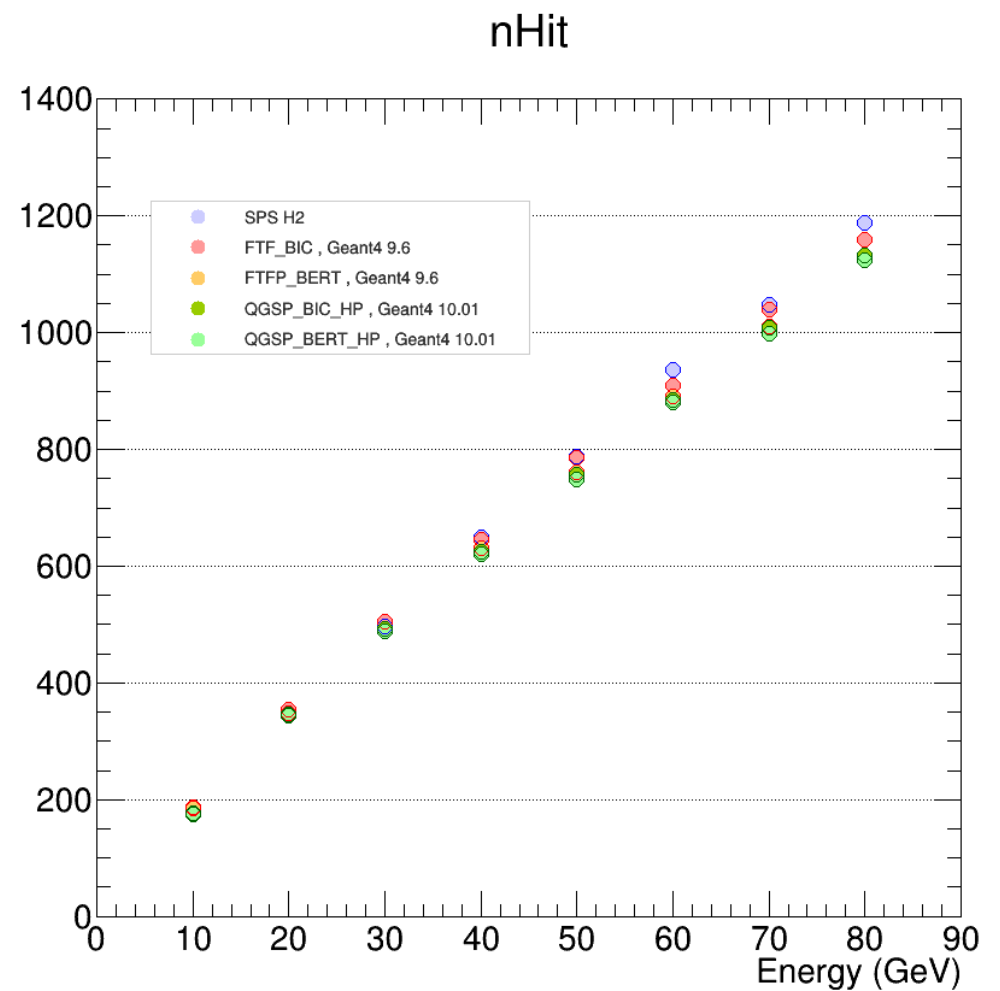


nHit 80 GeV



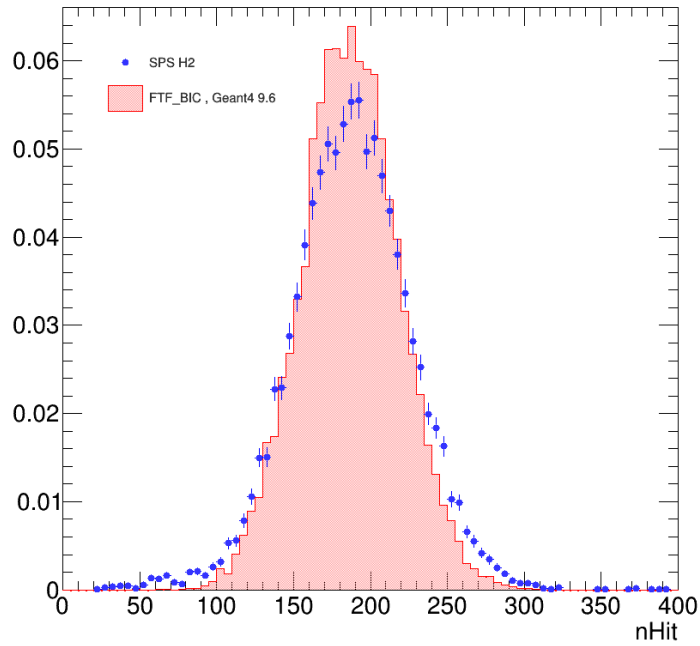
Simulation

- Best agreement is obtained with GEANT4 9.6 FTF_BIC list with max deviation of -3% at 60 GeV
- All other tested lists underestimate the number of hits for E=10 GeV and E>30 GeV

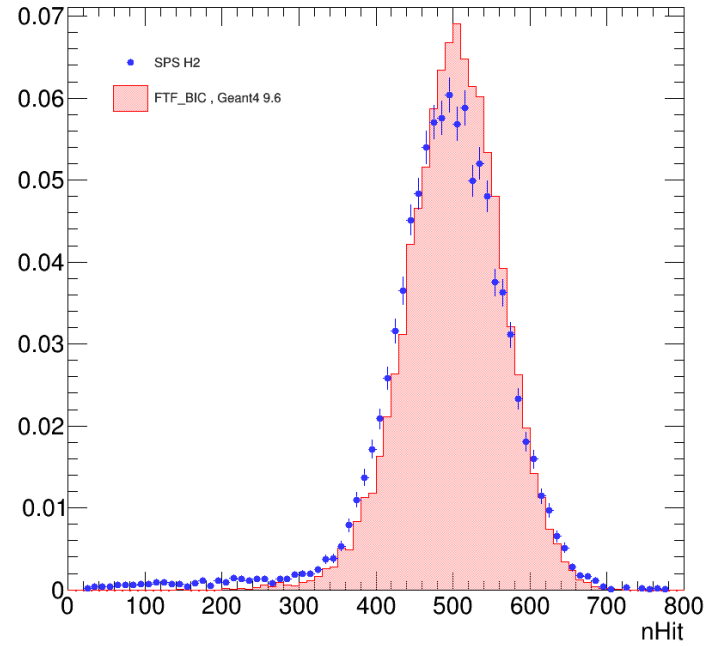


Simulation

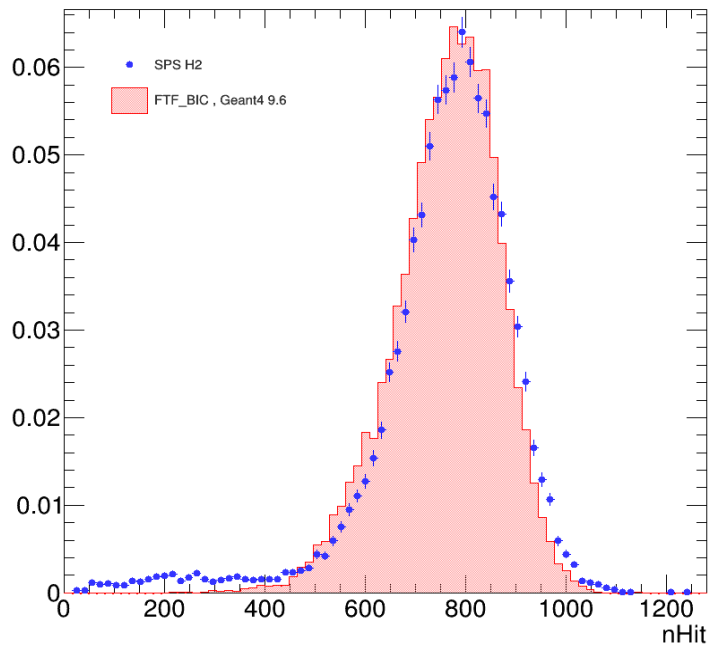
nHit 10 GeV



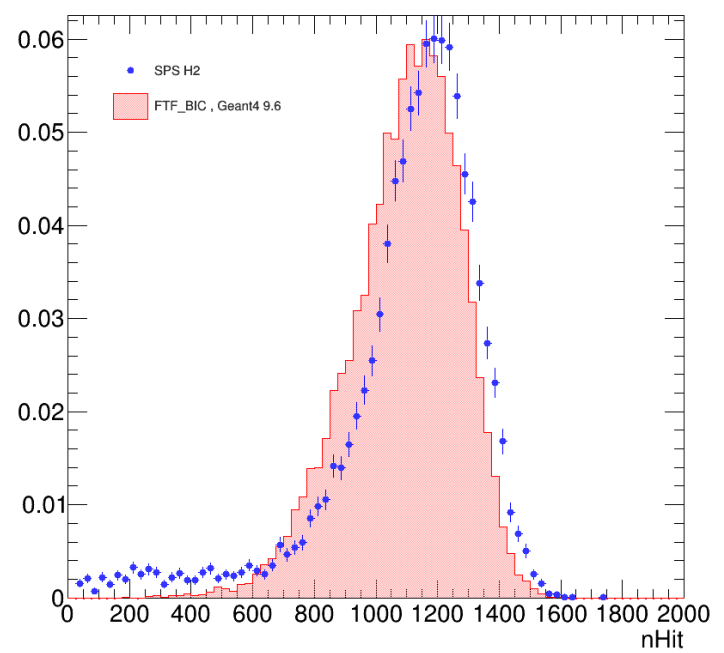
nHit 30 GeV



nHit 50 GeV



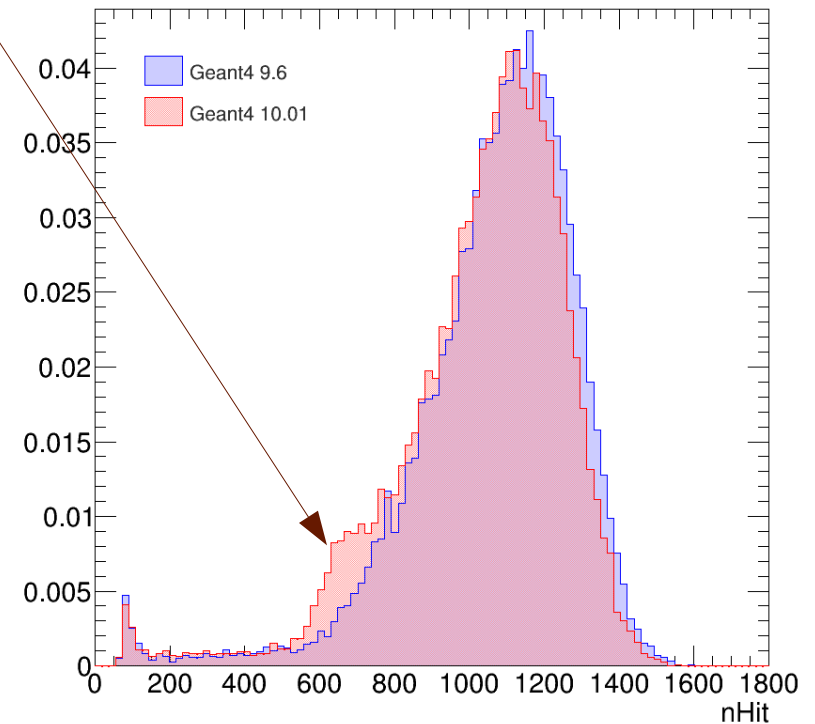
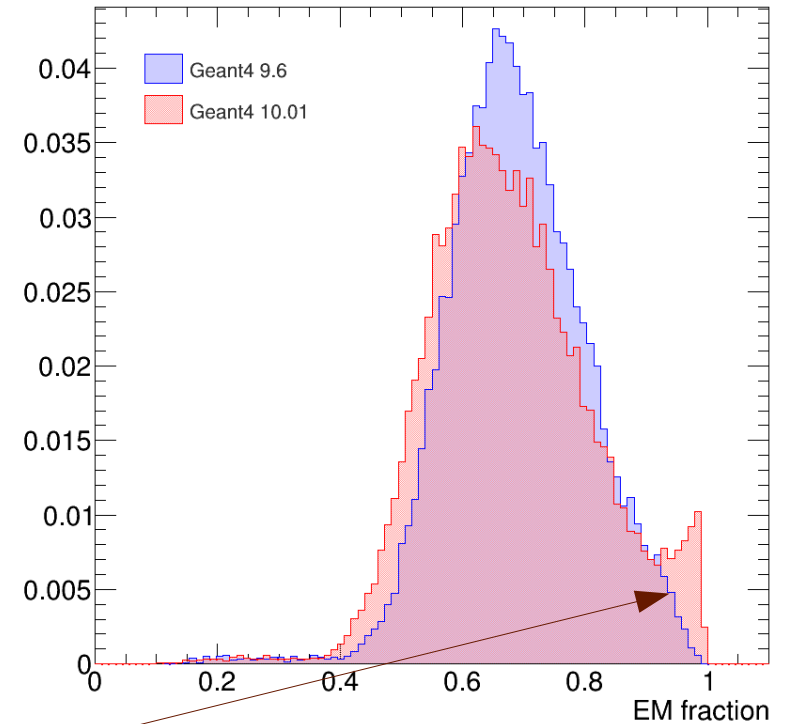
nHit 80 GeV



Simulation

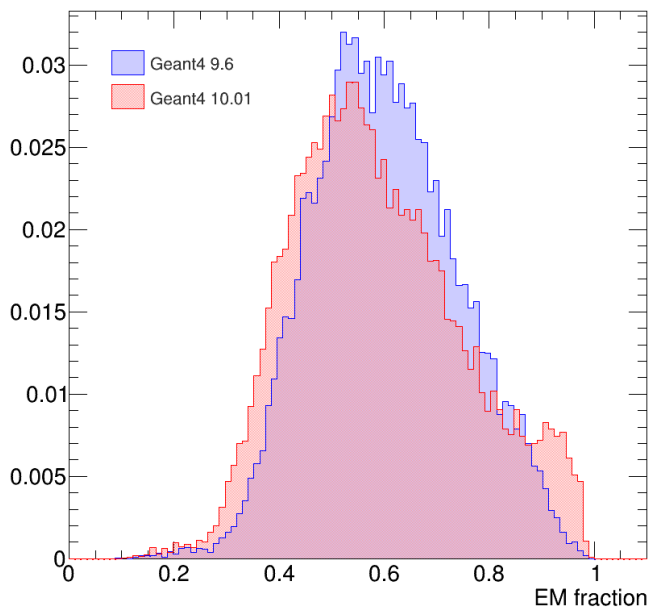
pi- 80 GeV , FTF_BIC

- **GEANT4 10.01** : Weird behavior in FTF based physics lists
 - EM fraction distribution of the shower has a very weird shape
 - A lot of showers are ~100% EM
 - This causes a 'bump' in hits distribution
 - This bump is not present in data

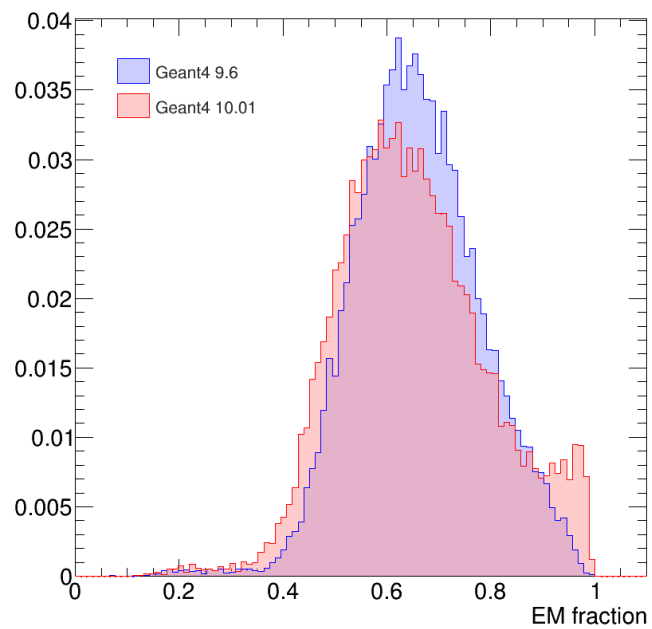


Simulation

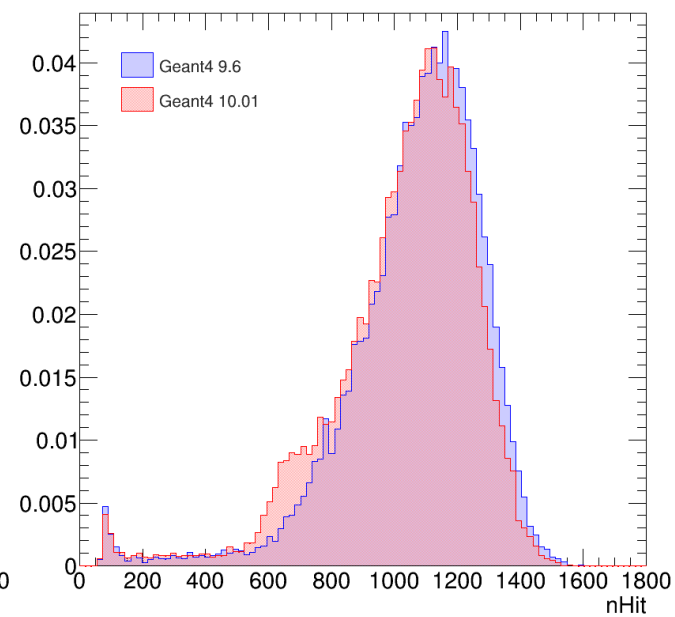
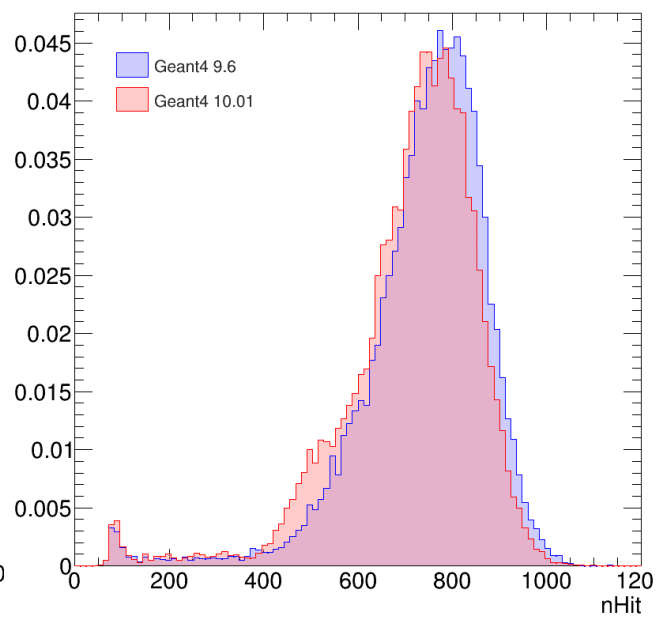
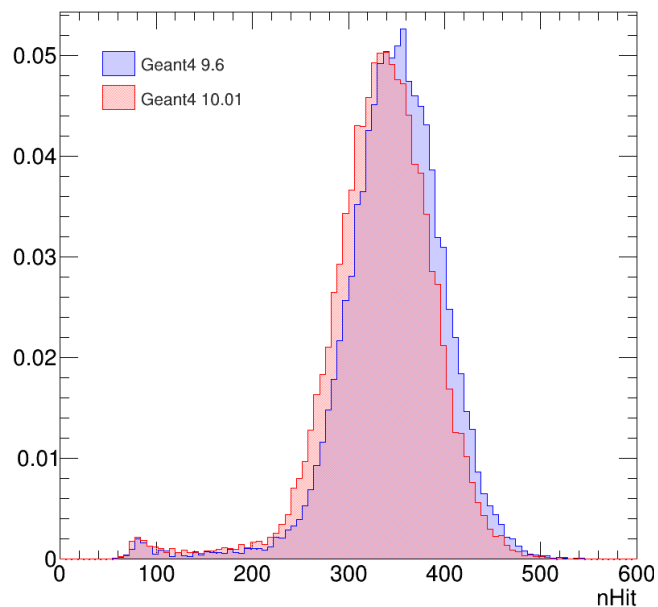
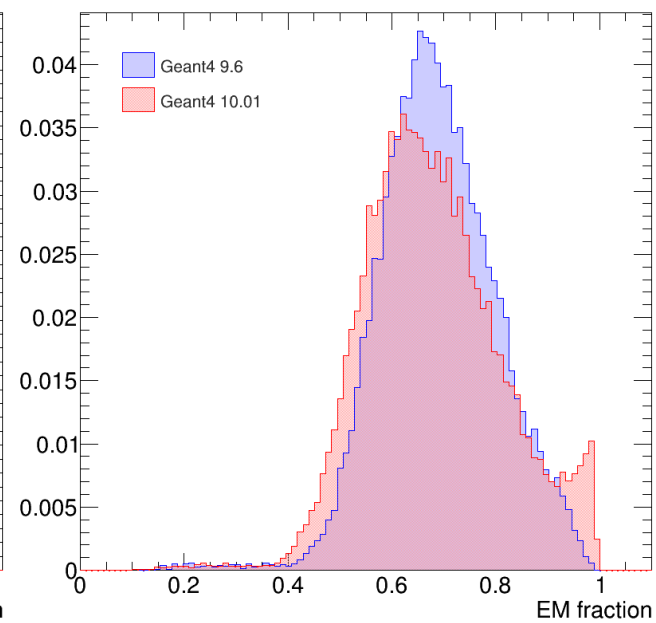
pi- 20 GeV , FTF_BIC



pi- 50 GeV , FTF_BIC

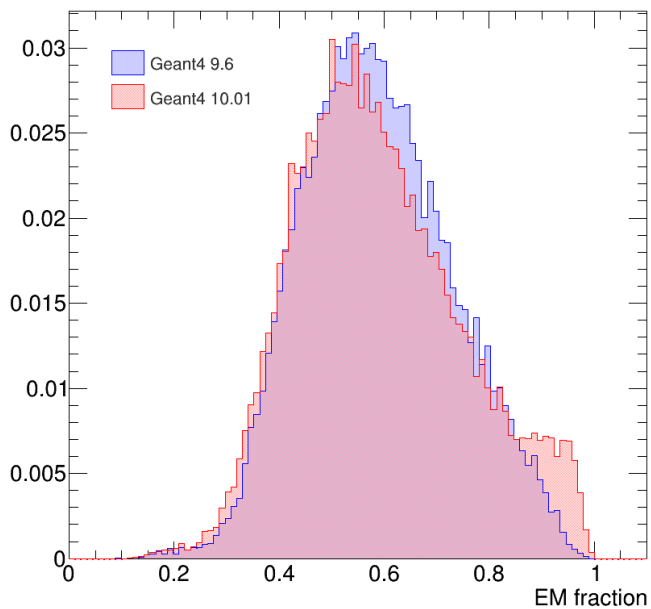


pi- 80 GeV , FTF_BIC

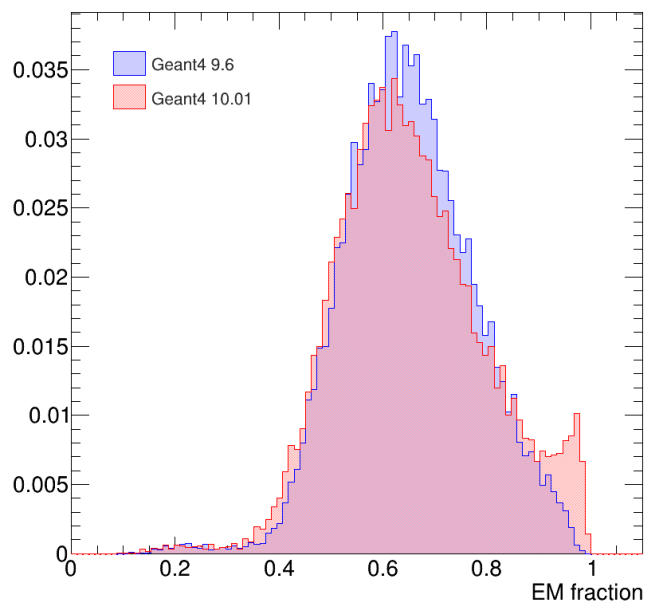


Simulation

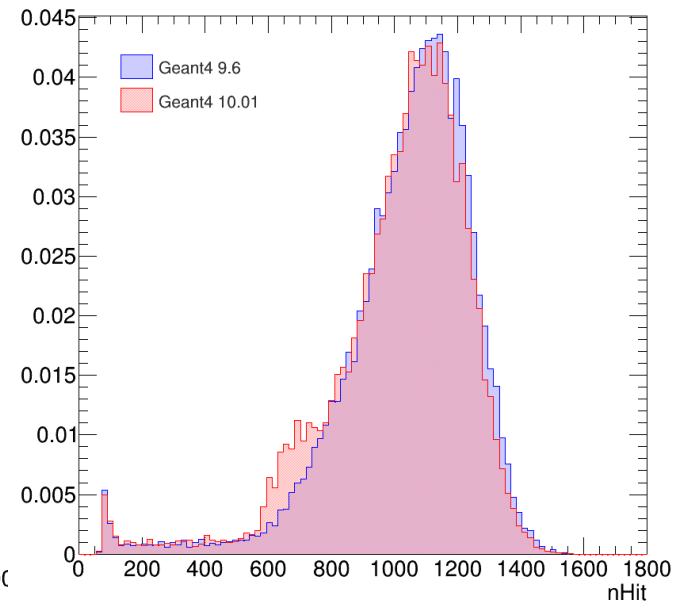
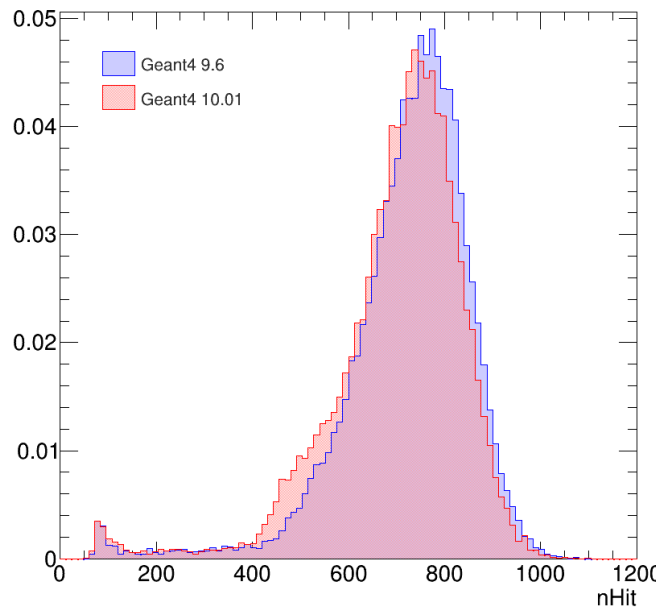
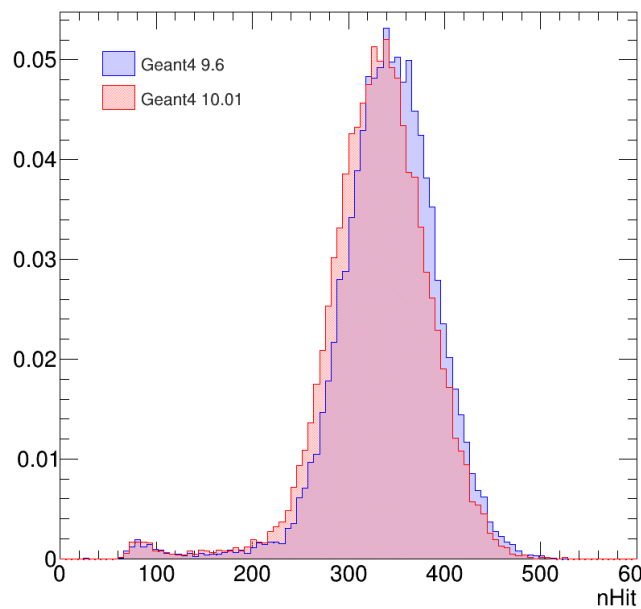
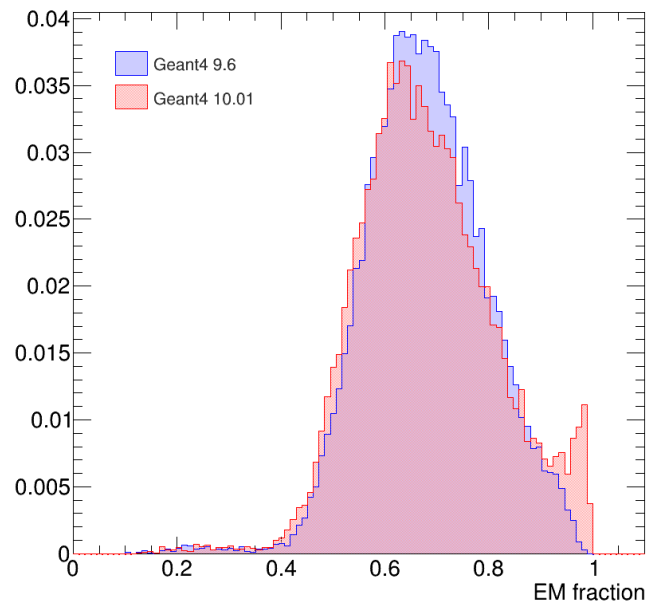
pi- 20 GeV , FTFP_BERT



pi- 50 GeV , FTFP_BERT



pi- 80 GeV , FTFP_BERT



Conclusion

- Homogenization of the multiplicity per ASIC seems to work well
- Other techniques of homogenization are planned for future beam tests (homogenization per pad using gain correction)
- Simulation using GEANT4 9.6 FTF_BIC is in quite good agreement with data
- GEANT4 10.01 FTF based lists seems to have problems