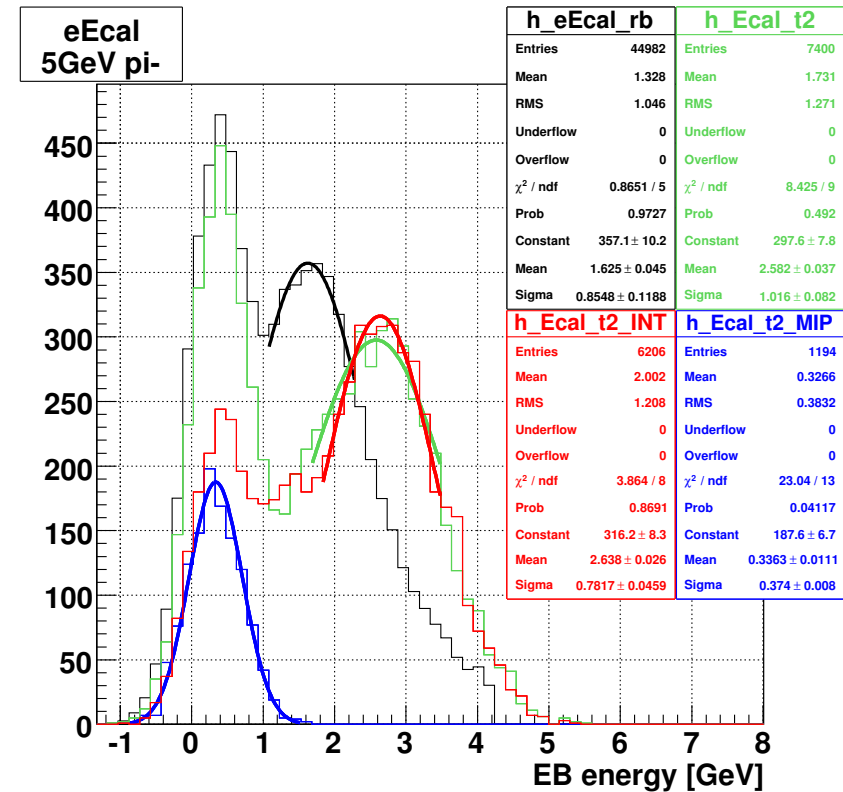
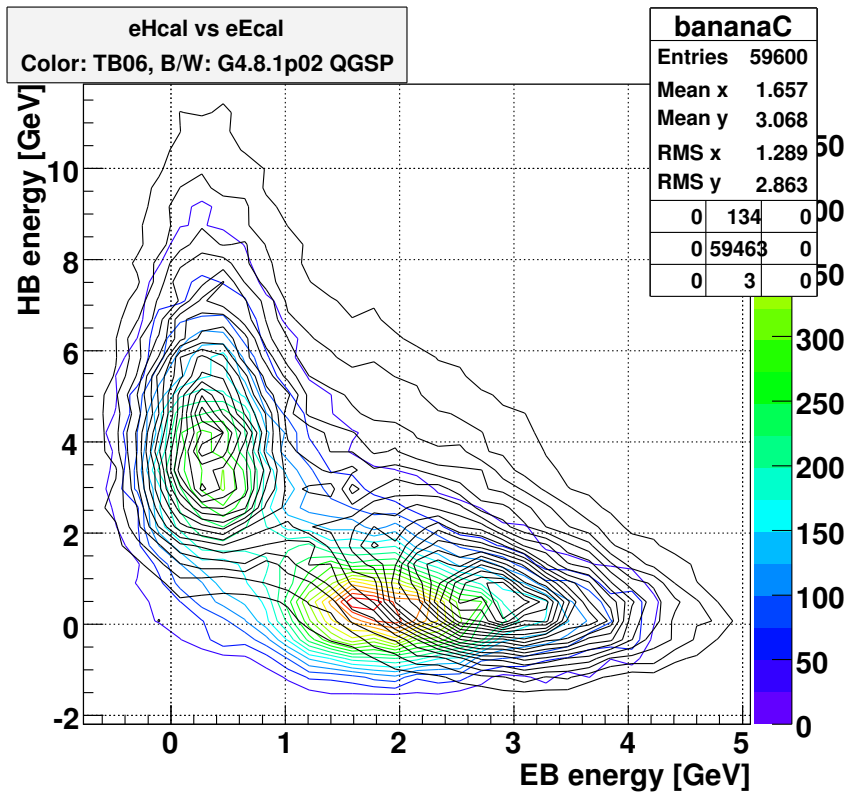


**”Studies of hadron shower profiles using  
2004 and 2006 H2 test-beam data with CMS  
Calorimeters”**

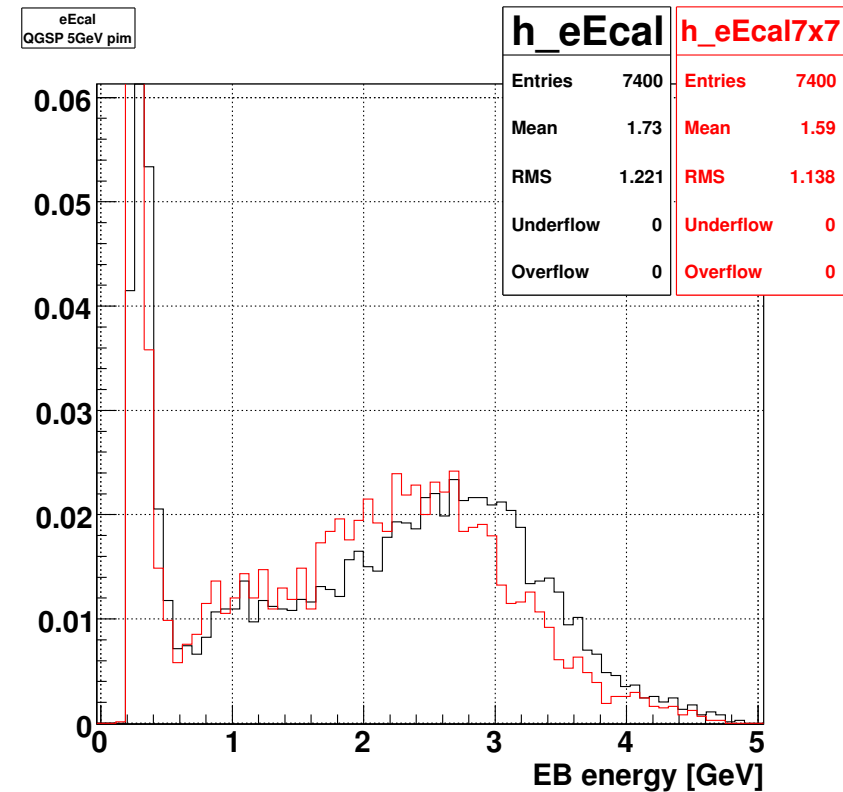
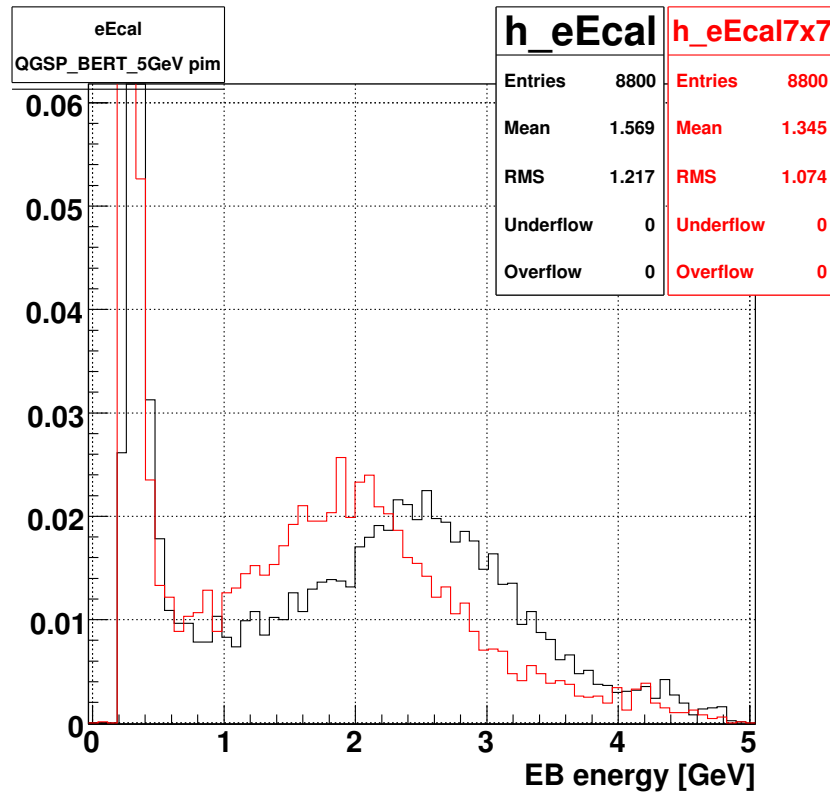
**Stefan Piperov**

**Jun 20, 2007**



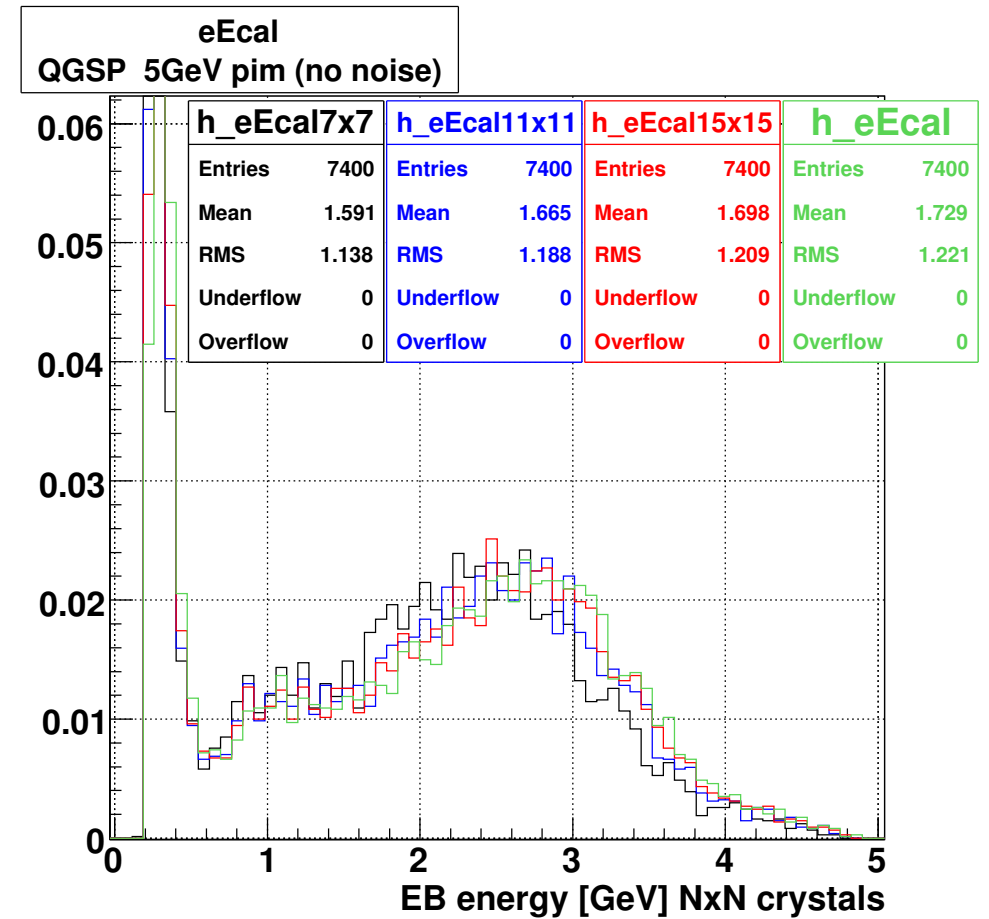
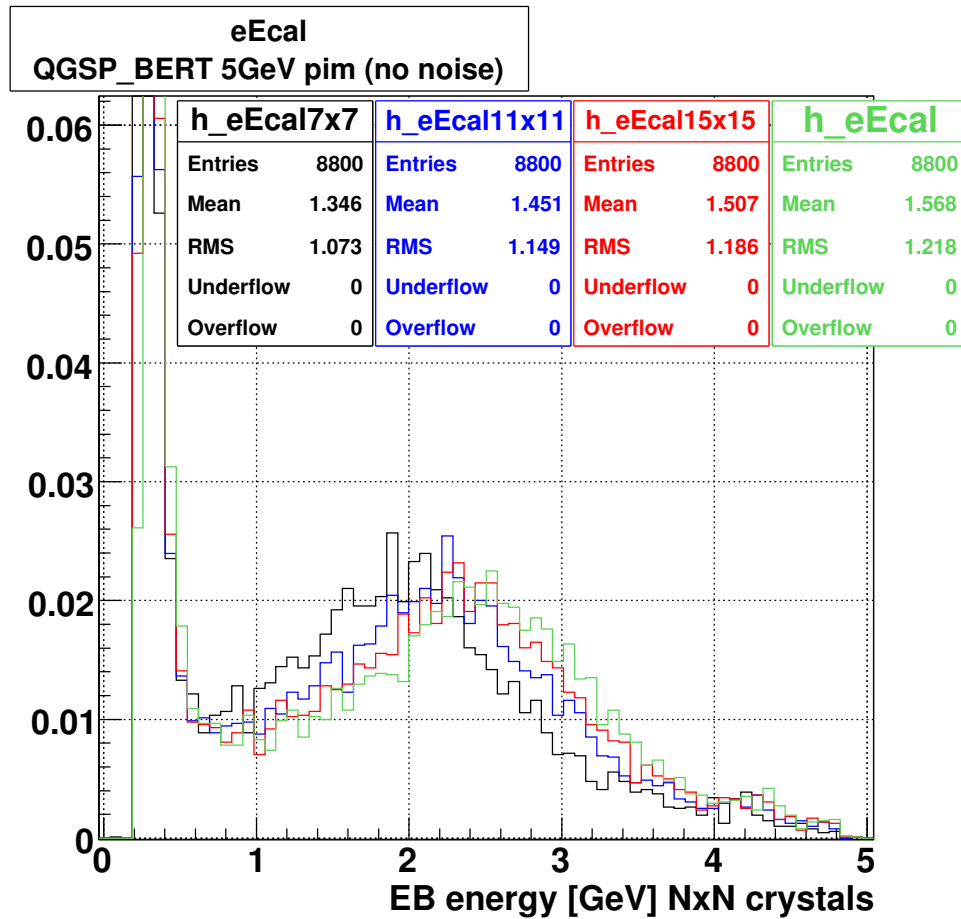
It looks like G4 predicts higher energy deposition in our ECAL crystals (green histogram) than we see in TestBeam (black).

It has been pointed out that we might be suffering from transverse containment effects:



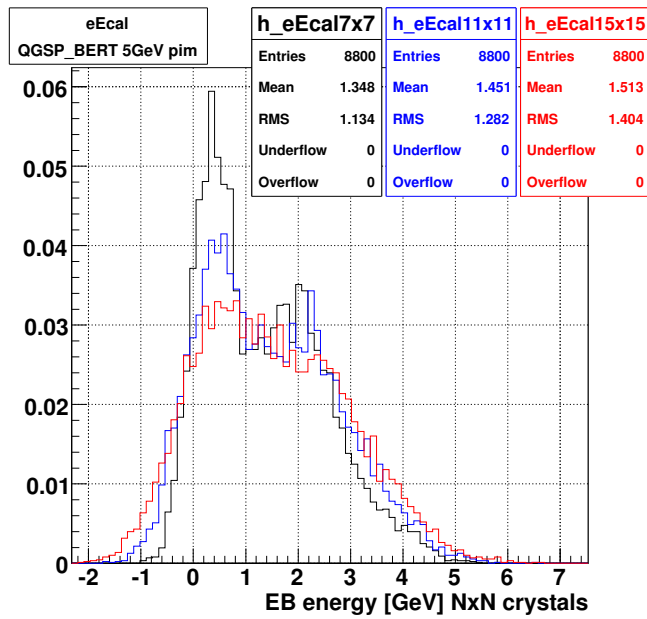
(Perhaps much more so in QGSP\_BERT than in QGSP.)

# ECAL - NxN crystals containment (no noise)

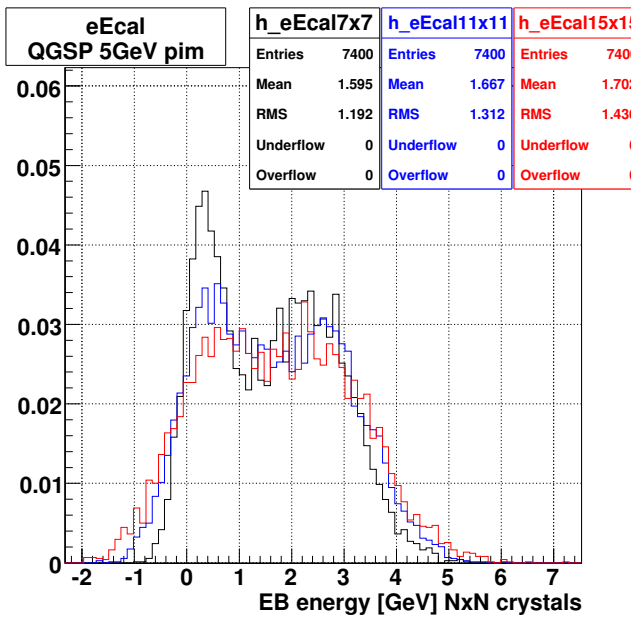


QGSP\_BERT is more sensitive to ECAL matrix size.

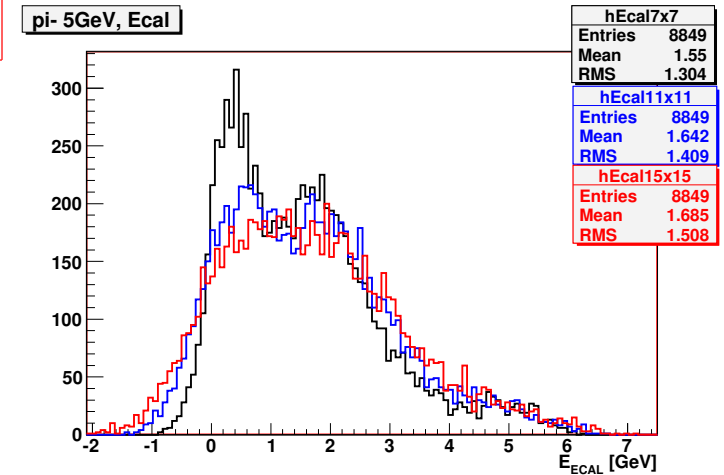
# ECAL - NxN crystals (with TB-like noise) vs. TB Data



QGSP\_BERT



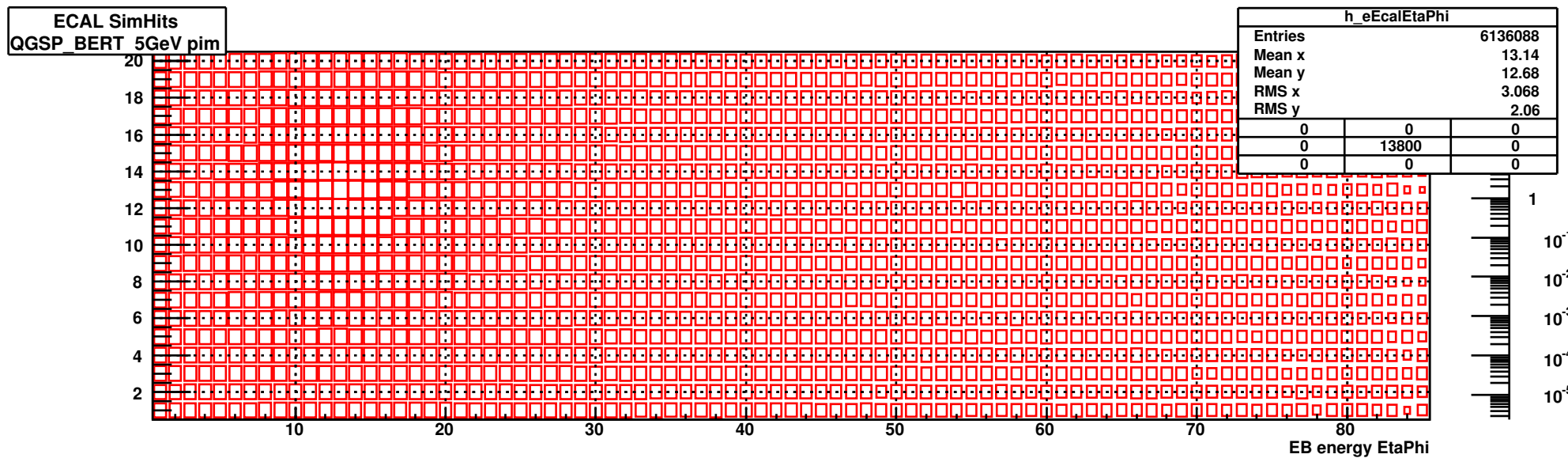
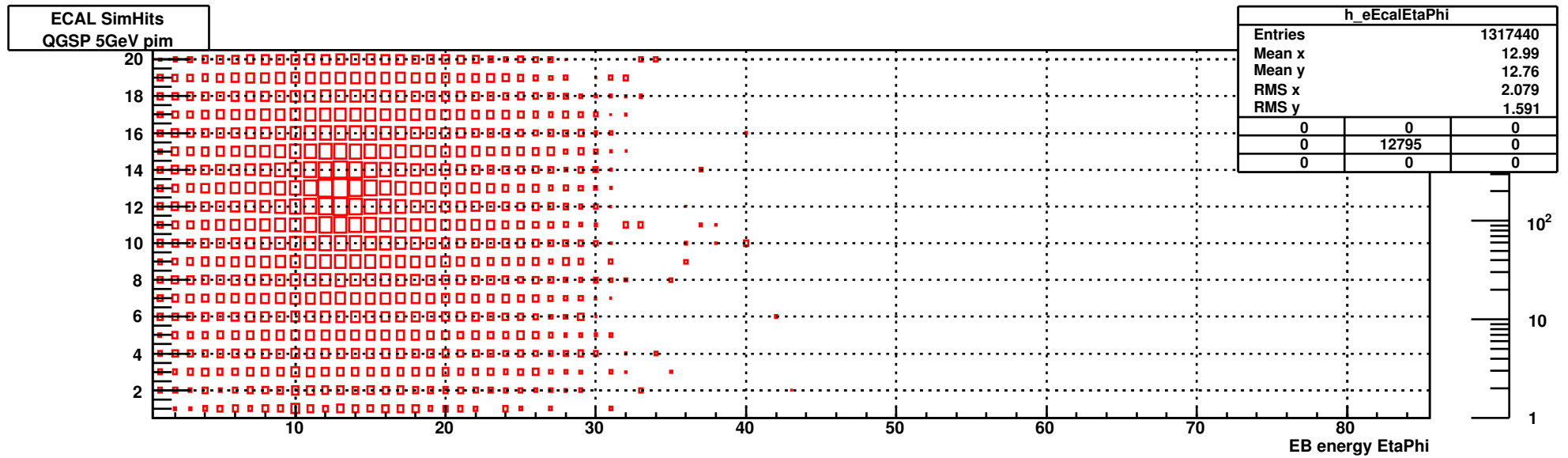
QGSP



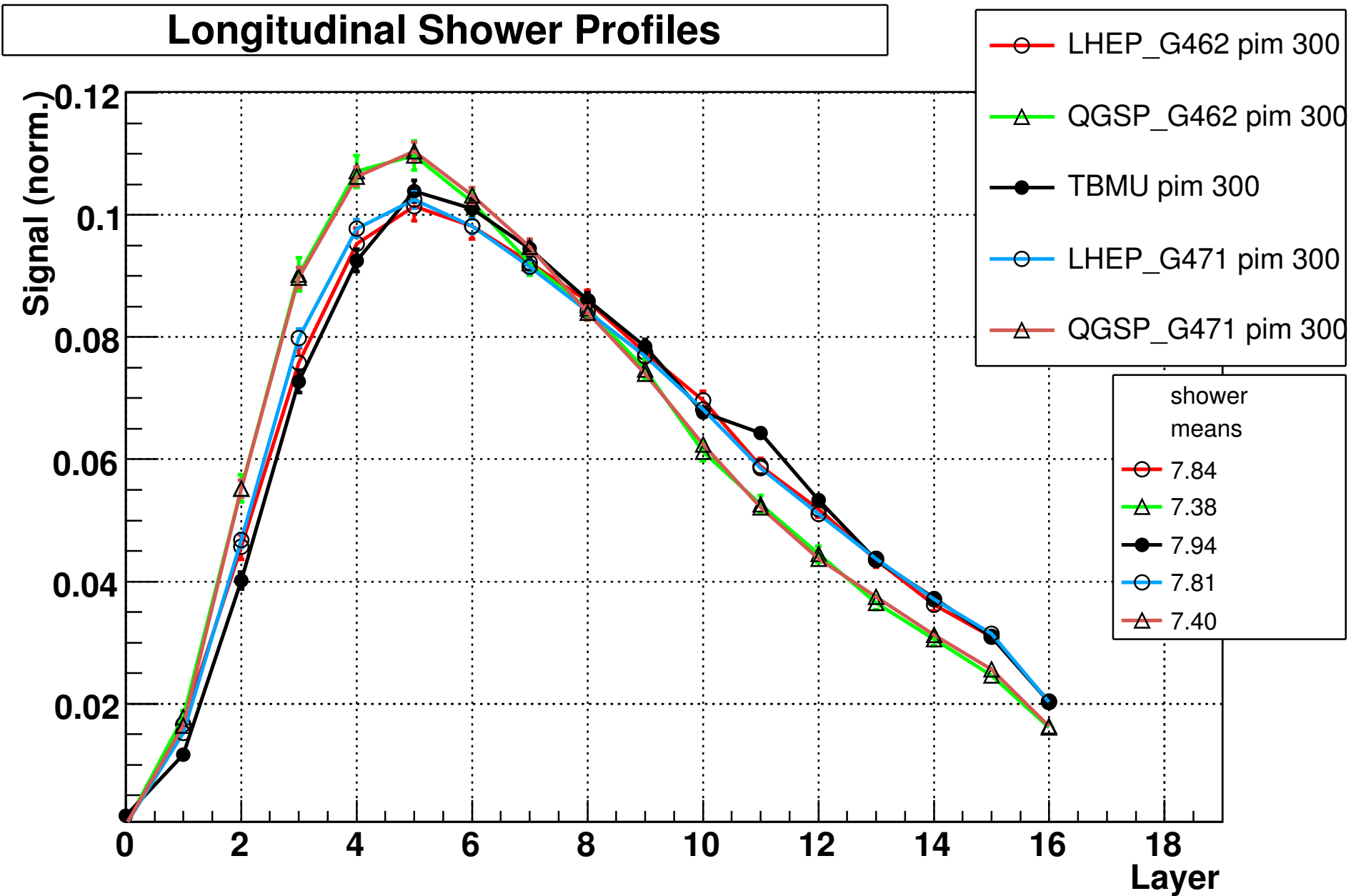
TB2006 data

- more MIPs in QGSP\_BERT ??
- Skew?

# ECAL - transverse shower all (crystals)

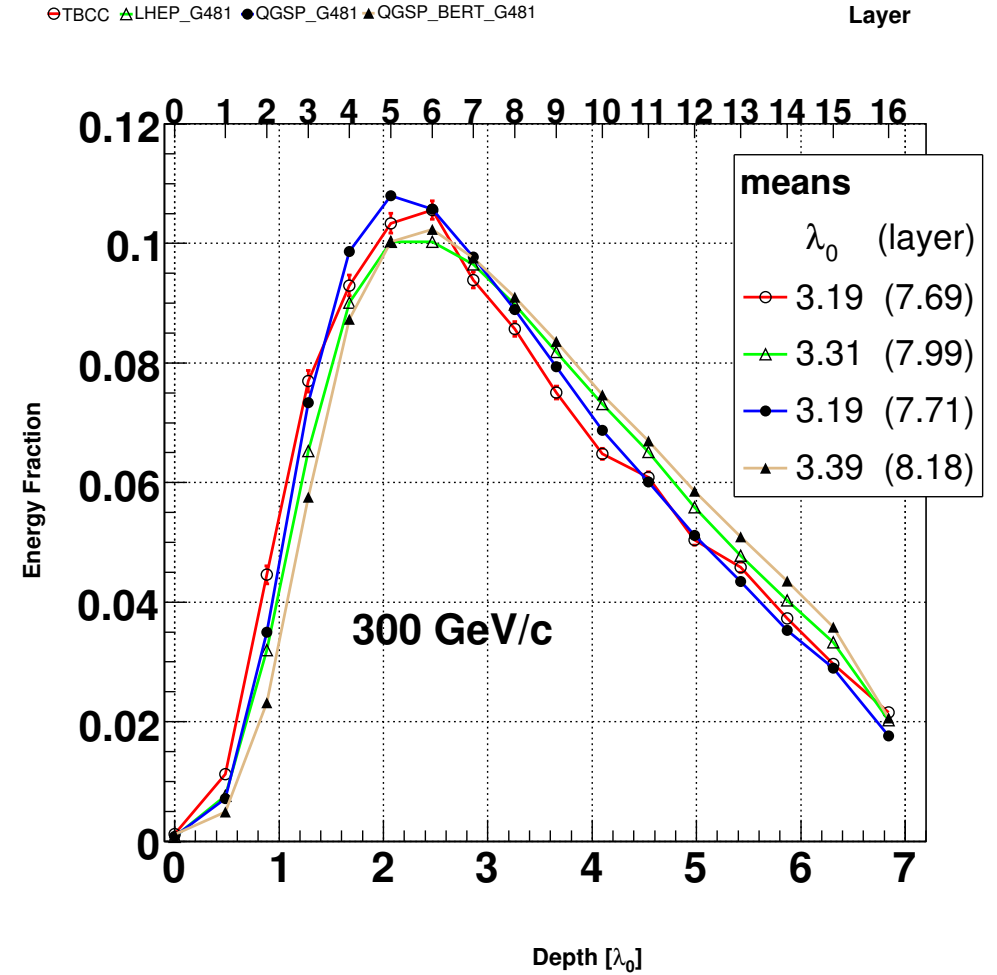
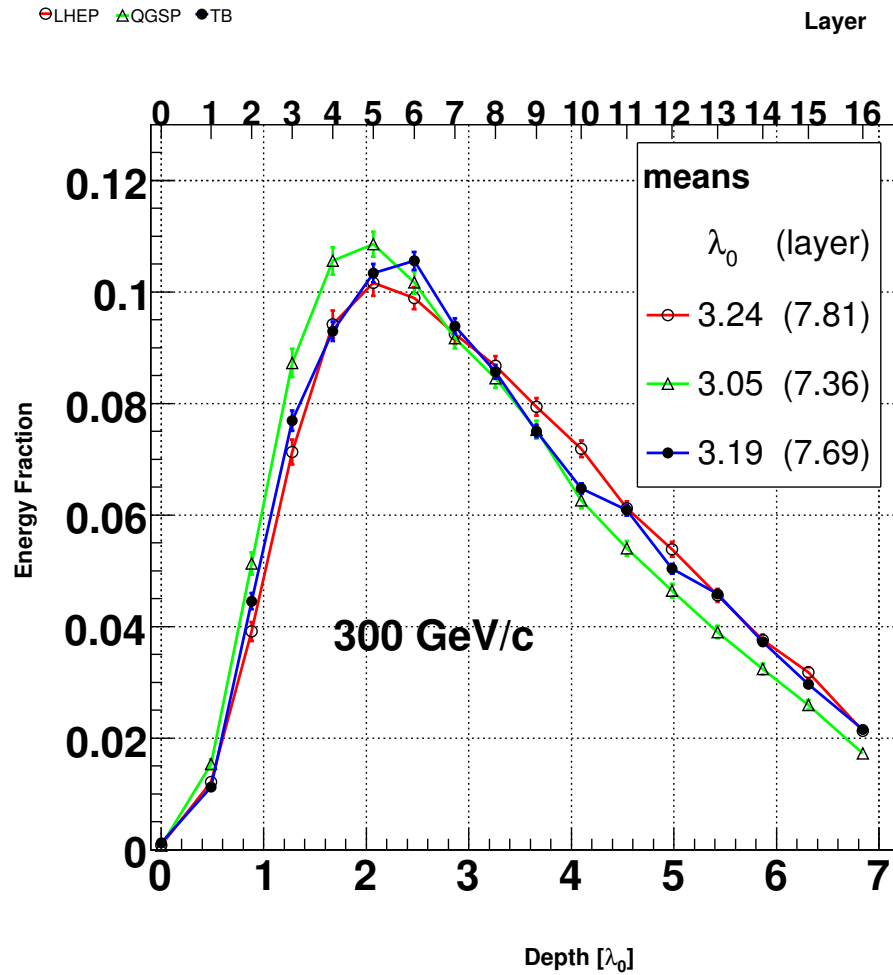




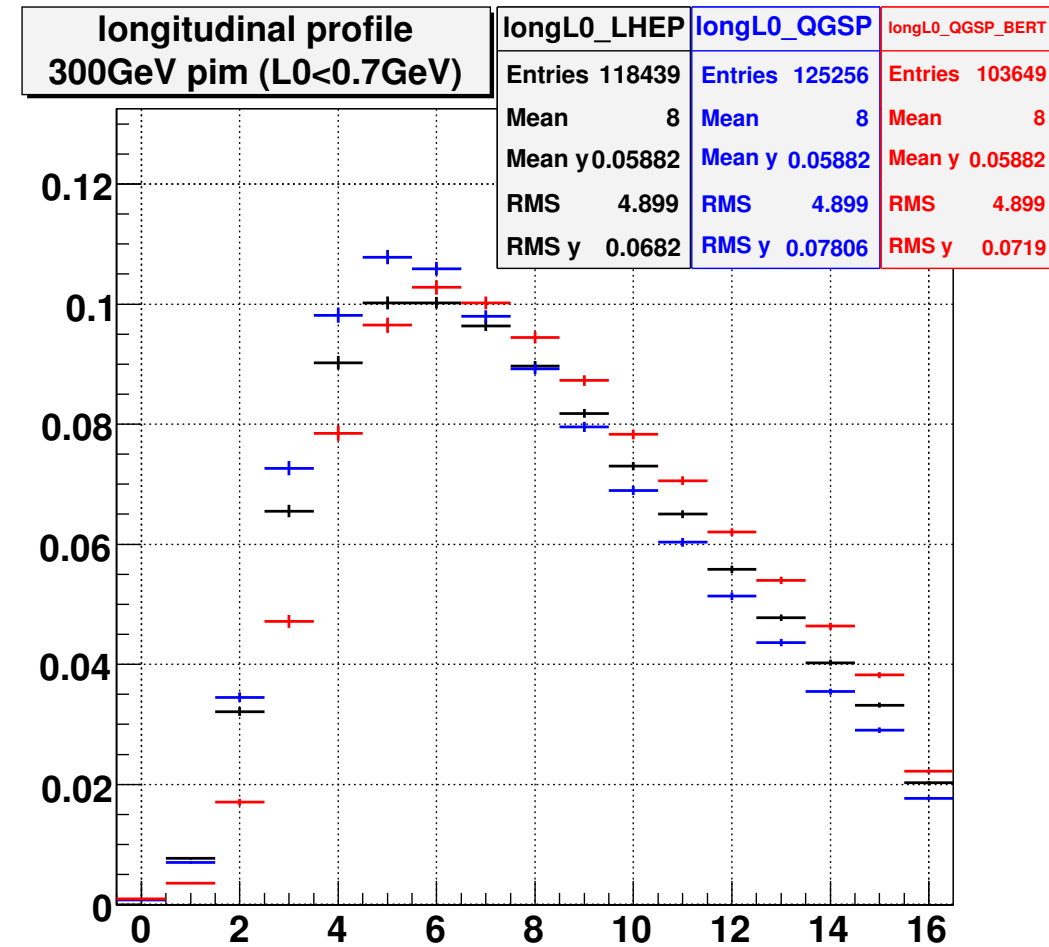
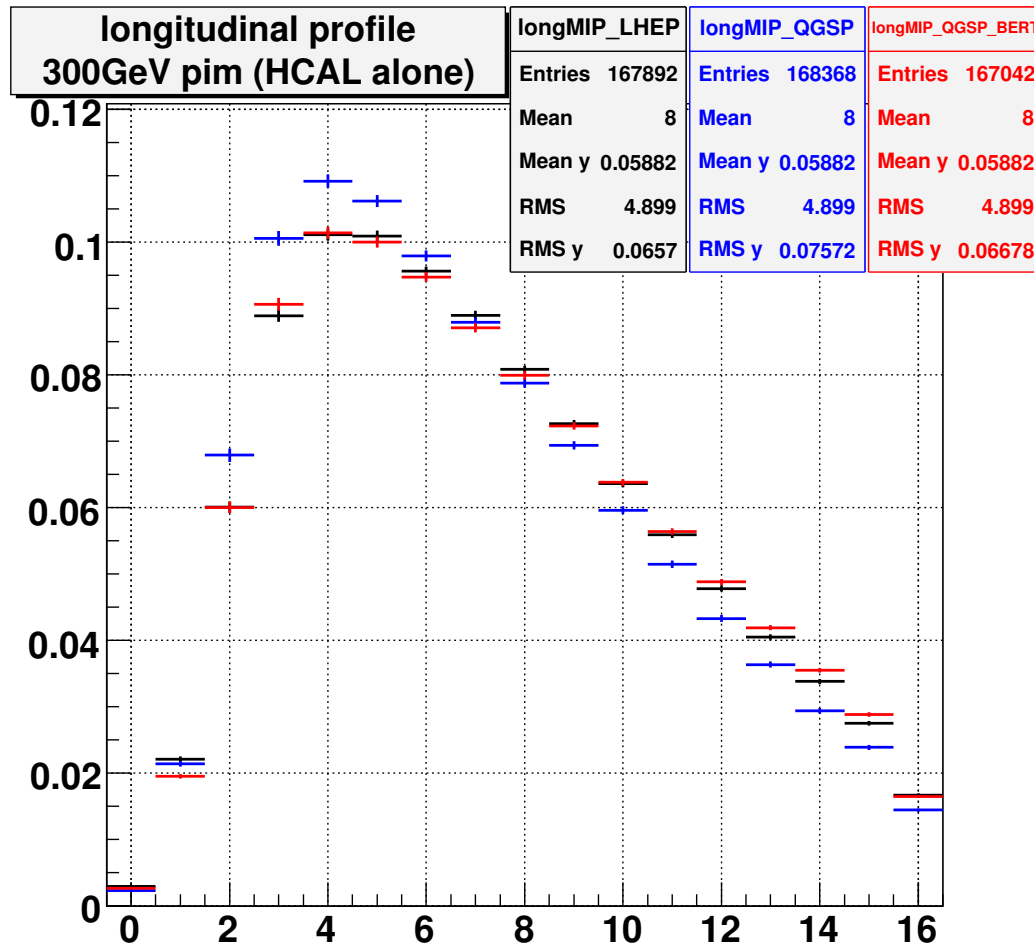




# Longitudinal Shower Profile G4.6.2 vs. G4.8.1



# Longitudinal shower L0 cut effect



- without the L0 cut QGSP\_BERT looks very much like LHEP.
- with the L0 cut QGSP\_BERT is dramatically different. Why?

- G4 simulation of hadronic showers is still under investigation.
- QGSP\_BERT shows remarkable agreement with data and old LHEP sometimes, but is real or coincidental?
- Shower profiles of QGSP\_BERT do look different from LHEP/QGSP
- Simulate the transverse shape of the TB04 beam.
- Get new/better Longitudinal shower data from TB2007.

