

Pion Simulations for the ATLAS HEC Testbeam

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- **No new results** since December 2003 meeting
(<http://agenda.cern.ch/age?a036494>)



- HEC stand-alone testbeam

- Geant4
 - Version 5.0p01
 - Hadronic physics lists for calorimetry
 - * LHEP 3.3
 - * QGSP 2.3
 - 20 μm range cut

- Geant3
 - Version 3.21
 - G-CALOR (hadronic shower code)
 - 100 keV transport cuts and 1 MeV process cuts



- Energy normalisation

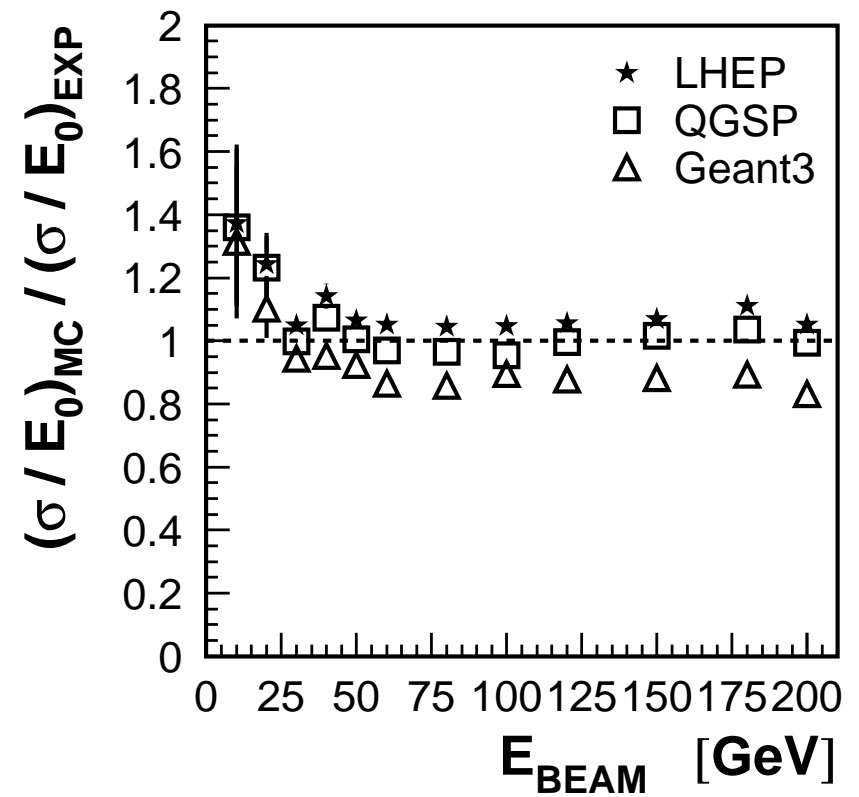
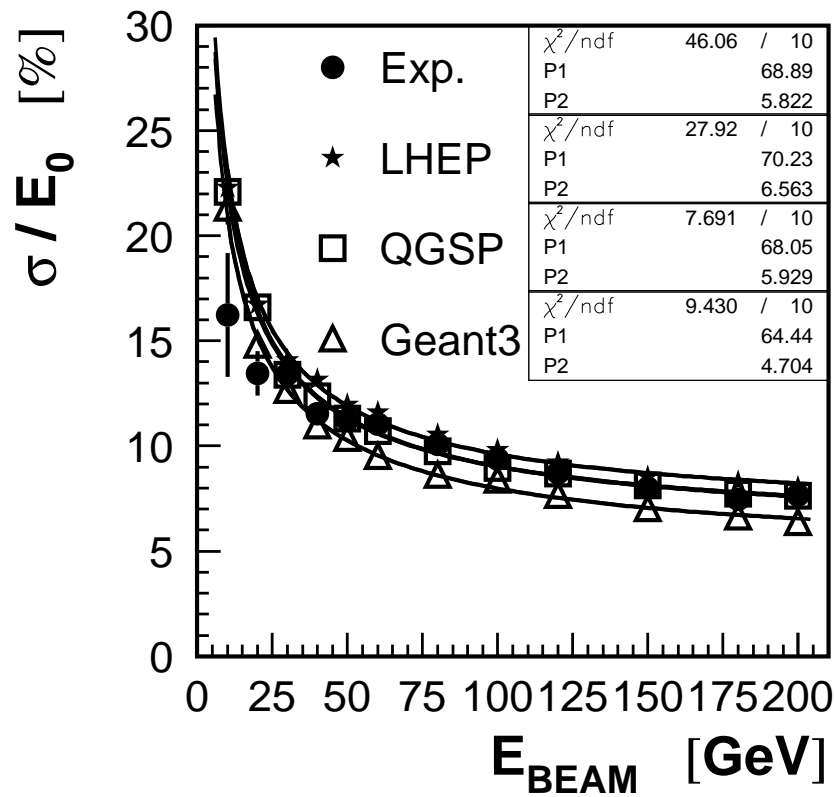
- Simple (one-parameter) EM-scale calibration:
 - * electron beams
 - * average visible energy \Rightarrow beam energy
- Most of studied variables enter in ratio
(resolution σ/E_0 , fraction of energy in layers, etc.)

- Noise treatment

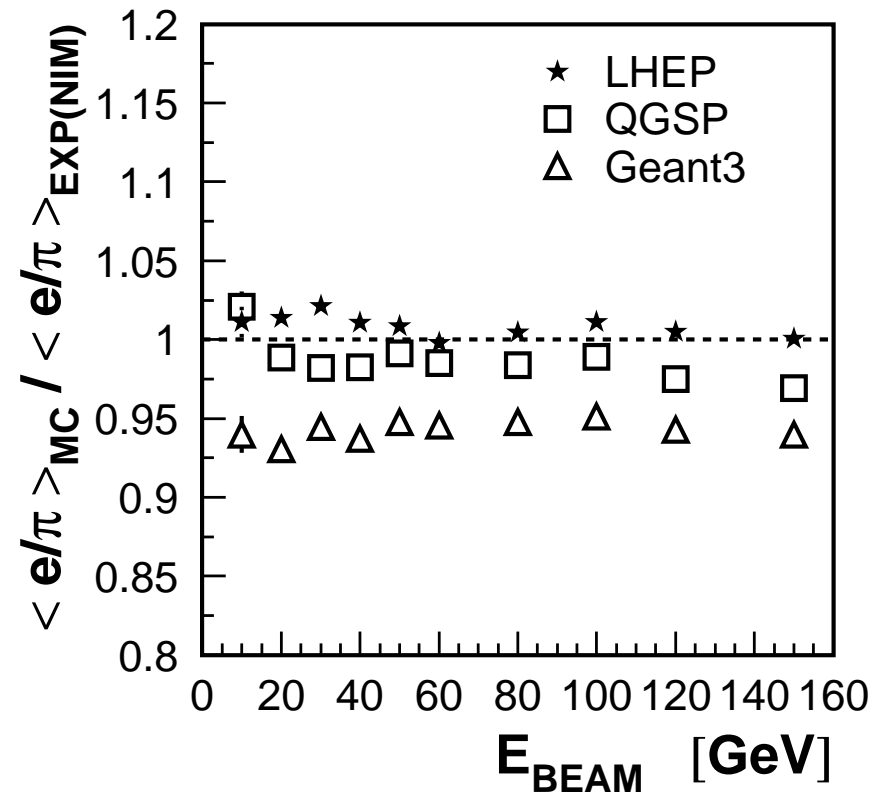
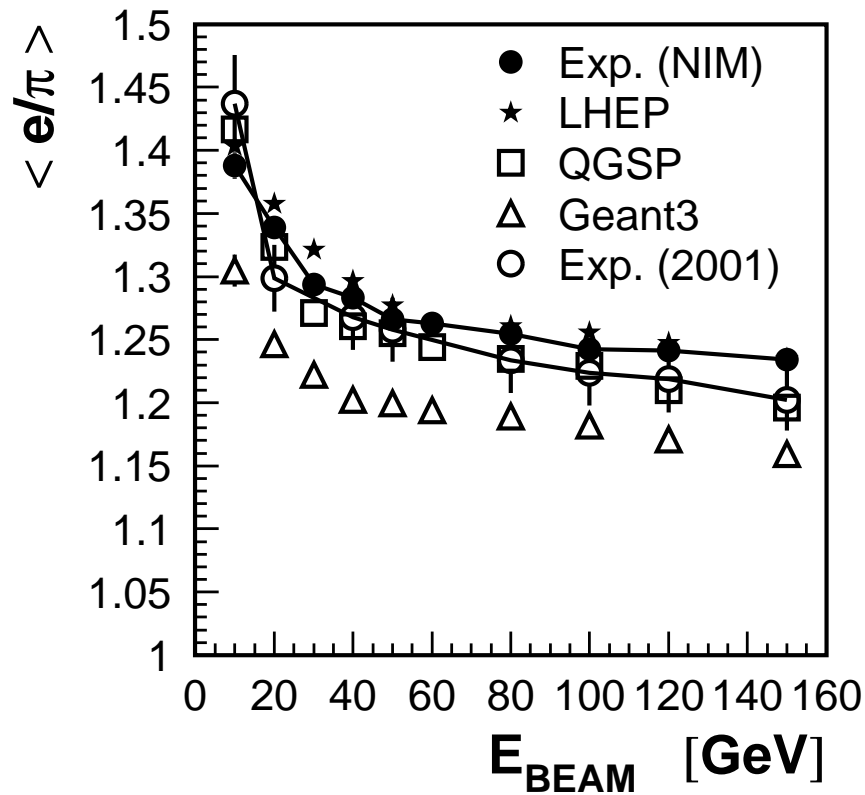
- Cluster of fixed size
- Well controlled distributions of noise in clusters
(first five time slices)
- Noise subtraction from experimental values of resolution



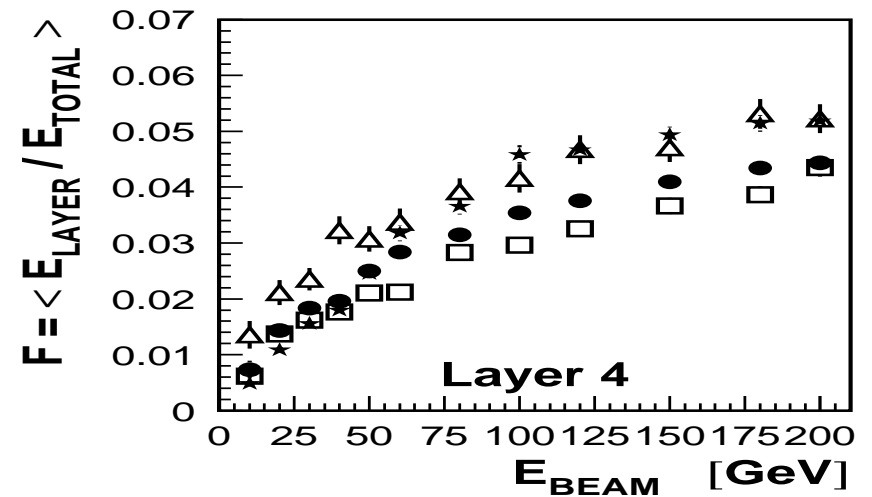
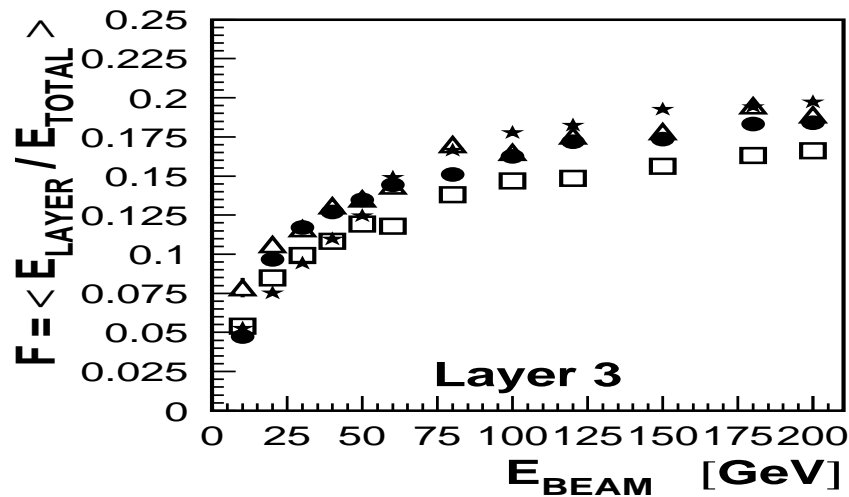
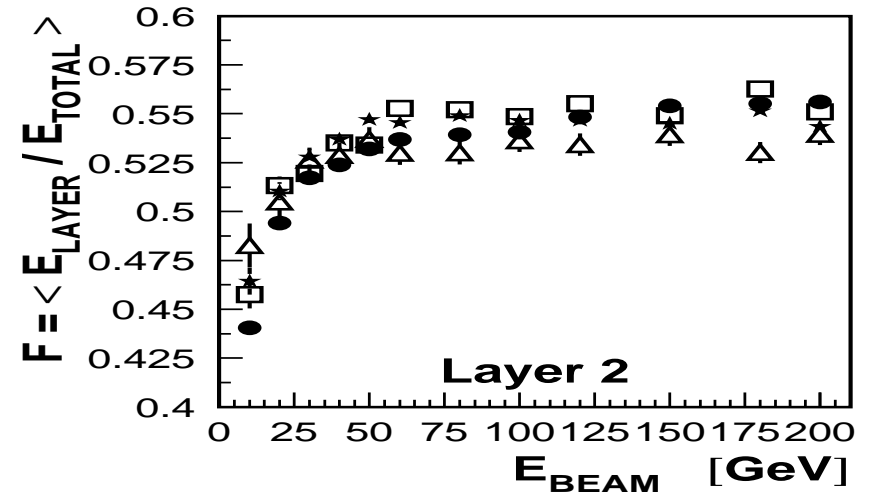
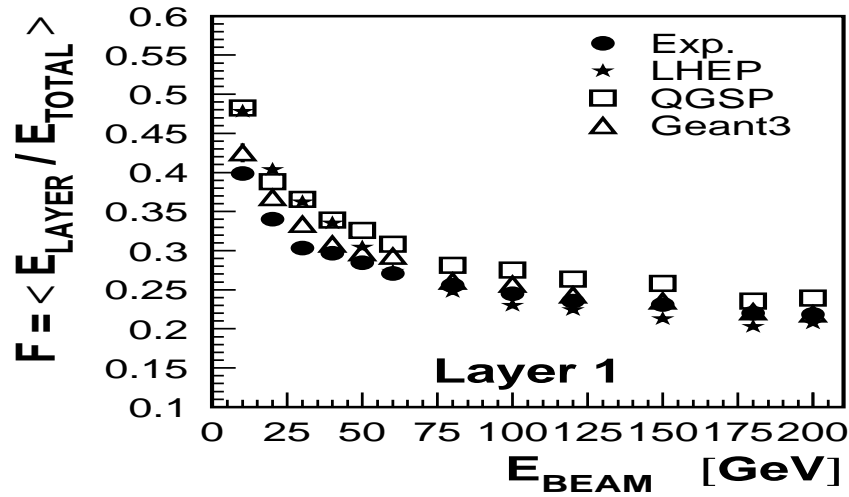
Pion energy resolution



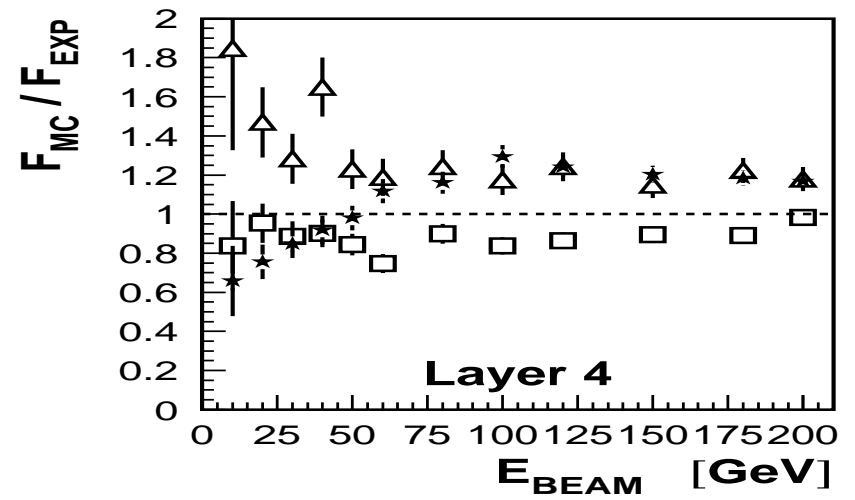
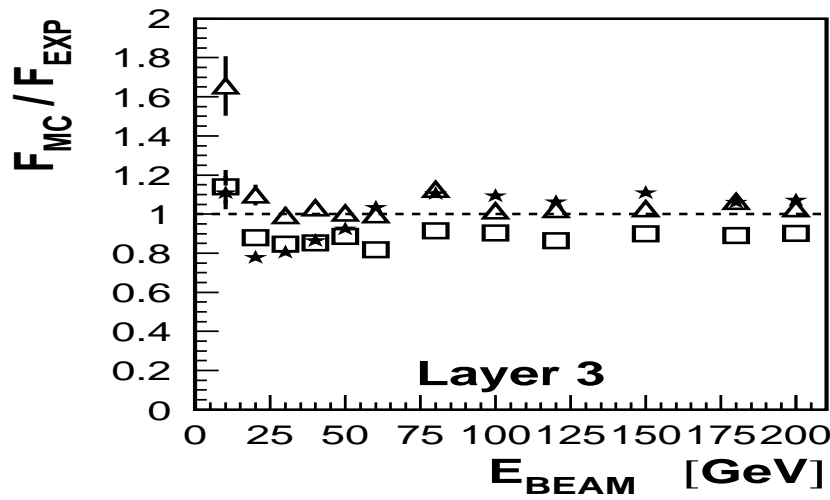
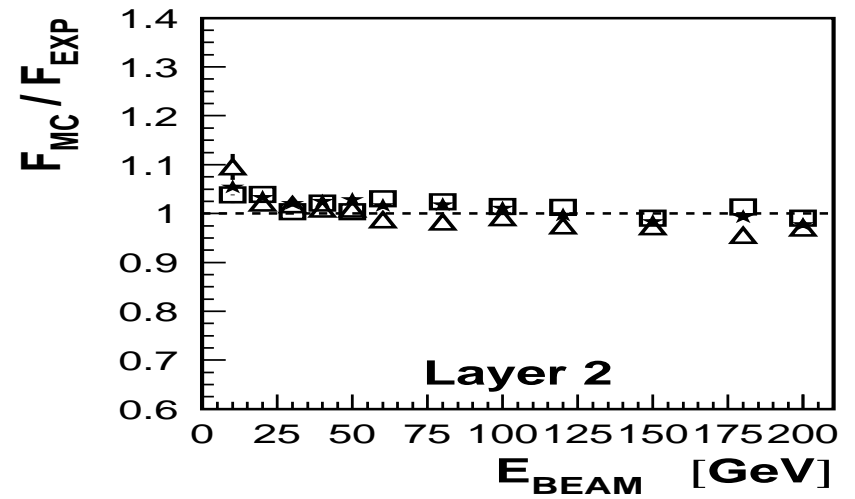
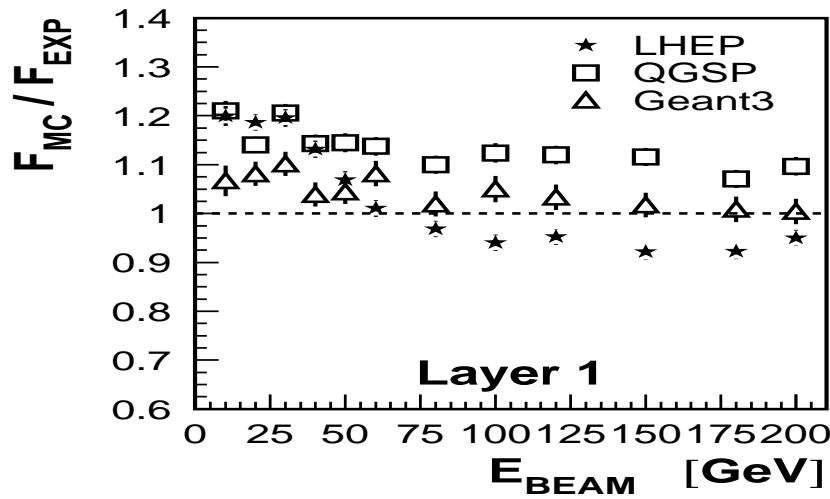
Ratio e/π



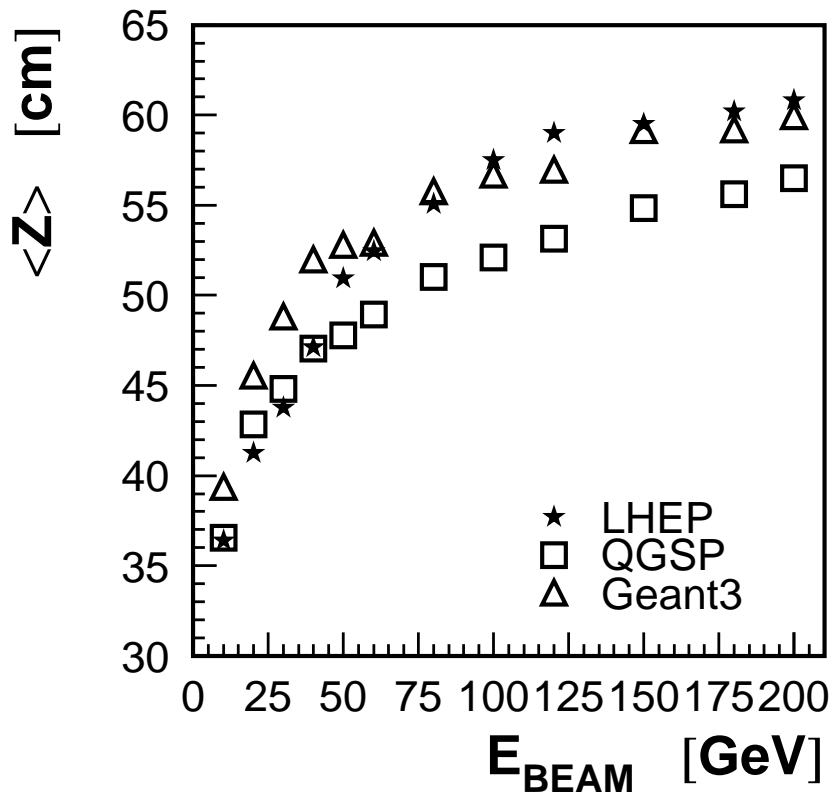
Fraction of energy in HEC layers



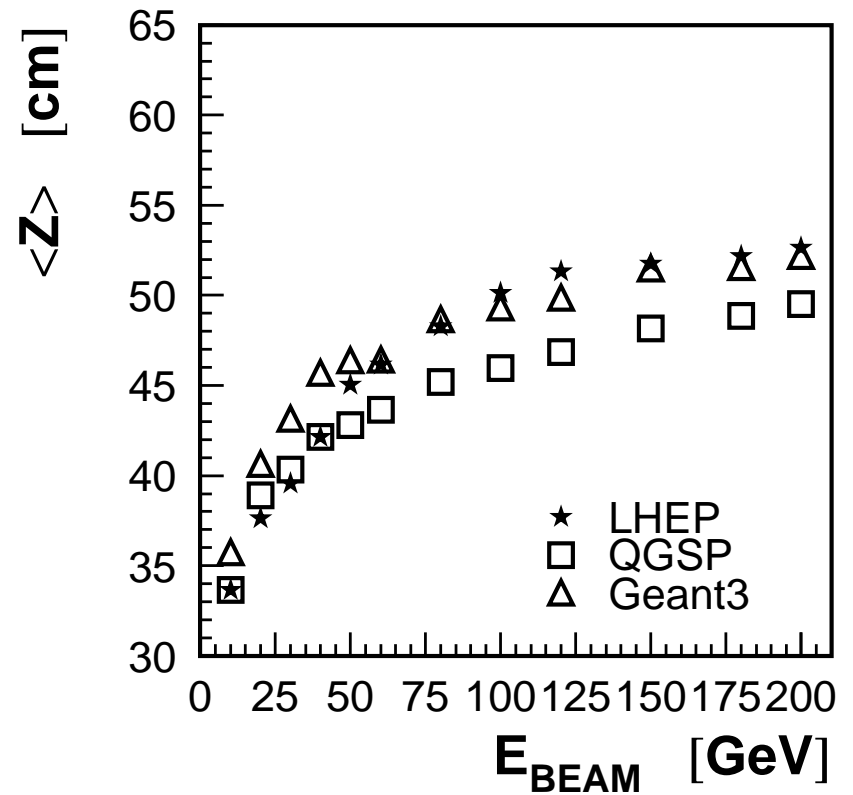
Fraction of energy in HEC layers (ratio to experiment)



Average longitudinal position of a shower



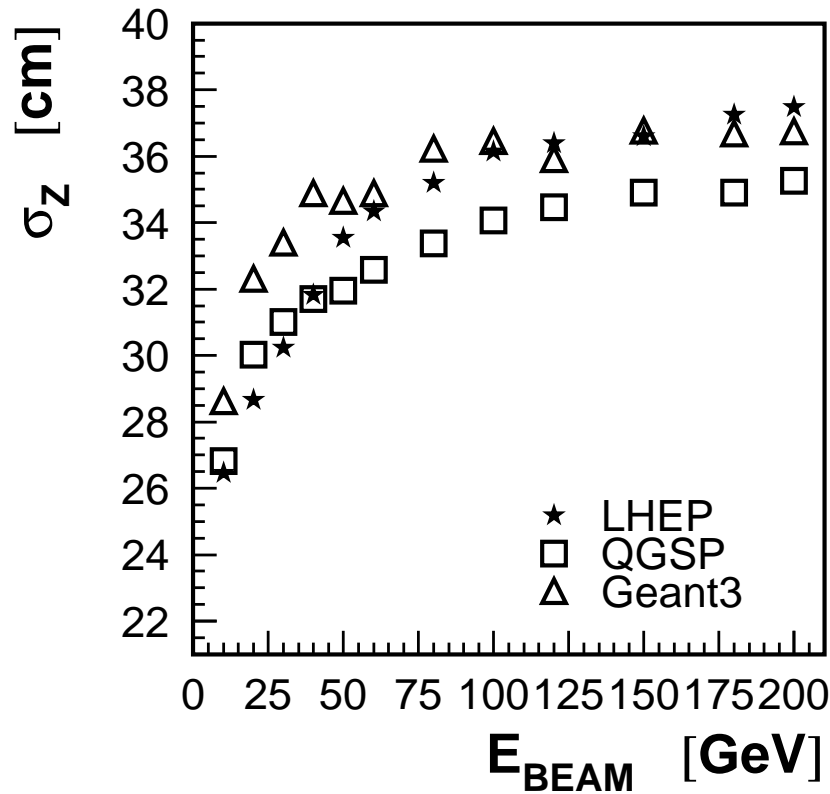
Copper plates



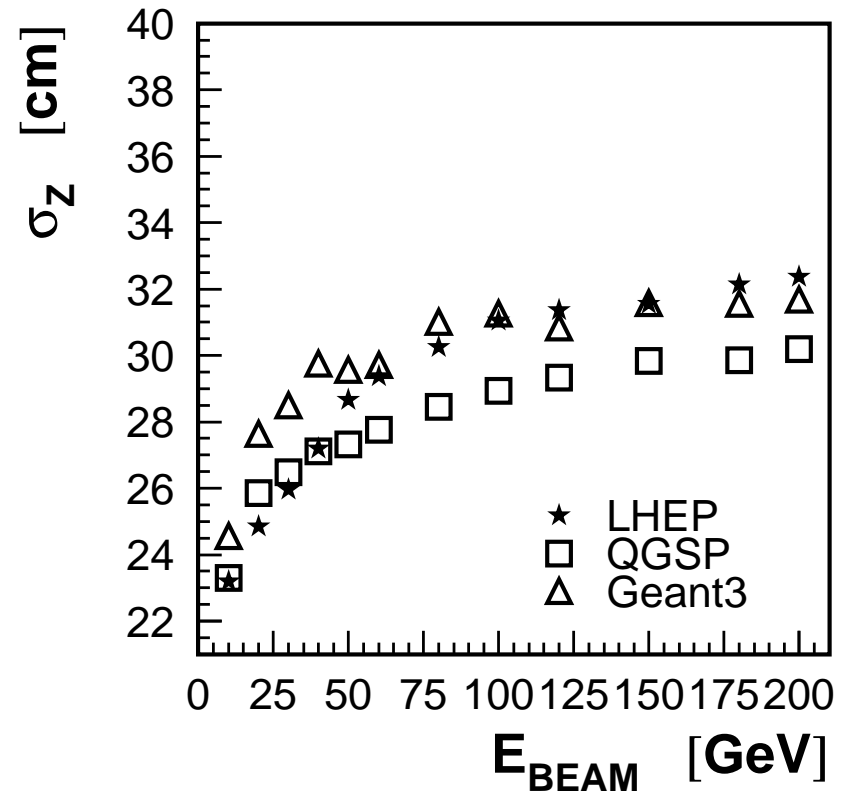
LAr gaps



Longitudinal spread of a shower



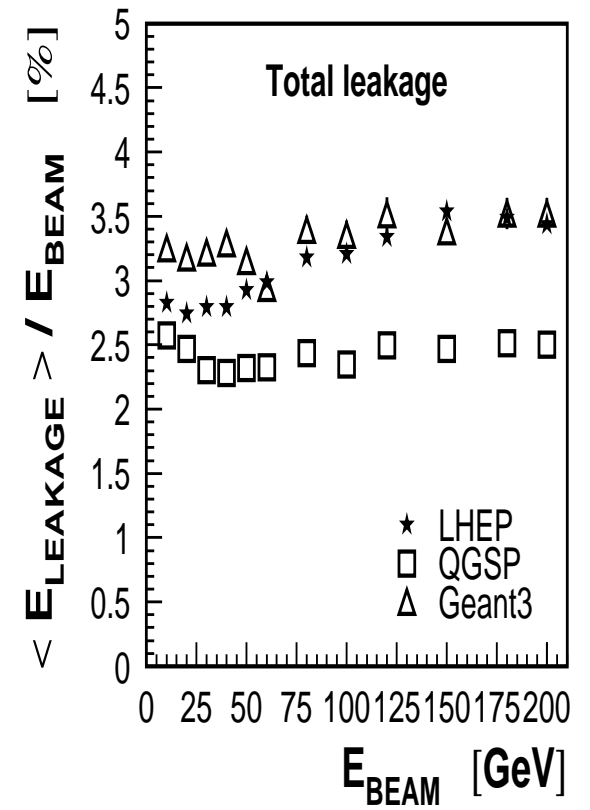
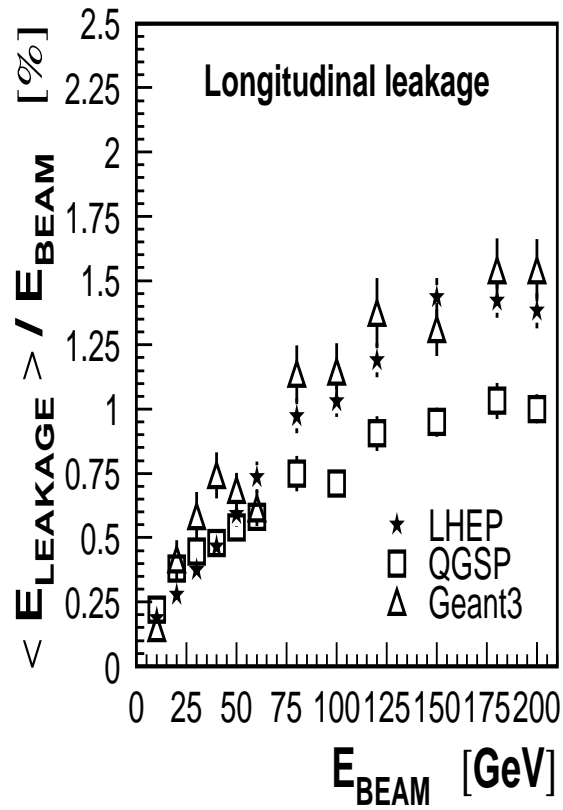
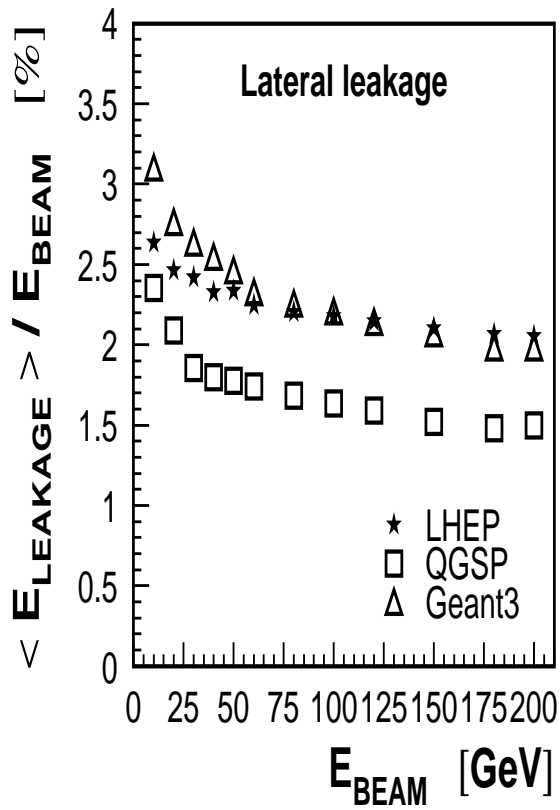
Copper plates



LAr gaps



Energy leakage



Current Conclusions

Geant4 (5.0p01) based simulations for the HEC testbeam:

- LHEP-3.3 and QGSP-2.3 physics lists describe rather well:
 - the energy resolution for pions
 - the e/π -ratio
- There are still some problems in the description of longitudinal development of hadronic showers

