
*On resolving the shower-shape issue in
the simulation of ATLAS HEC.*

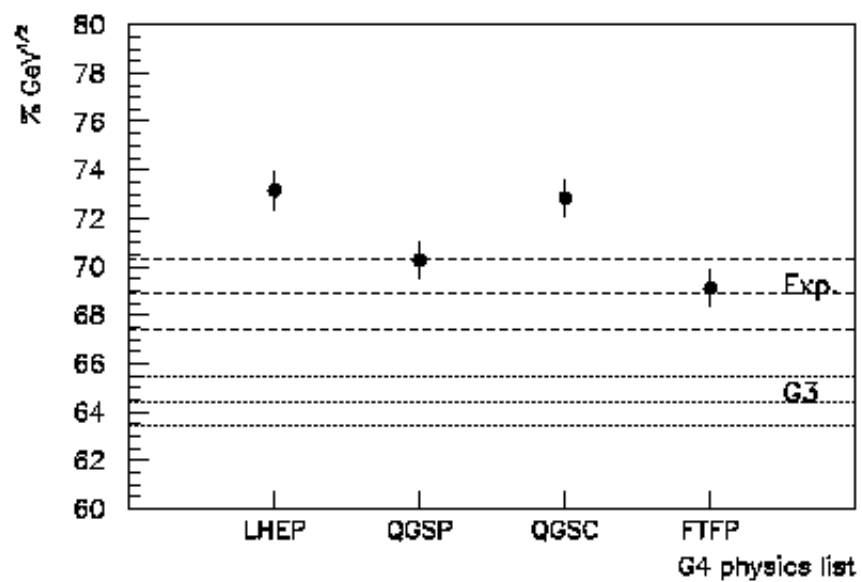
J.P. Wellisch
CERN/EP/SFT

Brief summary of last status

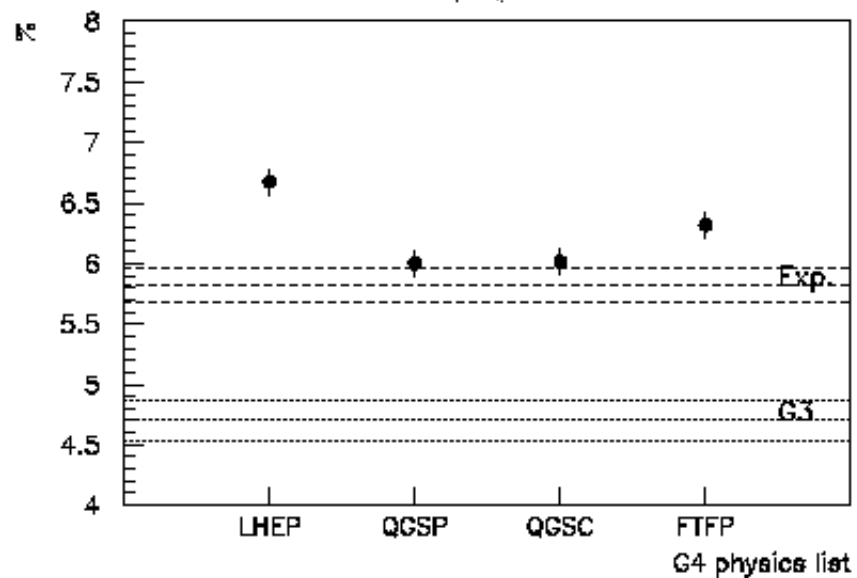
Some conclusions on current pion simulations

- Significant progress in the description of HEC testbeam data is reached with new physics lists for calorimetry (and with version 4.1) of Geant4
- QGSP (the best among physics lists 2-4) gives very good description of
 - the energy resolution
 - the e/π -ratio
- Physics lists 2-4 do not describe the fraction of energy in HEC layers: showers start earlier there
- LHEP:
 - energy resolution worse than in the experiment (the same level of deviation as Geant3, but in the opposite direction)
 - good description of the response behaviour as a function of the beam energy
 - e/π -ratio is close to the experiment (a bit overestimated)
 - certain problems in description of the fraction of energies in longitudinal layers (difference w.r.t. experiment in the low and high energy ranges)
- For all studied variables (except longitudinal shower development) Geant4 is now at the level or better than Geant3

Resolution in Clusters for Charged Pions

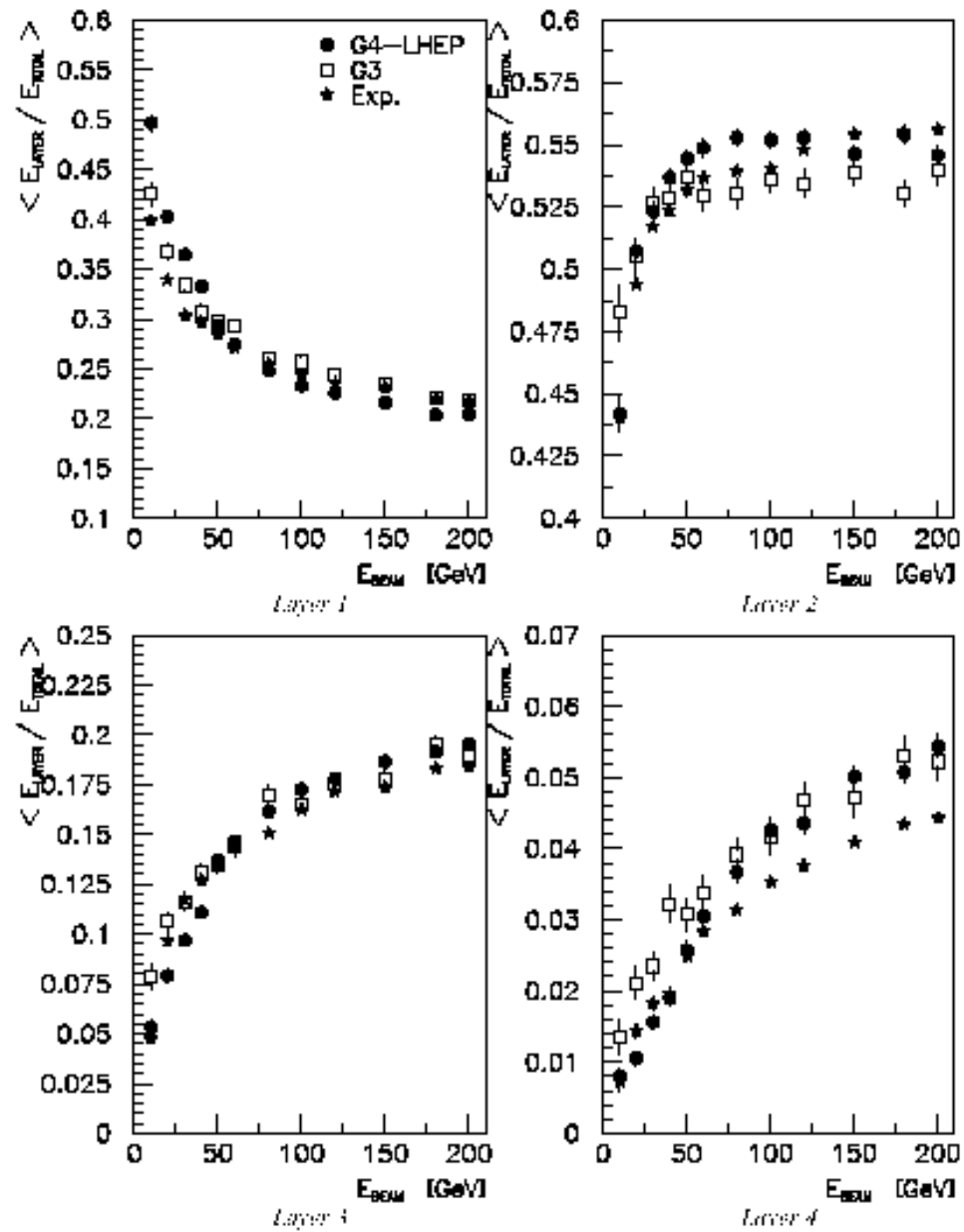


Sampling term

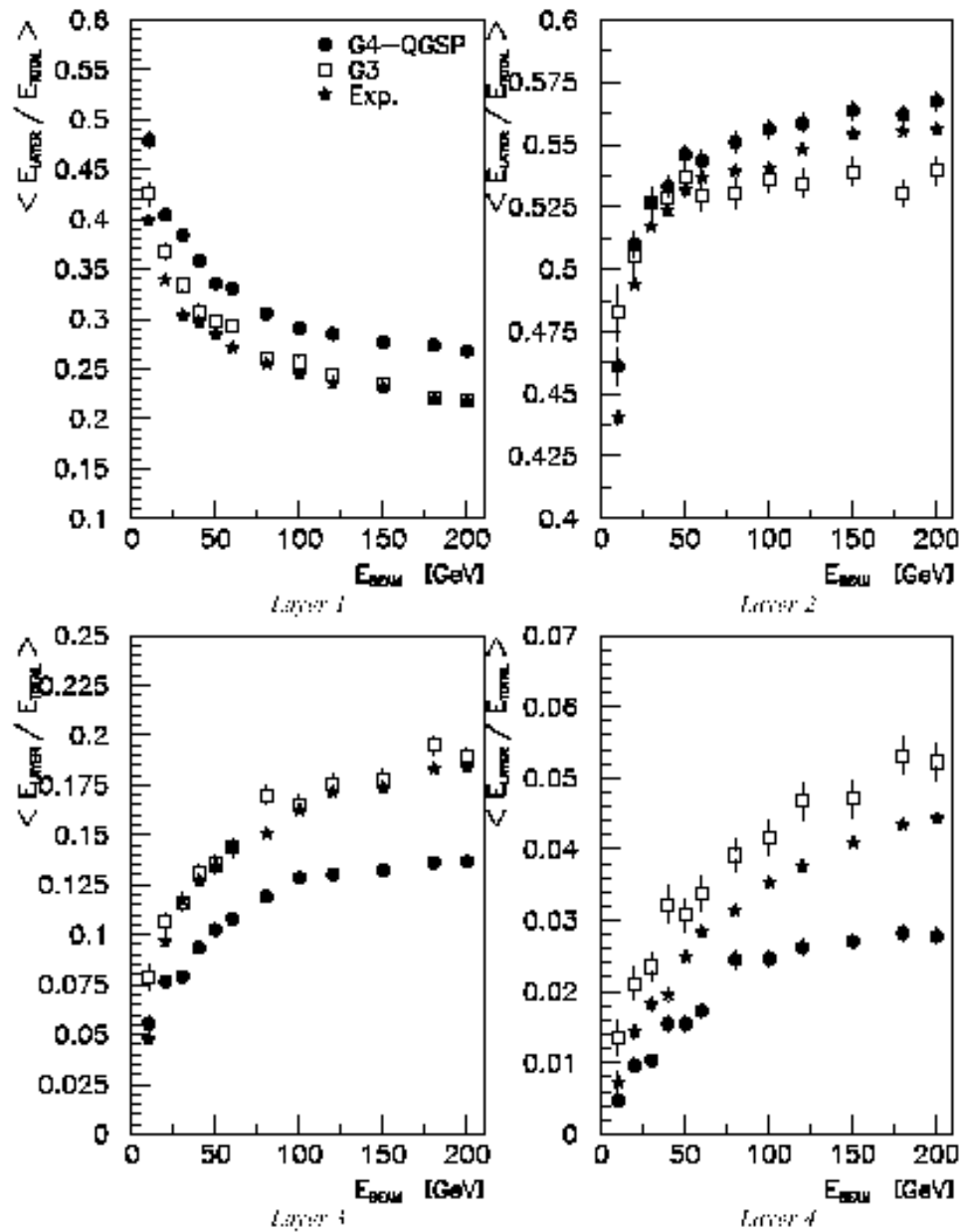


Constant term

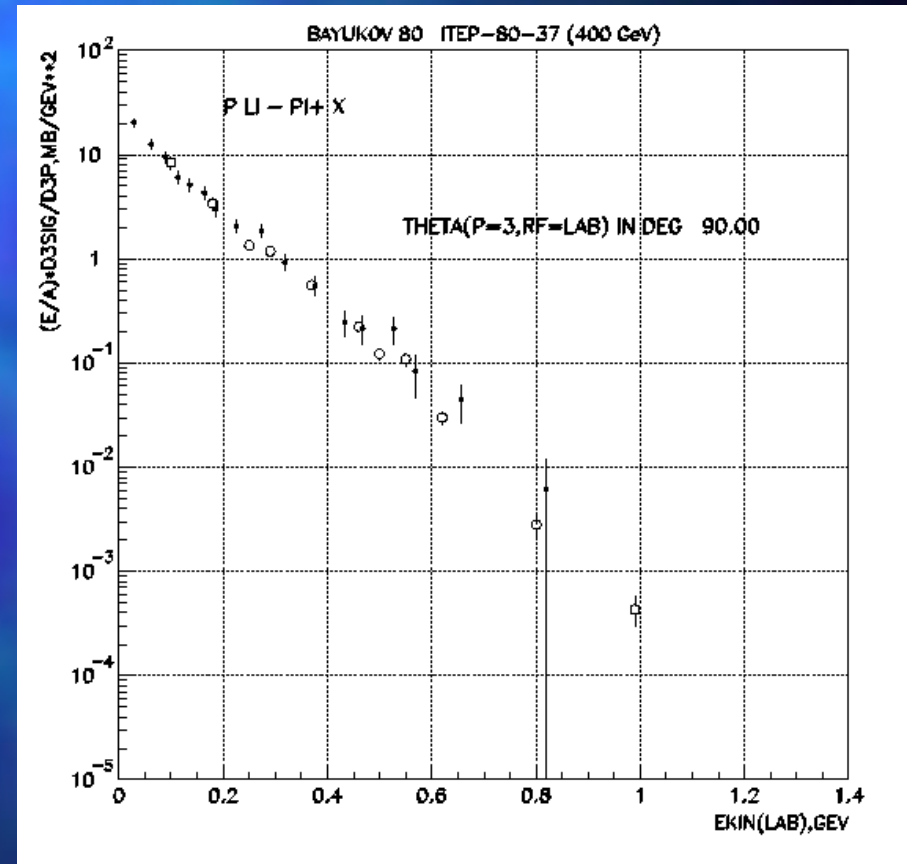
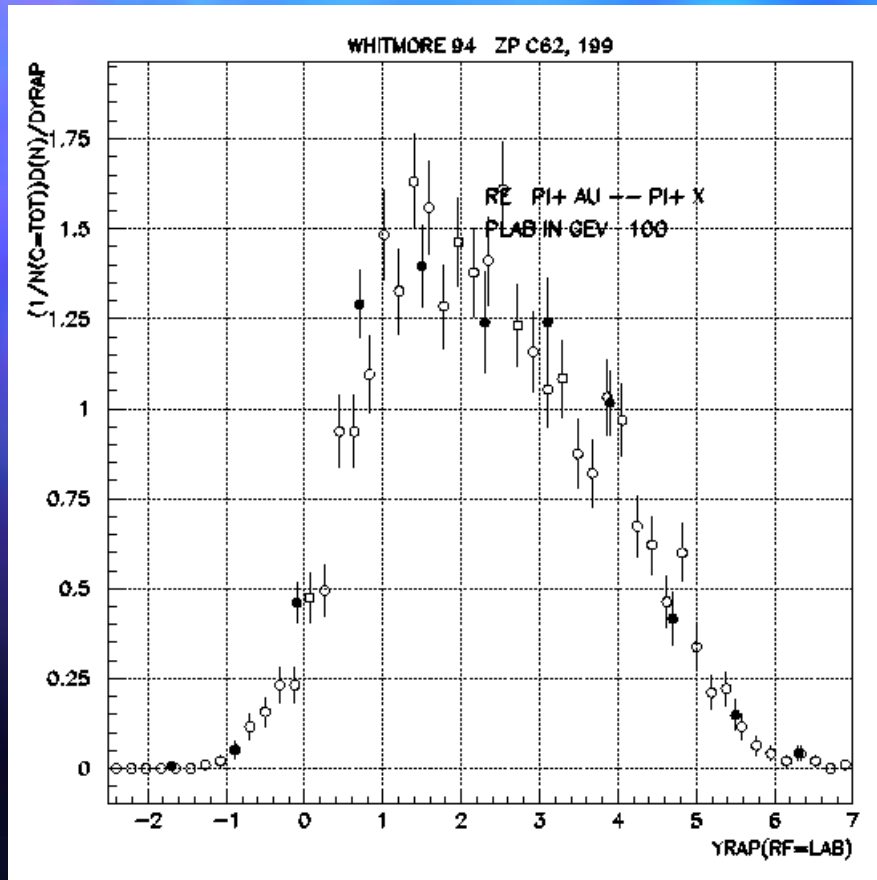
Fraction of Energy in Longitudinal Layers



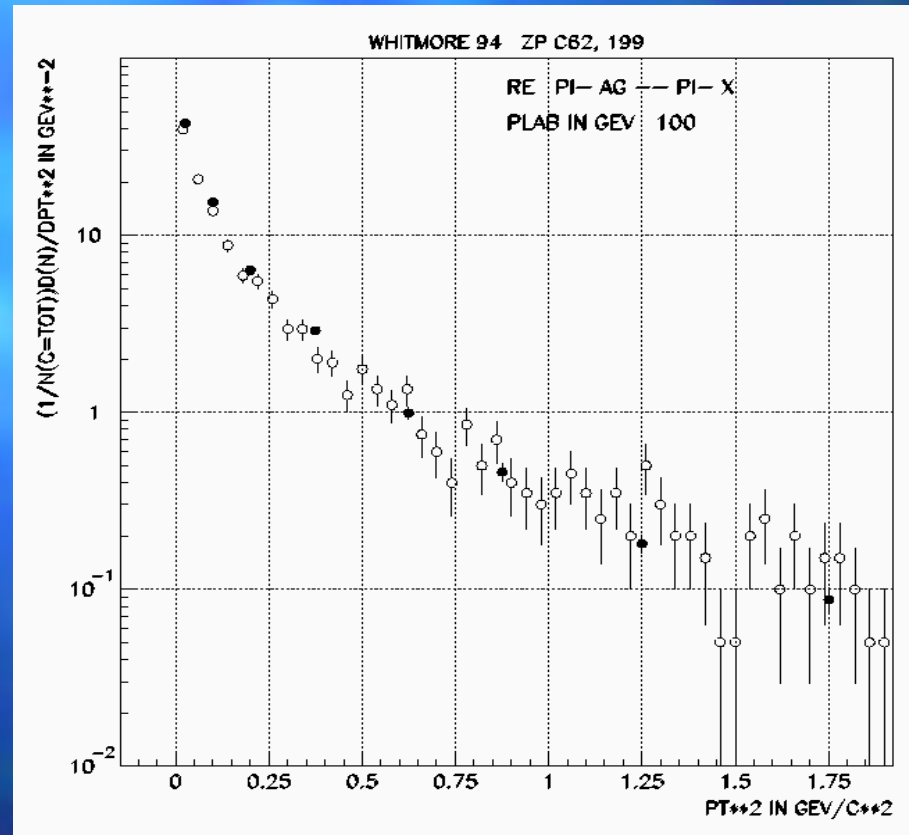
Fraction of Energy in Longitudinal Layers



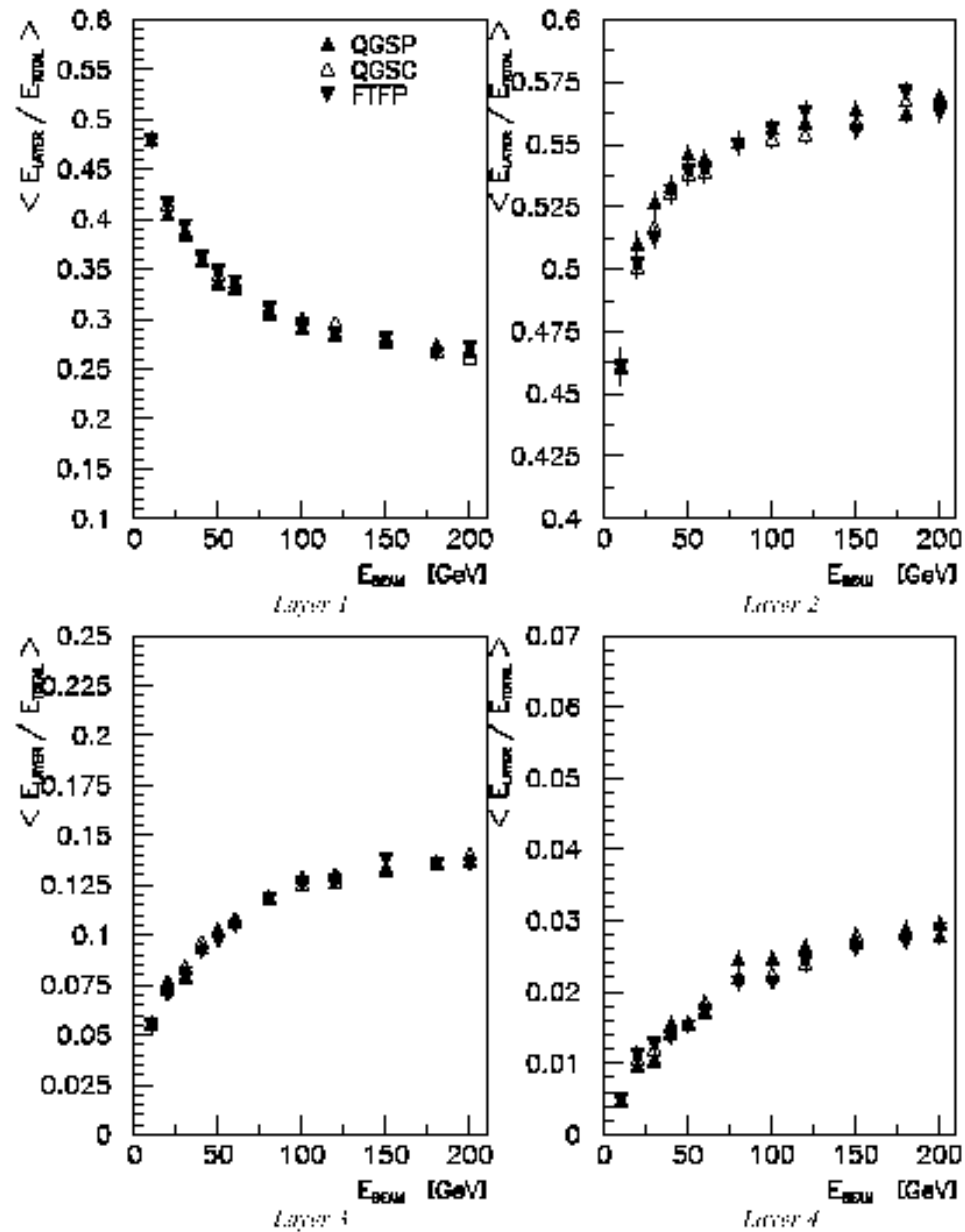
Looking at parts of the verification suite (ex.) for QGS model



samples continued



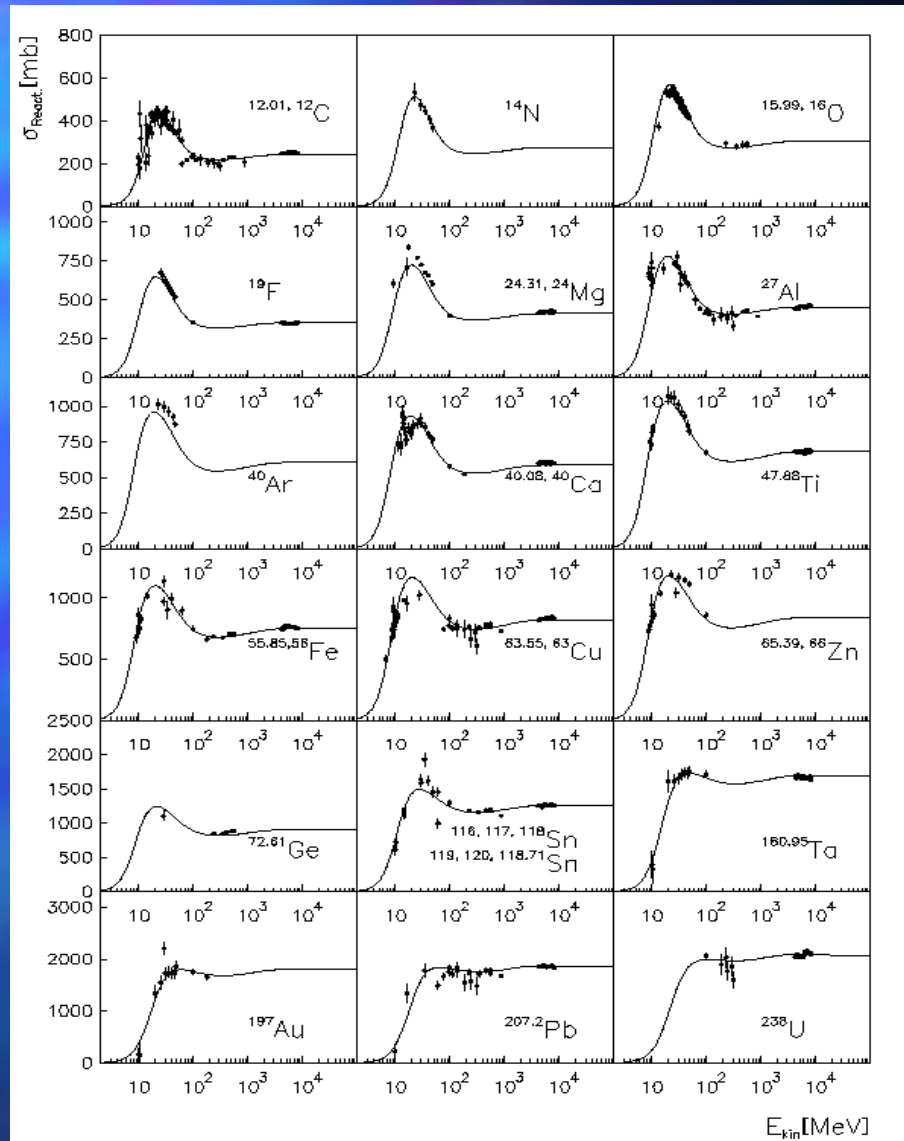
Fraction of Energy in Longitudinal Layers



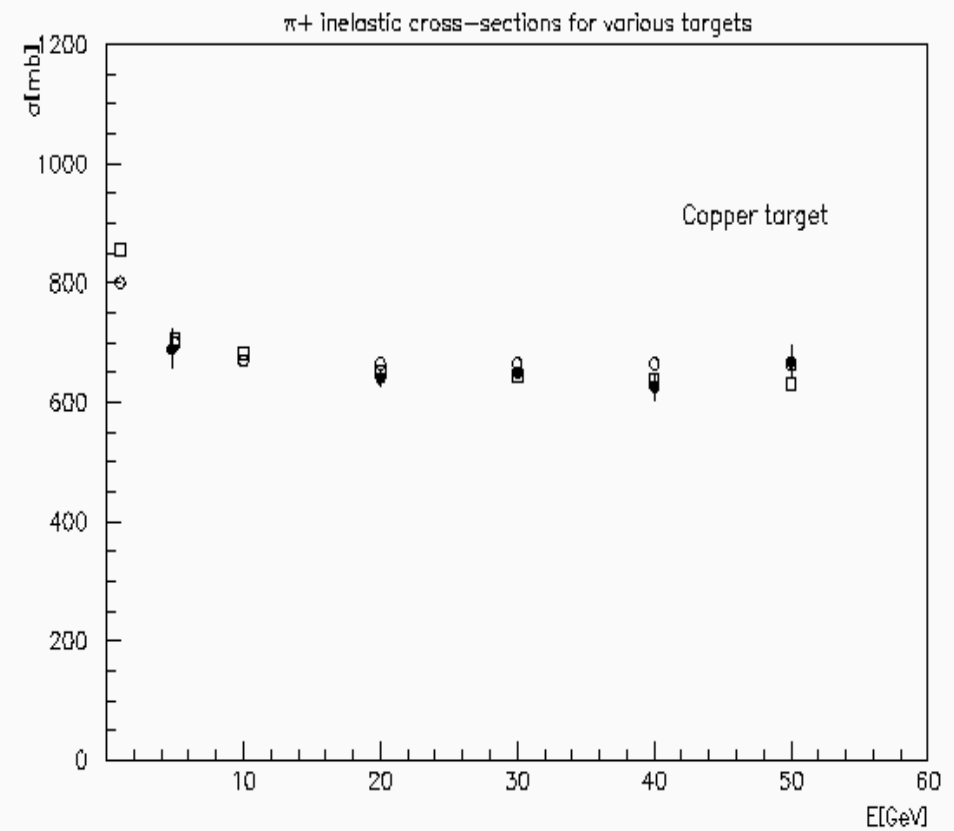
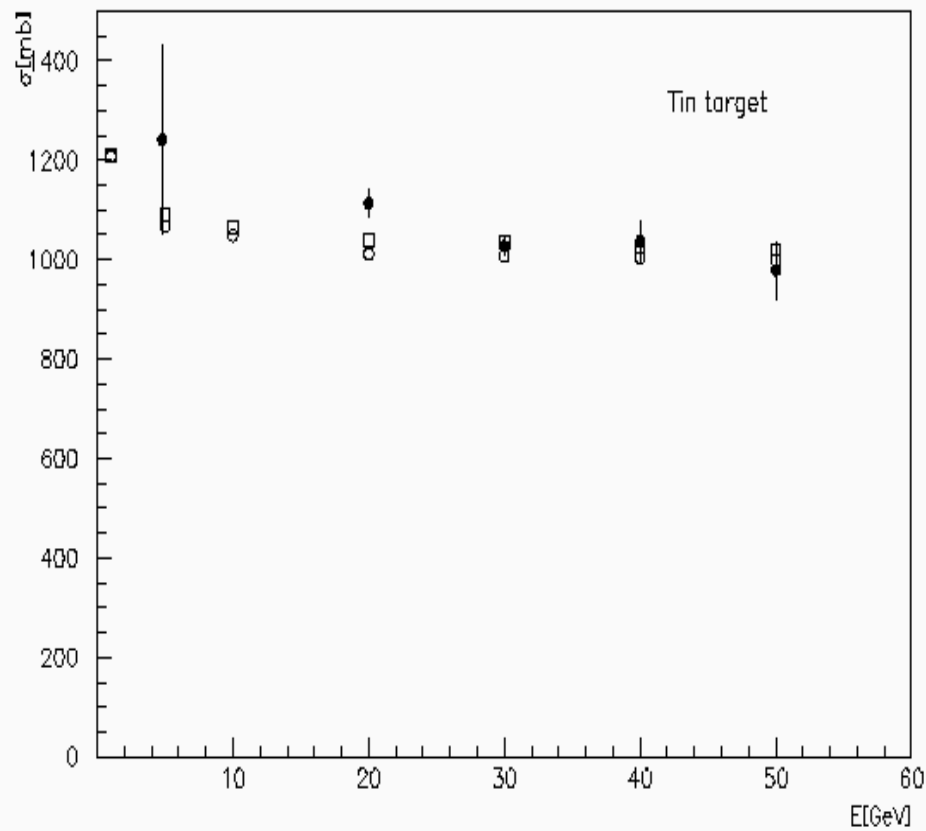
What could we profit from geant4 5.0.

- Most of the upgrade will have its effect, but in particular:
 - Alternative pion cross-section done for BaBar
- Impact of these cross section on longitudinal shower shapes.

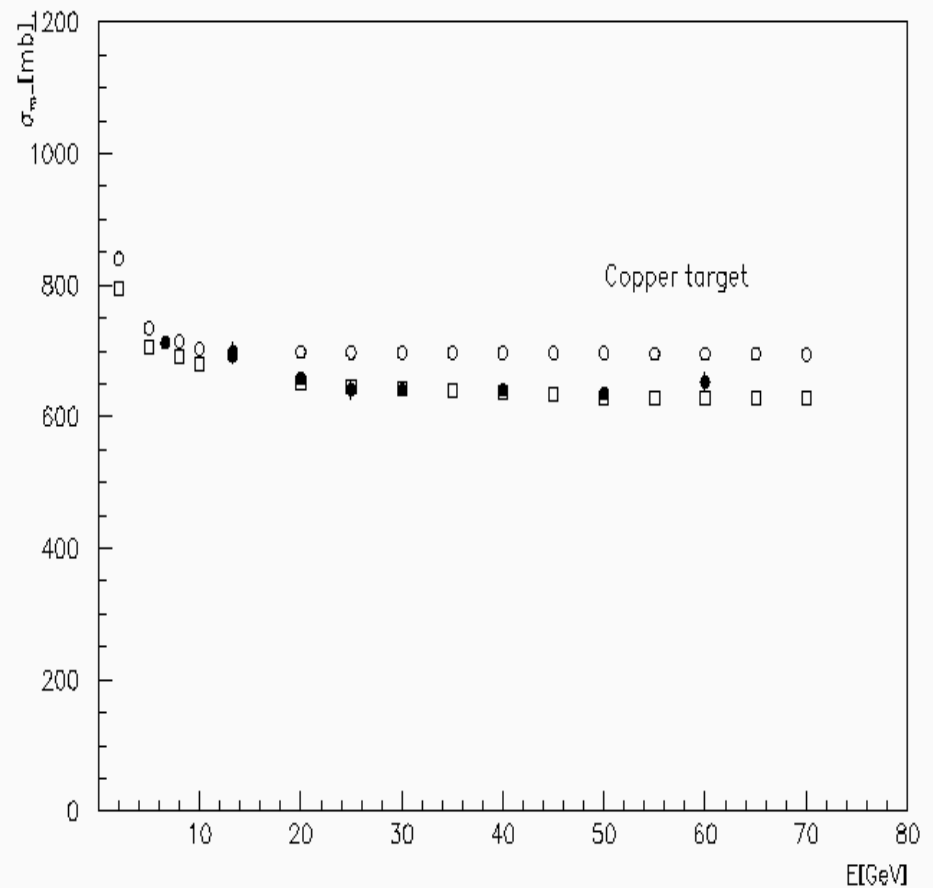
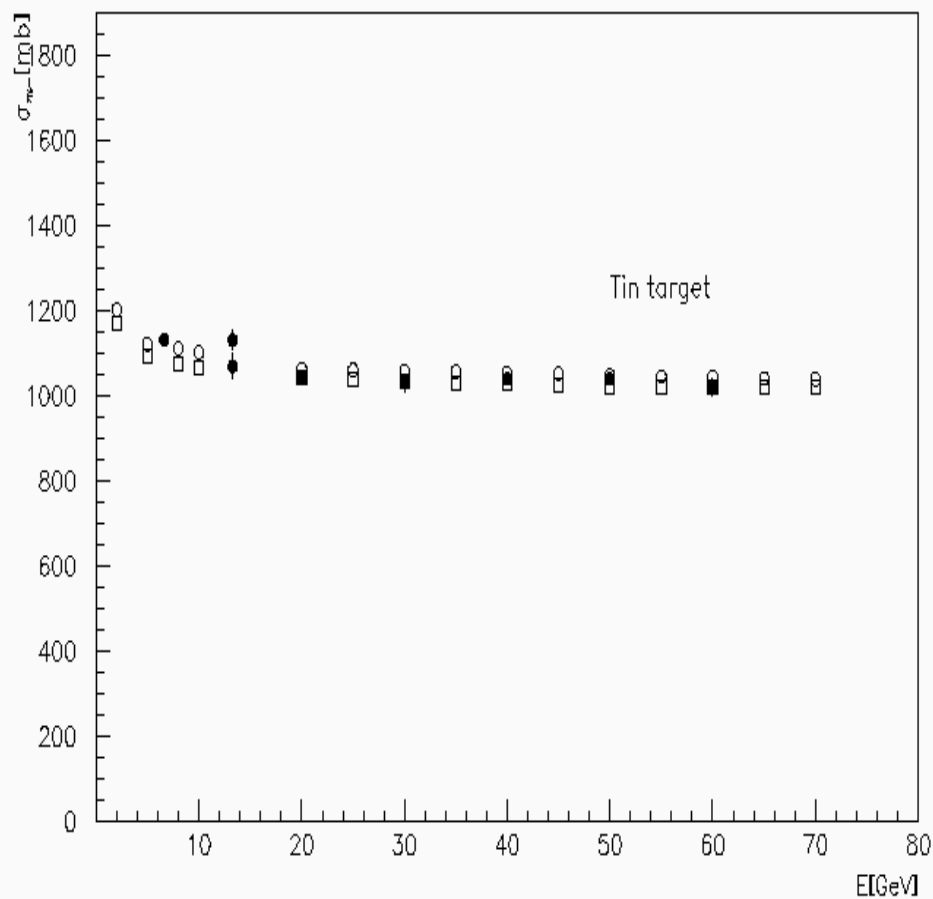
Looking at cross-sections



*π^+ reaction cross-sections: dots: data,
open symbols: 'default and new'.*



Pi- reaction cross-sections: dots: data, circles: 'default', boxes 'new in 5.0'.



H_{EC} shower shapes G4 5.0 (true geometry, my toy analysis)

