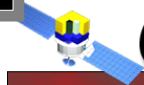


G4 physics checks EM showers & Cluster Widths

Progress report

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Thanks to Benoit Lott, Nicola Mazziotta, Johan Bregeon, Leon Rochester, Tracy Usher, Steve Ritz, Elena Moretti et al.



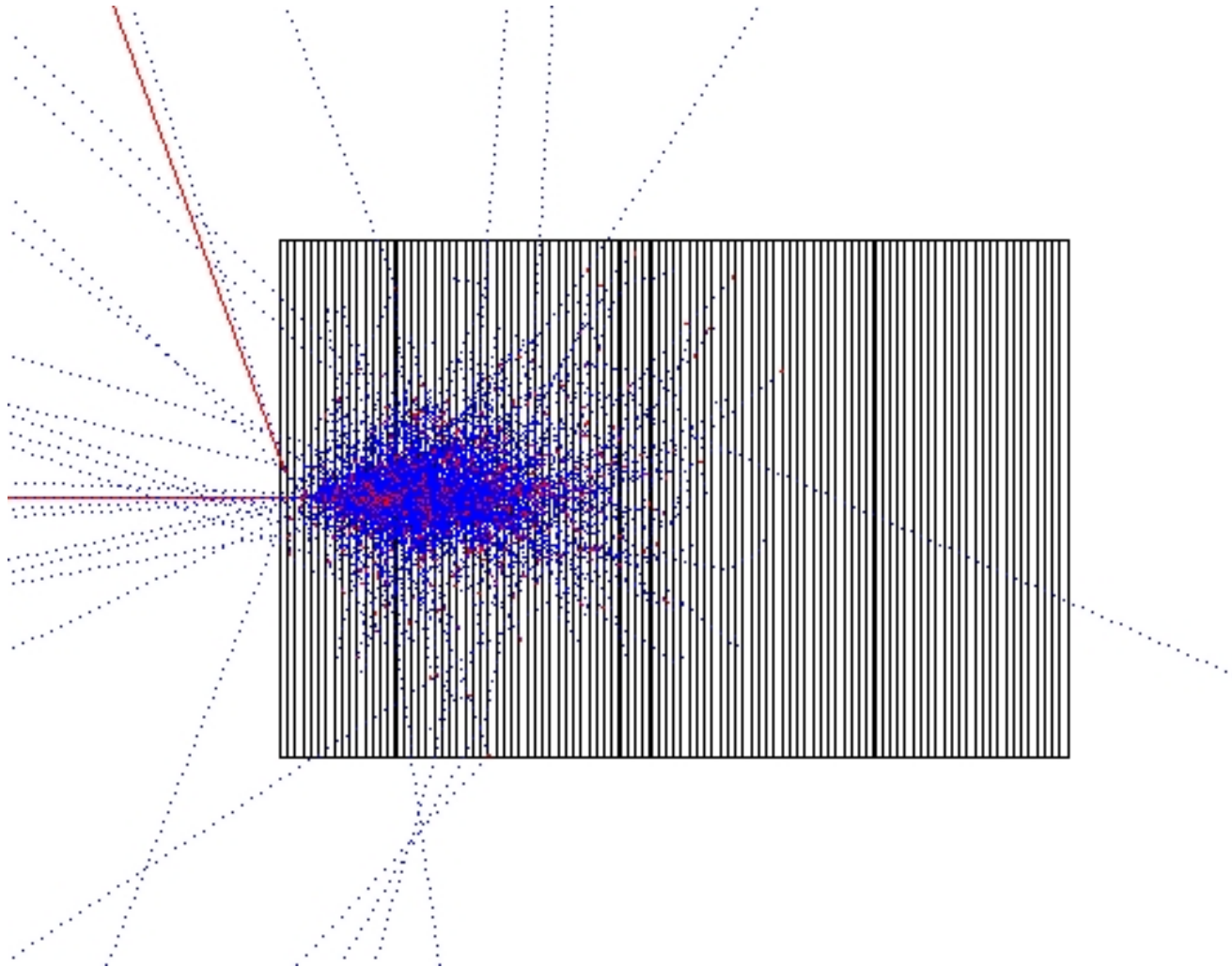


G3 vs G4

- Check for Discrepancy
- New geometry
- 100 layers of CsI (0.88 cm)
- Incident Electron Energies
 - 100 MeV, 250 MeV, 500 MeV, 1 GeV, 2.5 GeV
 - 5 GeV, 10 GeV, 25 GeV, 50 GeV, 100 GeV
- G3 Energy cuts
 - CUT for e^+/e^- == 100 keV
 - CUT for gamma == 100 keV
- Preliminary Study on G4 cuts
- Preliminary Study on Low Energy EM physics



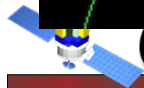
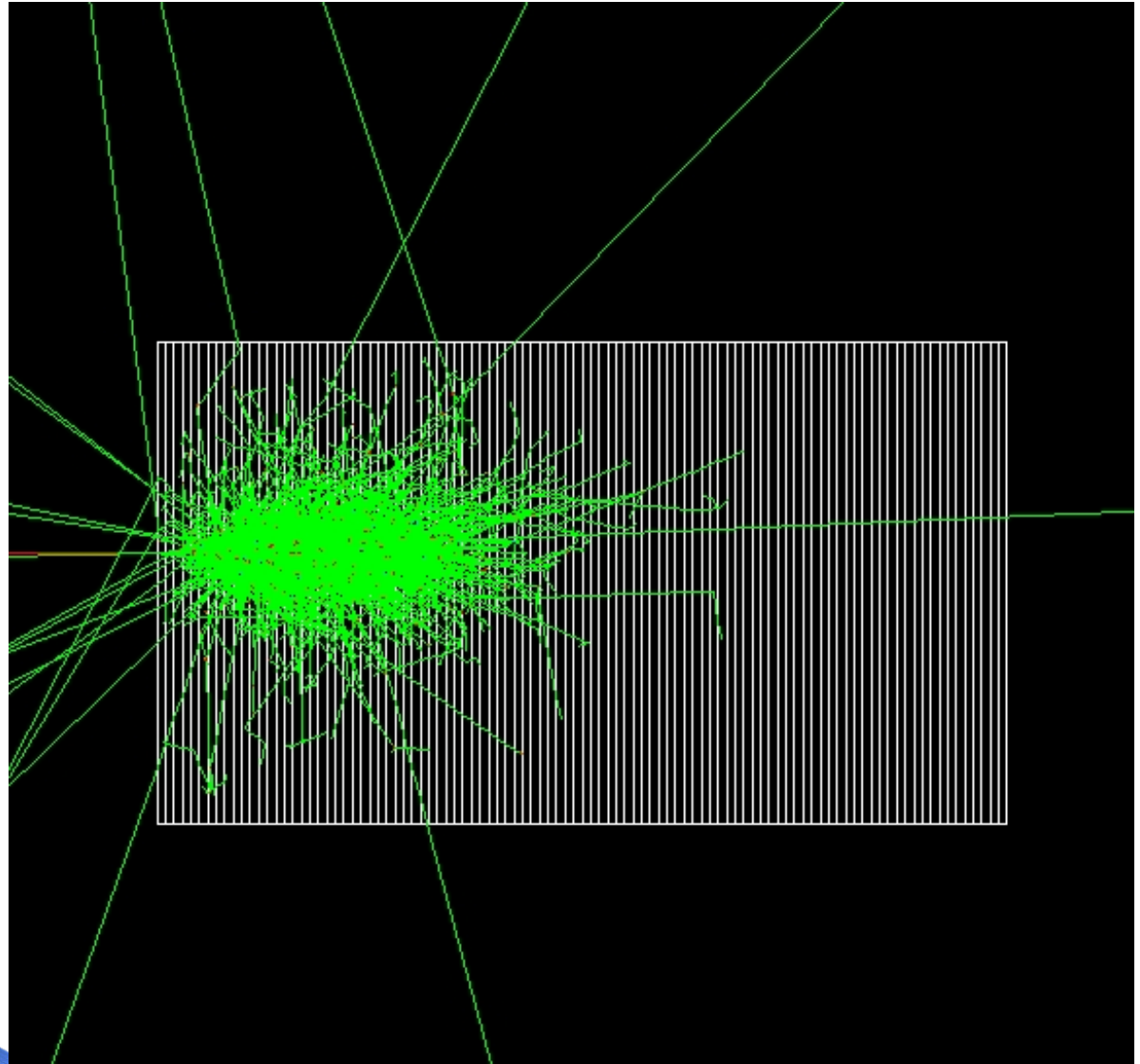
G3 shower simulation





G4 shower simulation

- EM std processes
- e^- 10 GeV
- Range cut 80 micron
 - Gamma: 8 keV
 - e^+/e^- : ~120 keV

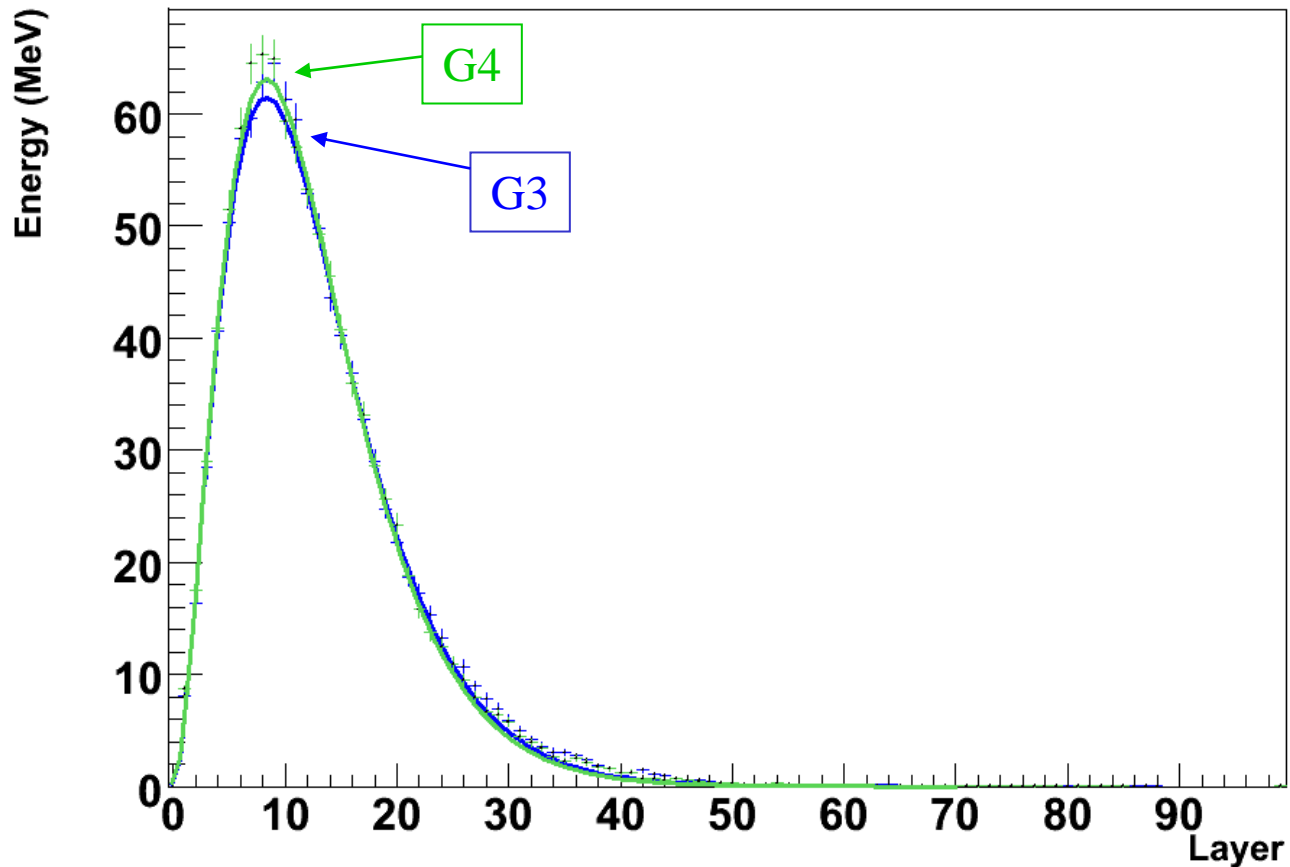




G3 vs G4 at 1 GeV

- Cuts at 80 micron

Energy curve @ 1GeV

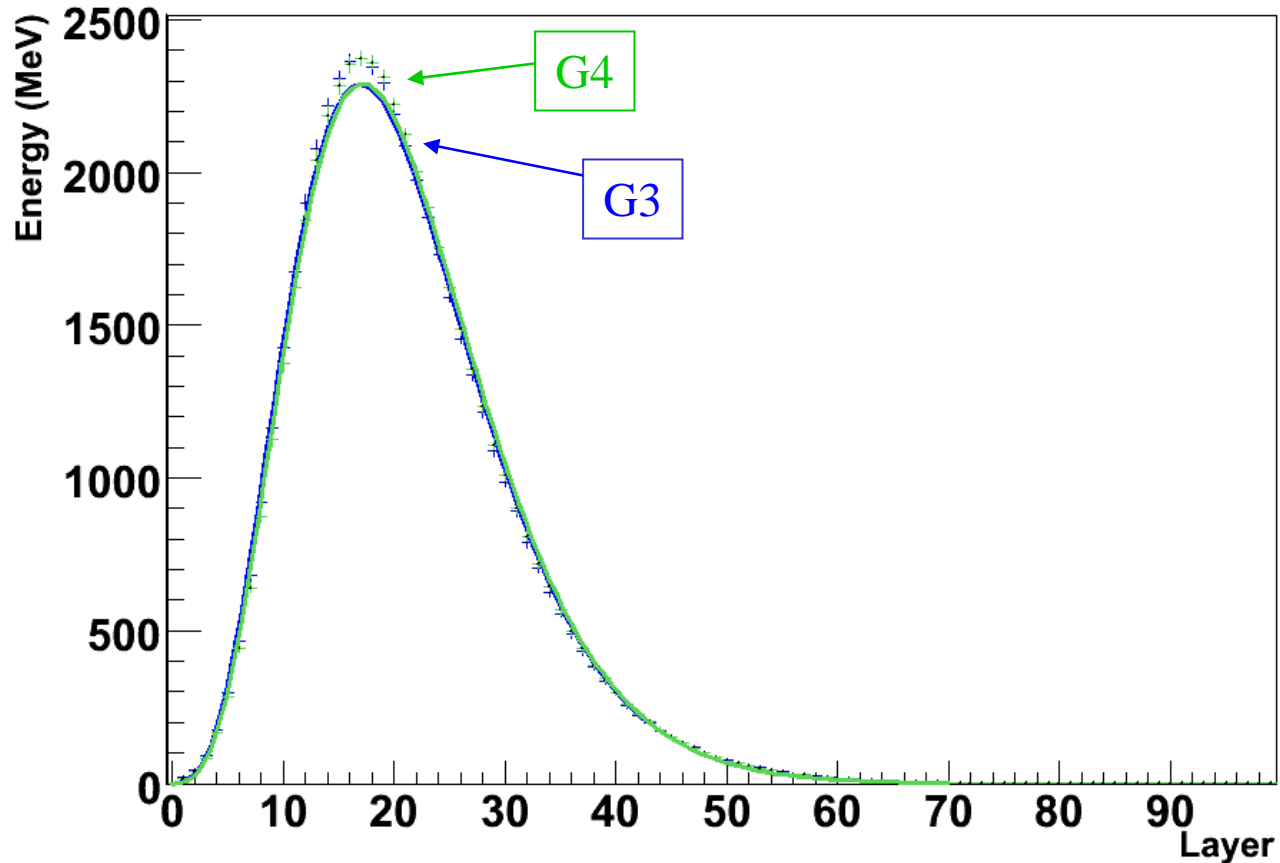




G3 vs G4 at 50 GeV

- Cuts at 80 micron

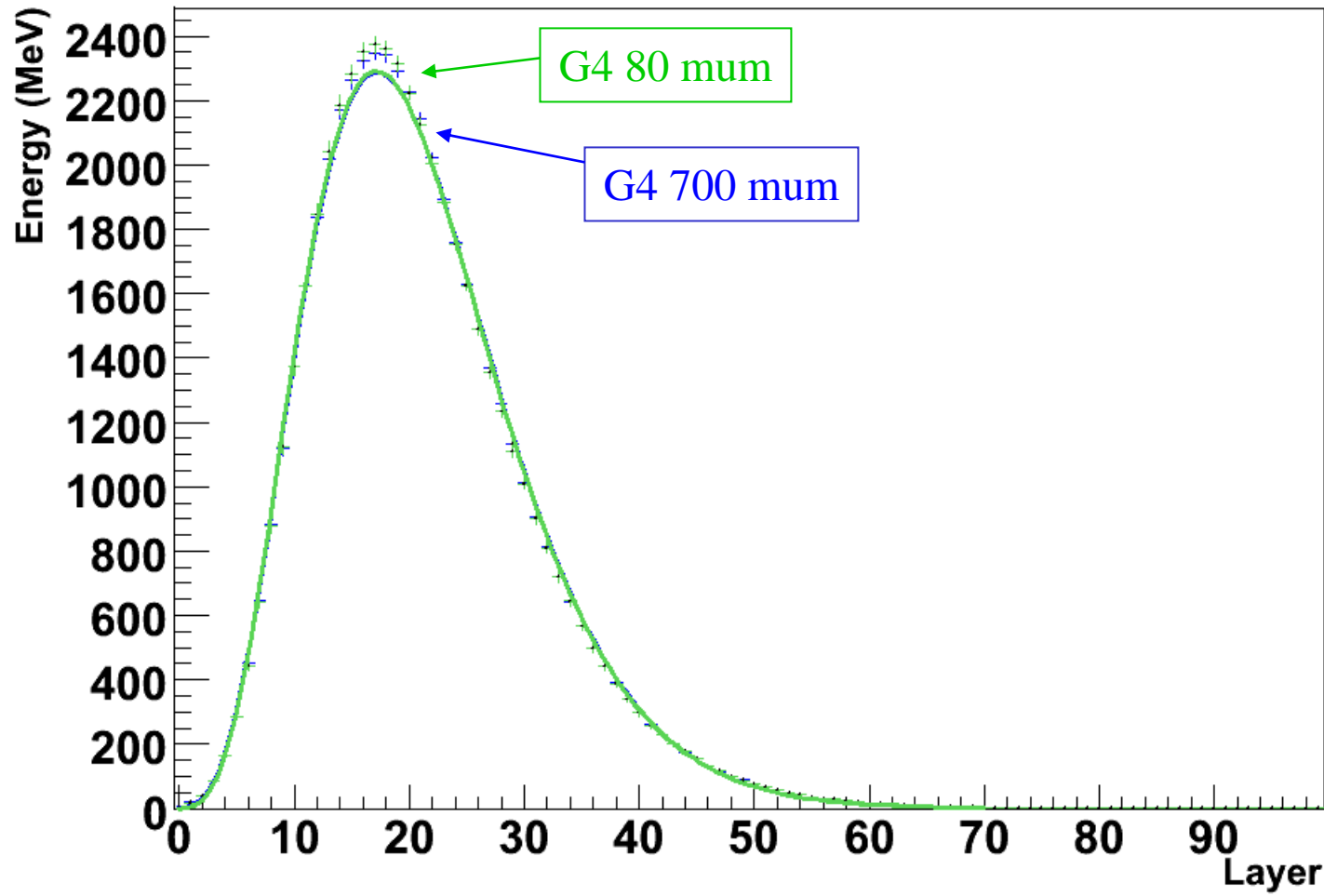
Energy curve @ 50GeV





G4 vs G4-II at 50 GeV

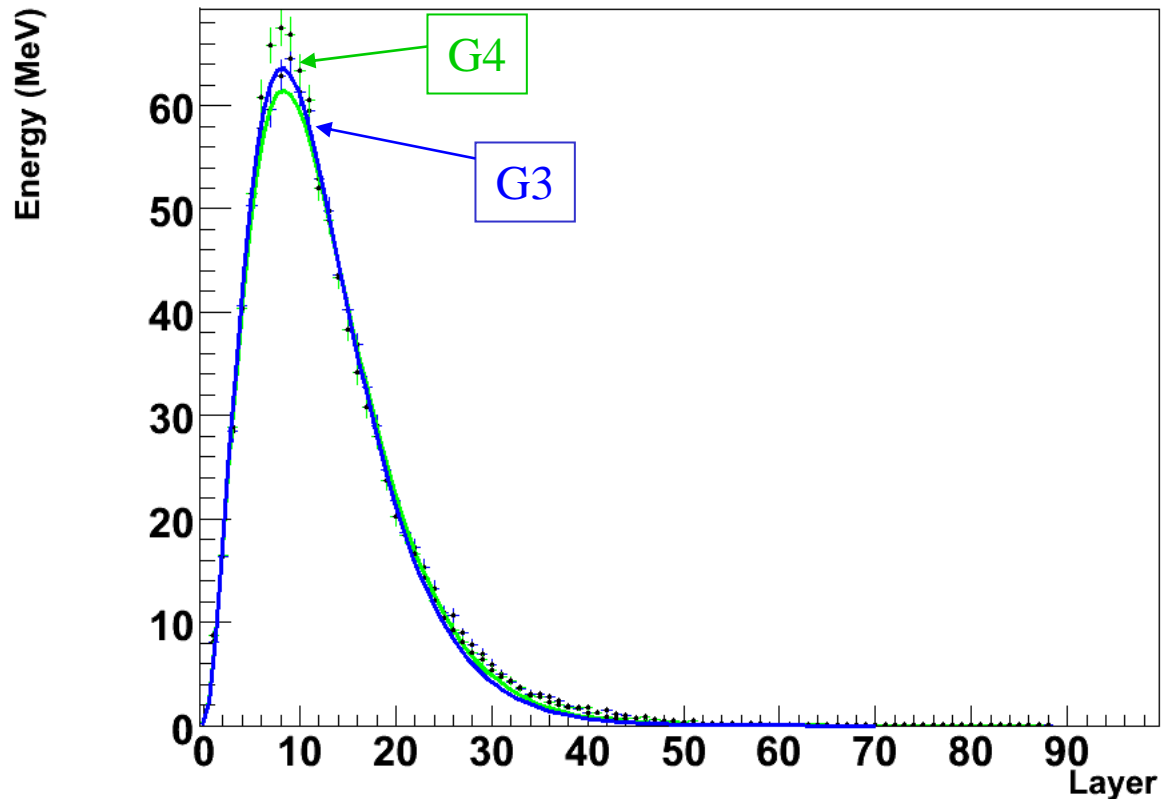
Energy curve @ 50GeV





G3 vs G4 LowEnergy EM processes

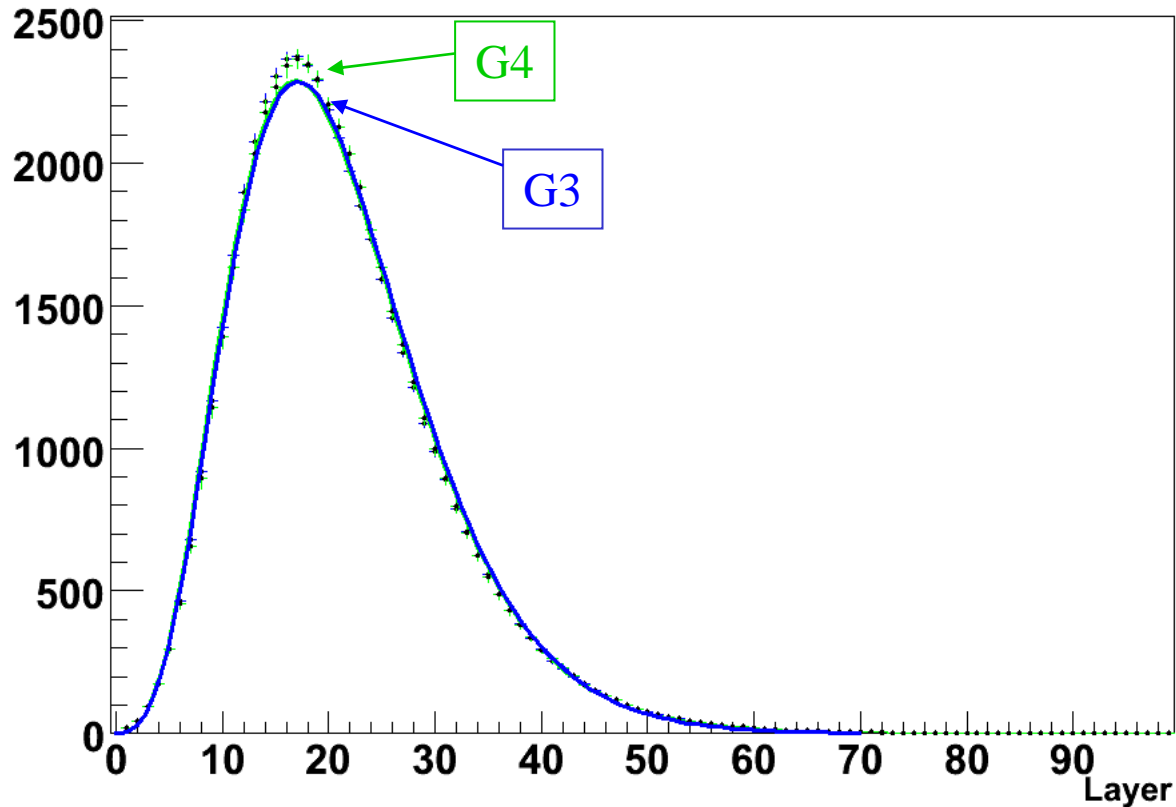
- EM LowE processes
- e^- 1 GeV
- Range cut 700 micron





G3 vs G4 LowEnergy EM processes

- EM LowE processes
- e^- 50 GeV
- Range cut 700 micron





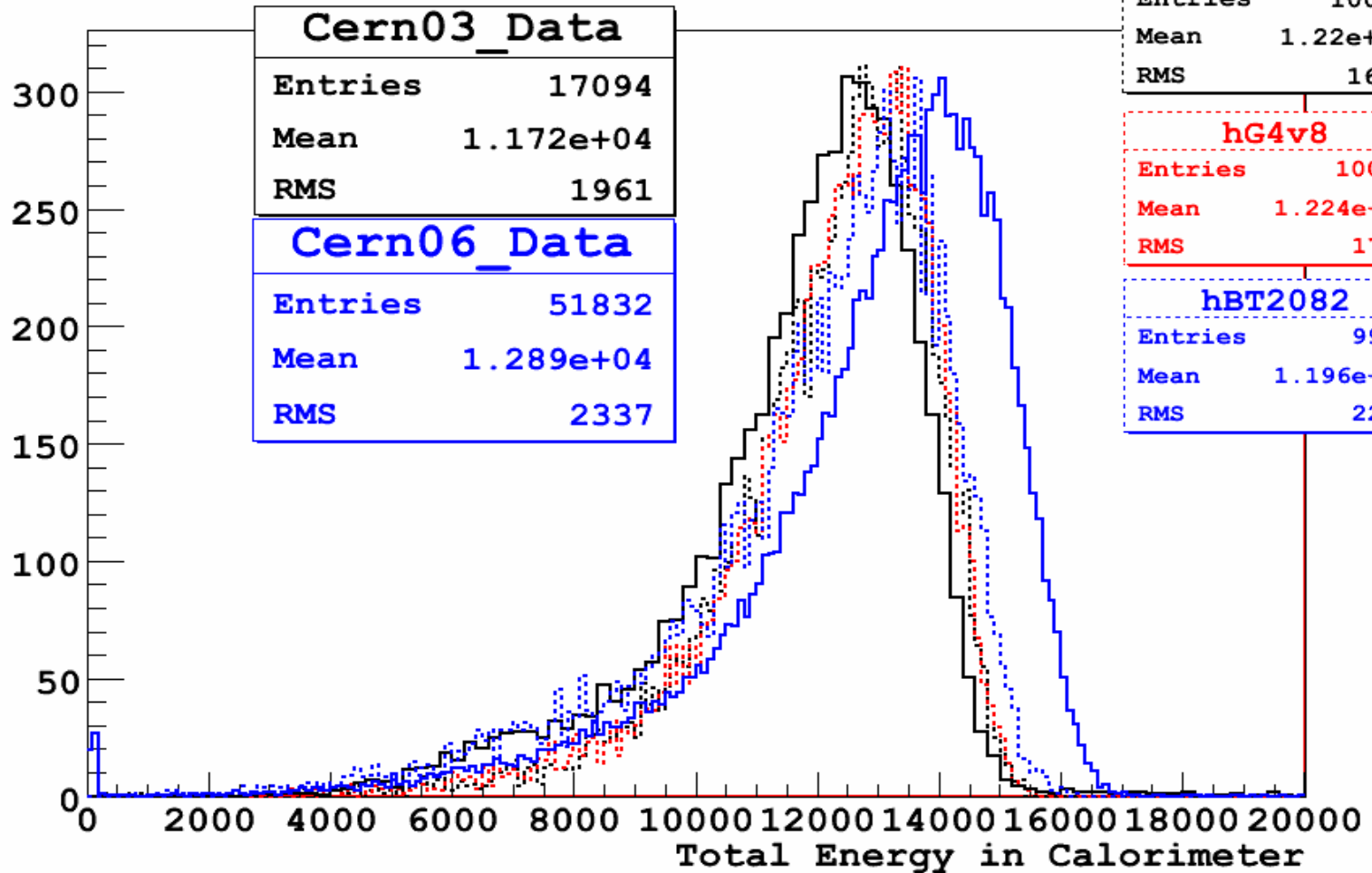
Test vs CERN 2003

- Energy deposit in the calorimeter for 20GeV electrons at 0 degree
 - **black bold** : Cern2003 data (1.46X0 Lead + 8X0 calorimeter with good electronic)
 - **black dashed** : GEANT4 v6.2 standalone simulation for the Cern2003 geometry
 - **red dashed** : GEANT4 v8.2 standalone simulation for the Cern2003 geometry
 - **blue bold** : CU Cern2006 data (standard old calibration with BTR v4...)
 - **blue dashed** : Mass MC for run 2082, 20GeV e- 0deg.
- All distribution are "compatible" (5% on whatever you want)...all but the CU data !
- Trying to run the CERN2003 geometry within beamtest06 to check specifically the way we use GEANT4.



CERN 2003 data

20GeV Electrons - Calorimeter Energy





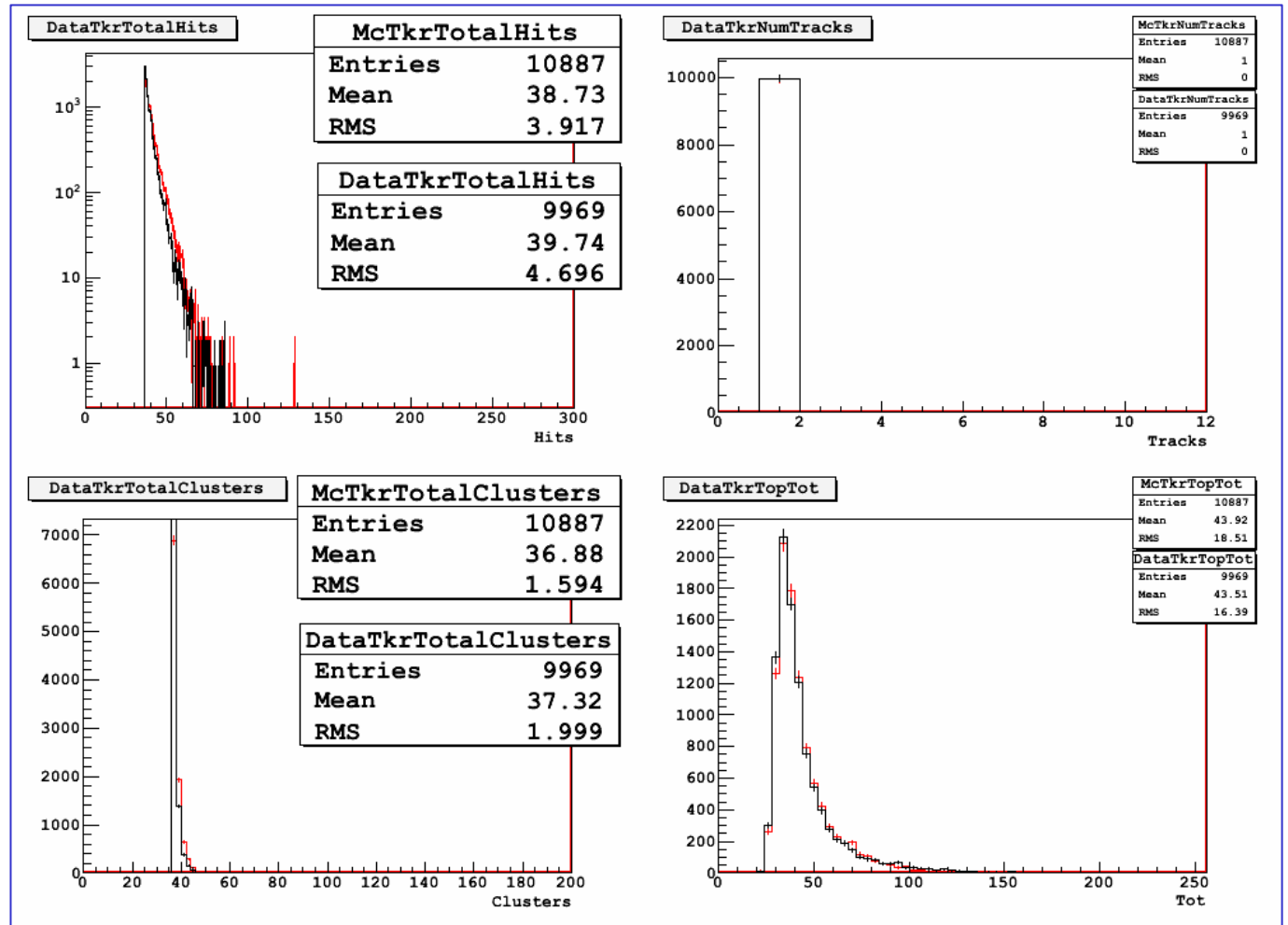
TKR clusters: The problem

- **Discrepancy among BeamTest data and MC simulations**
- **Related to Ionisation?**
- **First check: Using native MCS**
 - **This is equivalent in G4 8.0.p01 to reducing the step size in materials**
 - **Test run @ GlastRelease**
 - **Three BT MC runs (0937 – 1223 – 1423)**



BT check

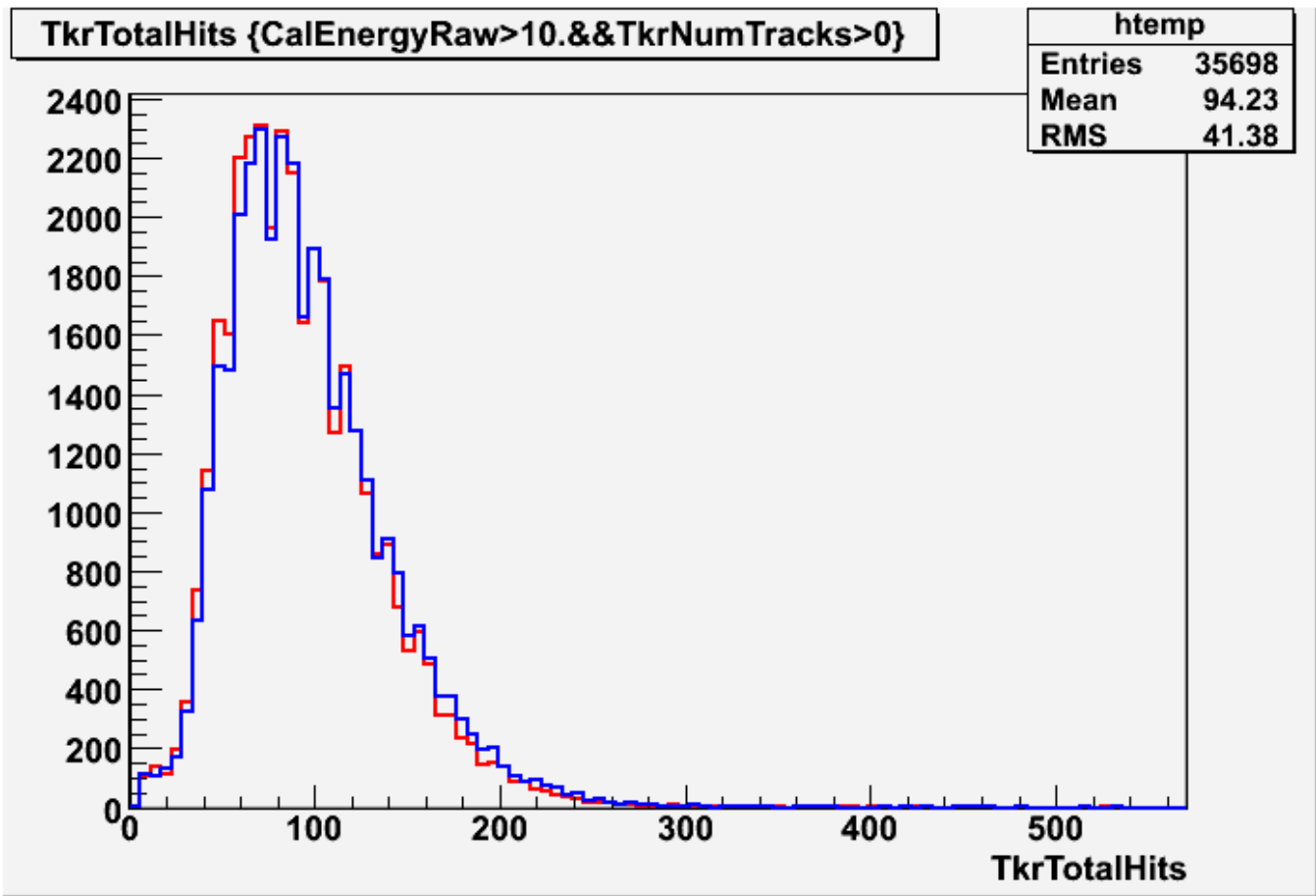
Johan Bregeon
 6 GeV p⁻
 Normal Incidence
 Native vs GLAST





BT check

5 GeV e-
Normal Incidence
Native vs GLAST

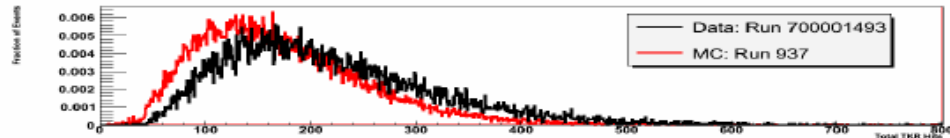
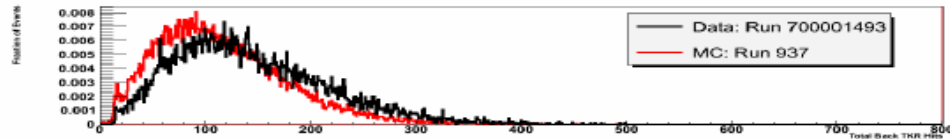
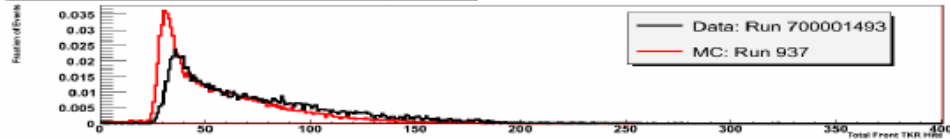




BT checks

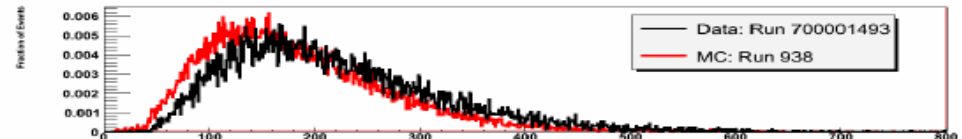
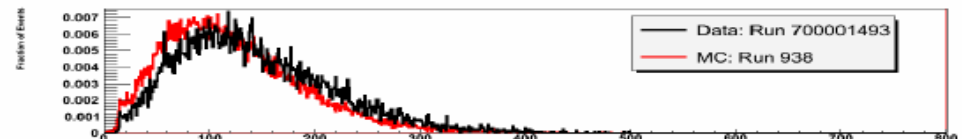
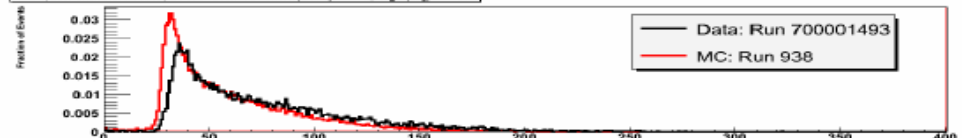
Front, Back and Total Hits Distributions

Front, Back and Total THR Hits, Electron Beam Momentum [GeV/c], S_Angle [deg] = 30



← Previous MC

Front, Back and Total THR Hits, Electron Beam Momentum [GeV/c], S_Angle [deg] = 30



Native m.s. MC →



To Do List

- **Understand G4 cuts vs Energy**
- **Plot of Gamma Theoretical Curve vs Simulations**
- **Simulation of Lateral Displacement**
- **Standalone G4 shower simulation (Philippe, Johan, Francesco et al.)**

- **Standalone G4 Tray Simulation**
- **Check of Delta Rays production**