Report on LowEnergy physics in the MonteCarlo

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BT EVO meeting - 29 August 2007

Introduction

- We are testing the LowEnergy physics using BTRelease HEAD1.131 compiled by Franz
- *Auger* and *Fluorescence* processes were turned OFF (they make the simulation too slow)
- Johan produced several runs, available at SLAC:

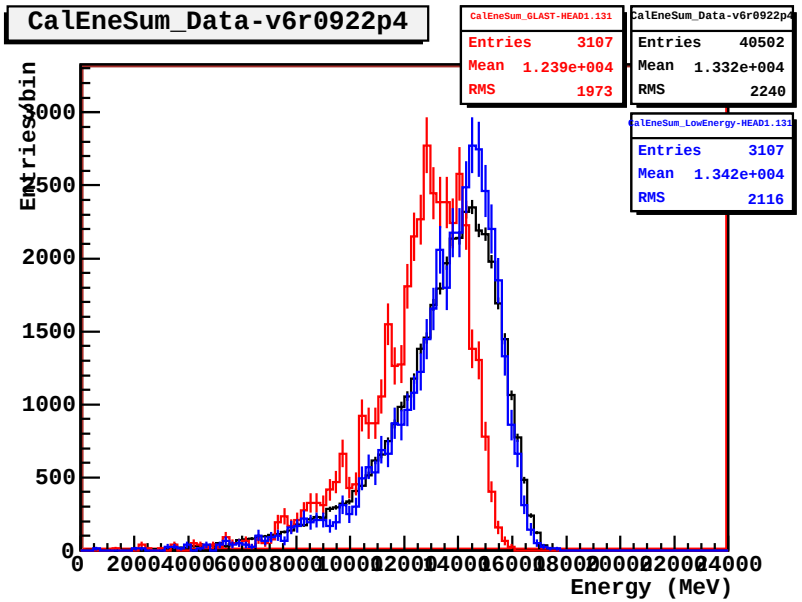
Run #	Particle	E (*GeV*)
2082	Electrons	20.0
1981	Electrons	99.0
1922	Electrons	282.
1445	Full brem γ	2.5
1460	Electrons	5.0
2338	Electrons	10.0

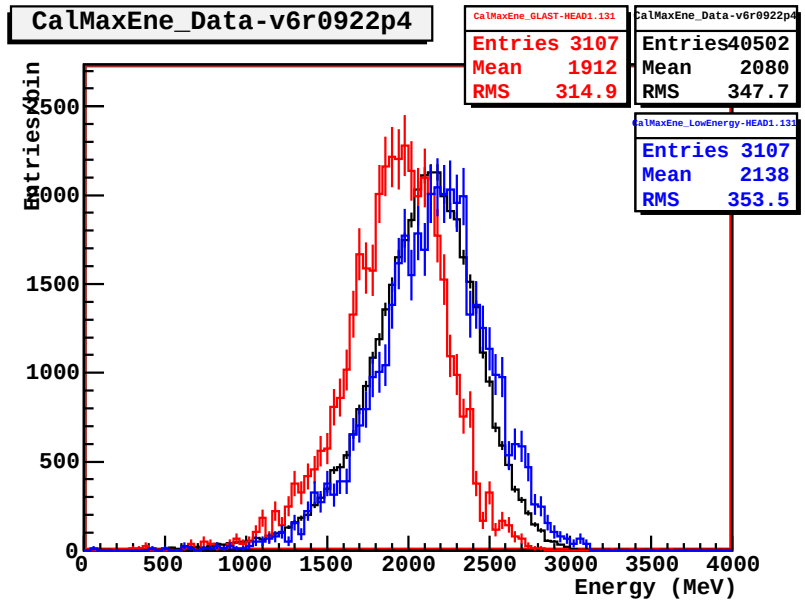
- **MC tuples**: ftp://ftp-glast.slac.stanford.edu/glast.u35/MC-tasks/BeamTest/HEAD1.131LE
- **BtSysTest report**: ftp://ftp-glast.slac.stanford.edu/glast.u35/MC-tasks/BeamTest/BtSysTest/report/

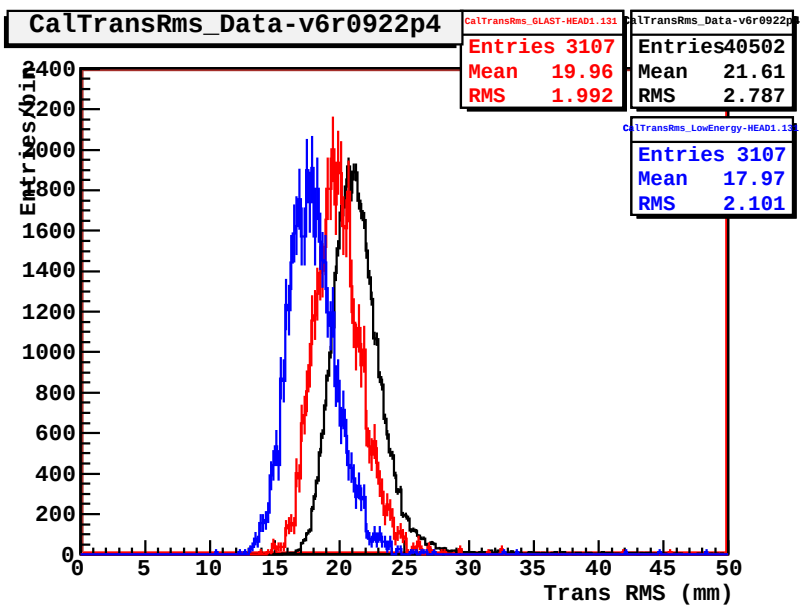
- The following slides show plots that compare
  - Data
  - GLAST Physics choice
  - LowEnergy Physics choice

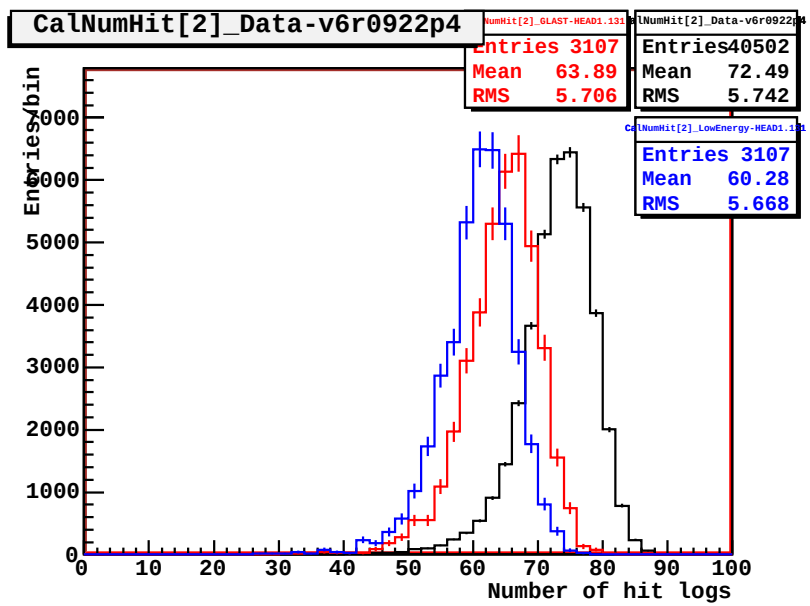
  for run 2082 (20 GeV electrons vertical on twr 2)

Cal base quantities

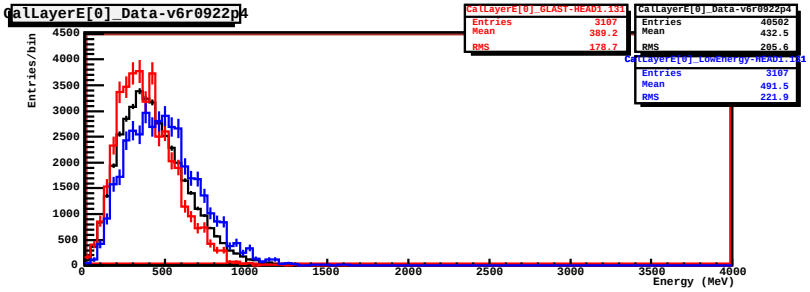


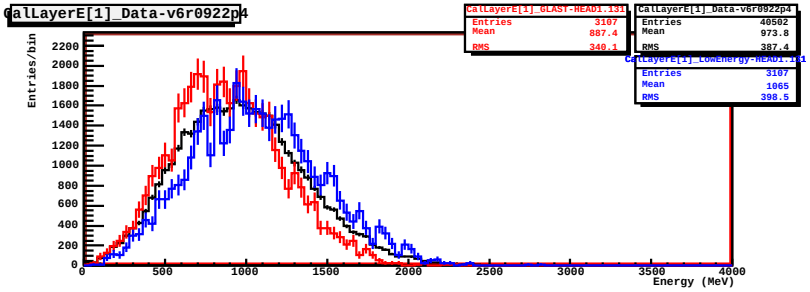


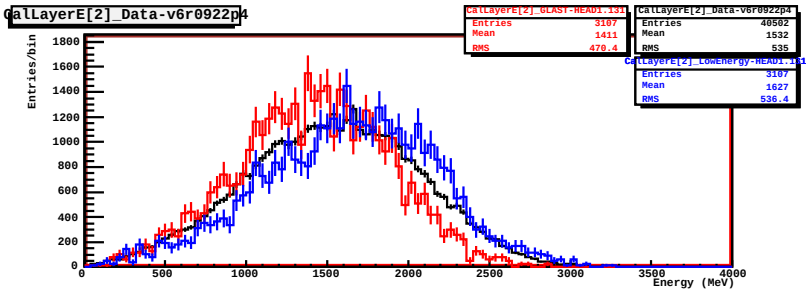


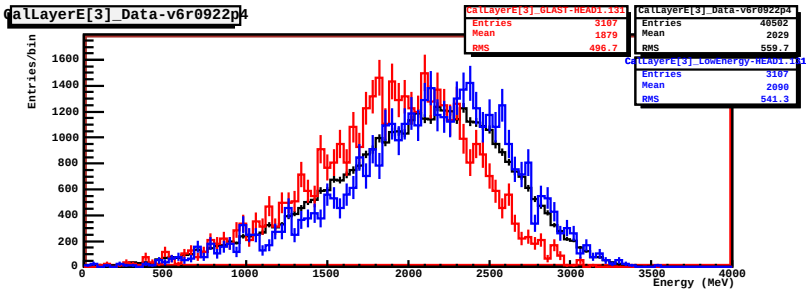


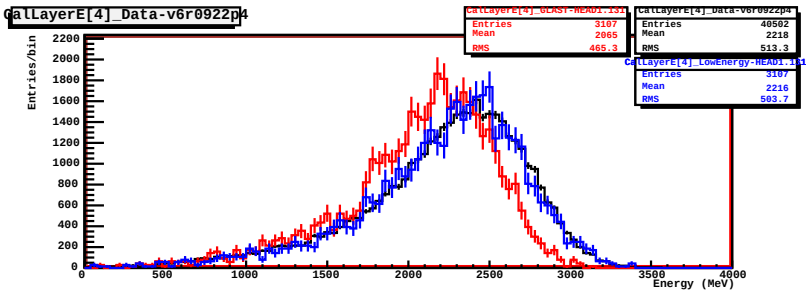
Cal layer energy

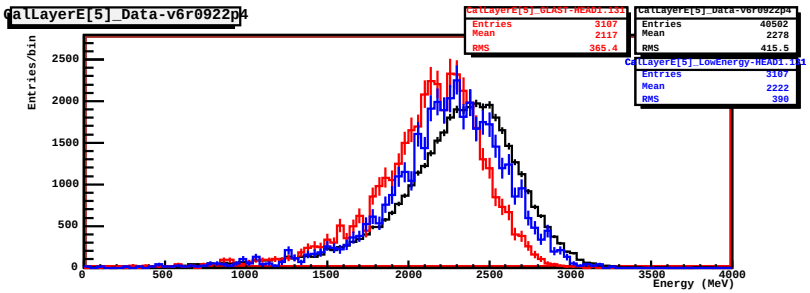


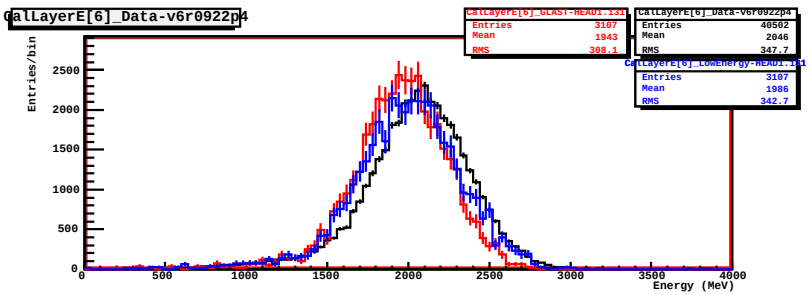


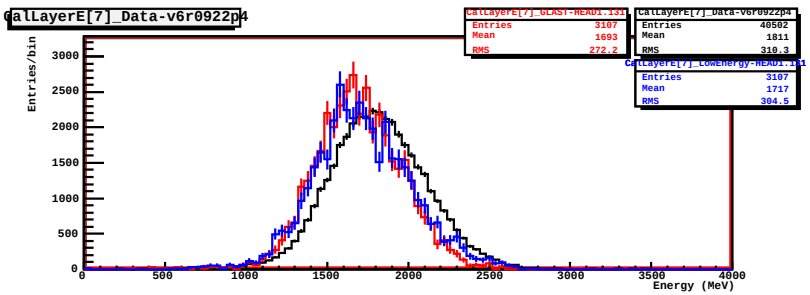




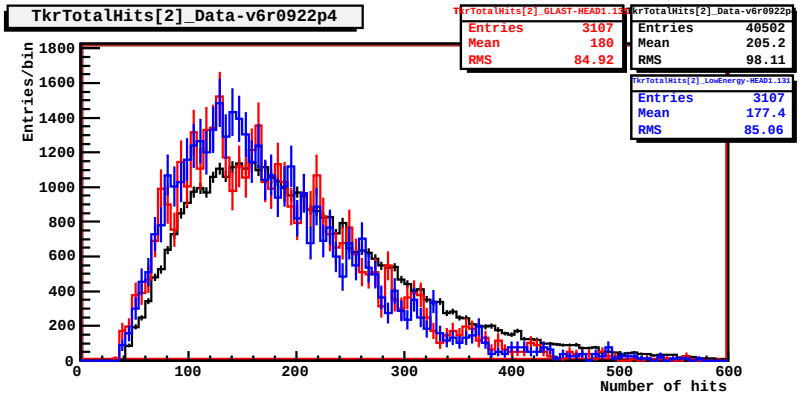


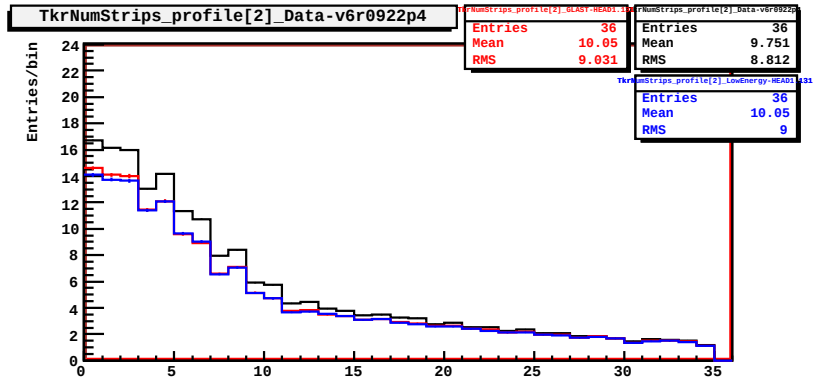


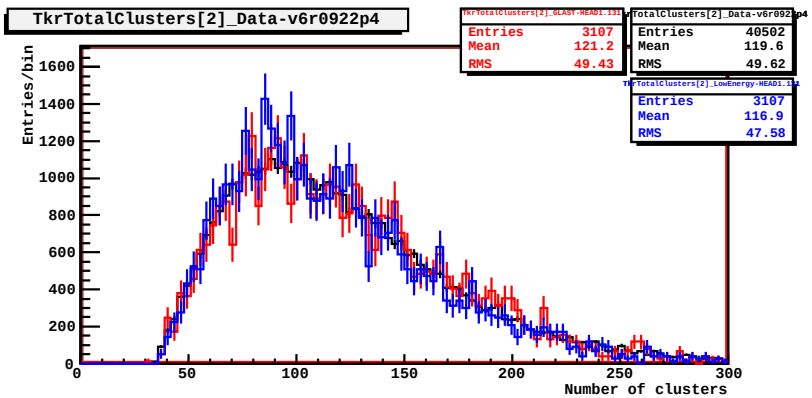


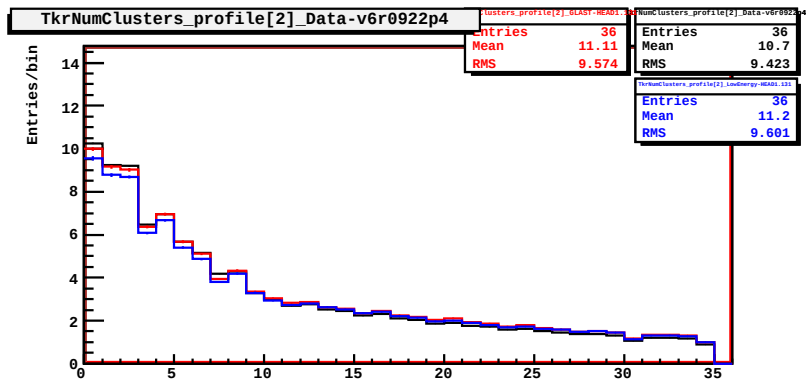


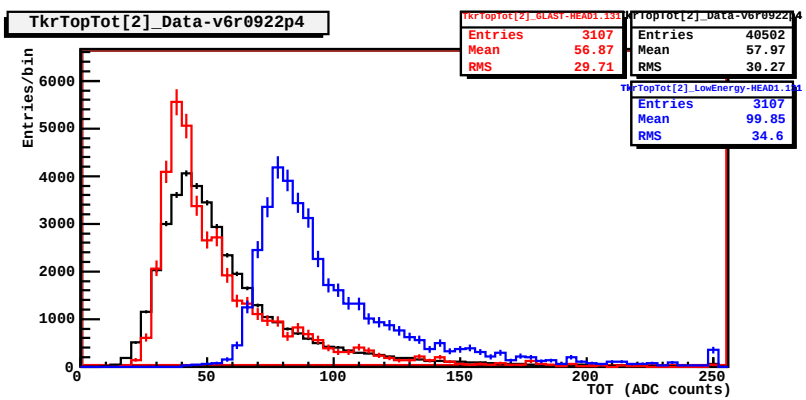
Tkr base quantities

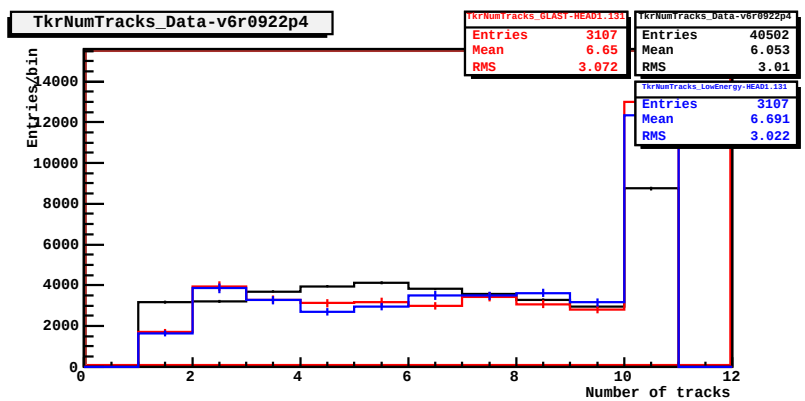












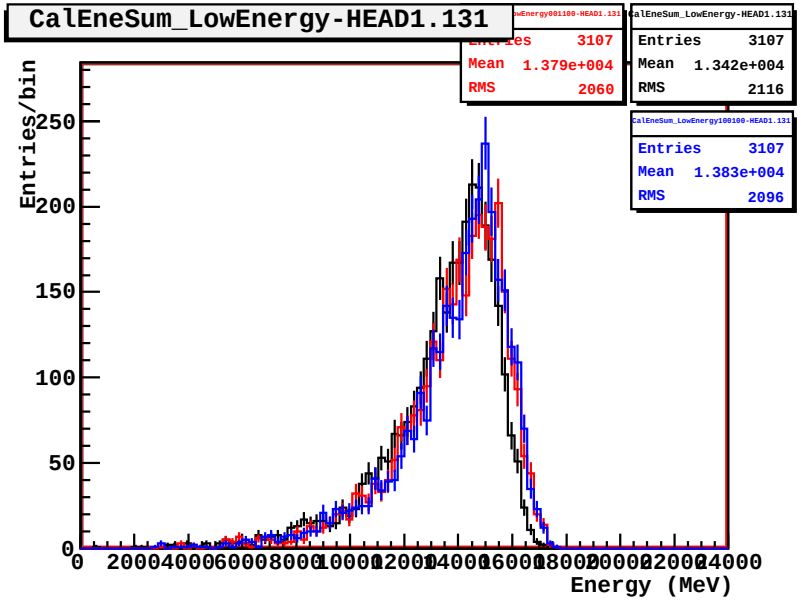
Summary

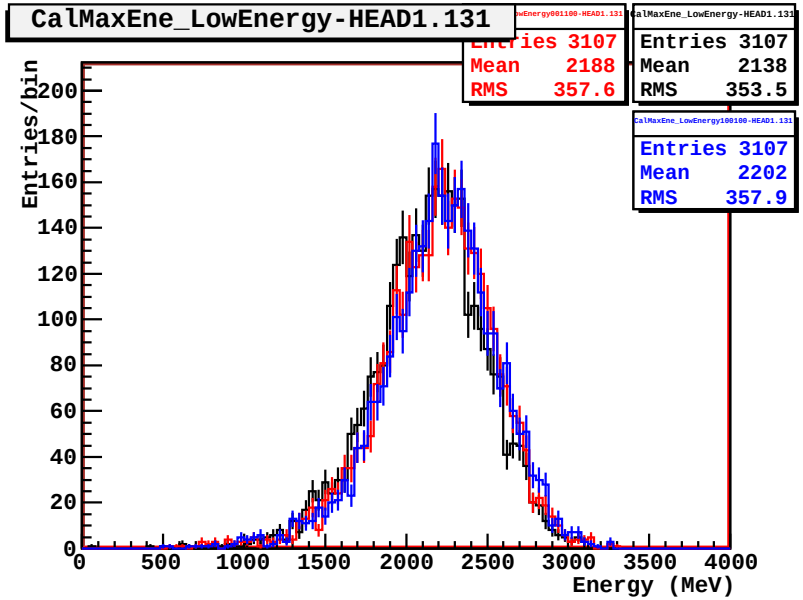
- More energy in the Cal...
- ...narrower shower shape (less logs, lower caltransrms)
- Tkr ToT is big but not exactly doubled as from a simple bug (double counting or energy)

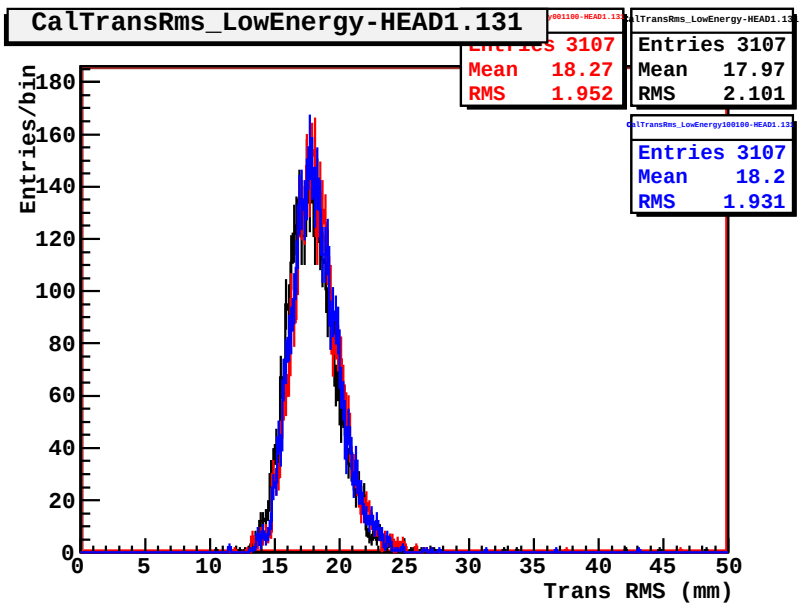
Is the range cut important?

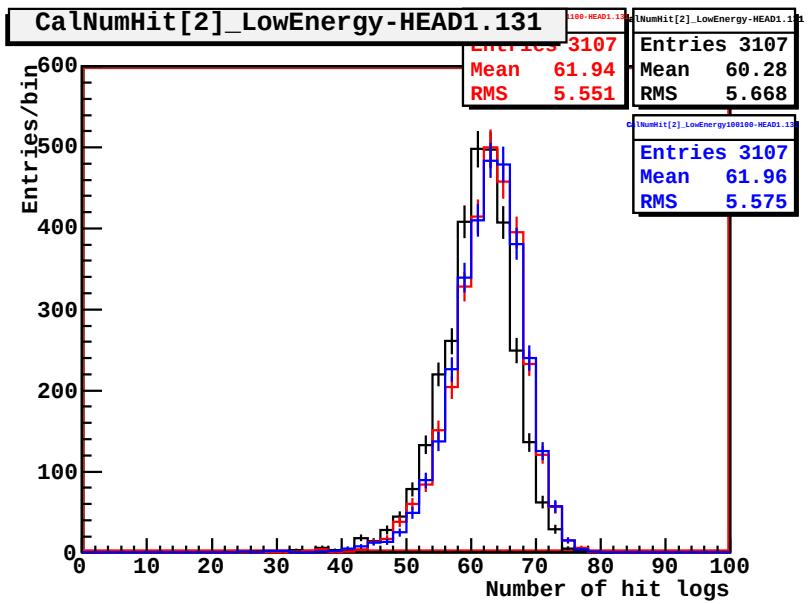
- The LowEnergy sim were done with very small range cut: Tkr=1μm Cal=10μm
- We compare runs that are identical apart from the range cut
- Use run 2082 with LowEnergy in the following configurations
  - Tkr=1μm Cal=10μm
  - Tkr=1μm Cal=100μm
  - Tkr=100μm Cal=100μm

Comparing range cut for LowEnergy - Cal variable

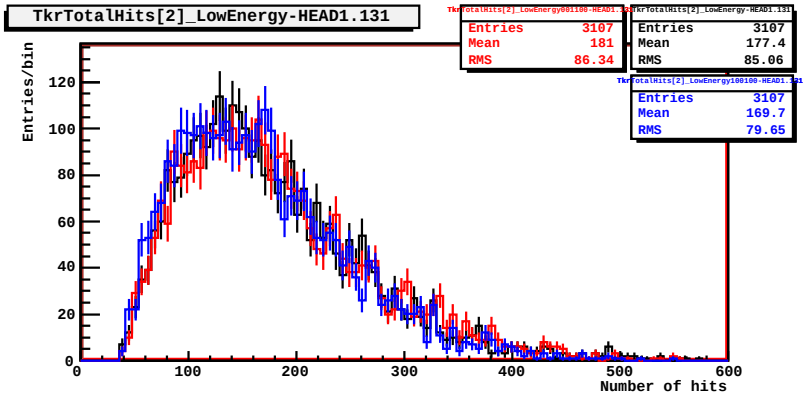


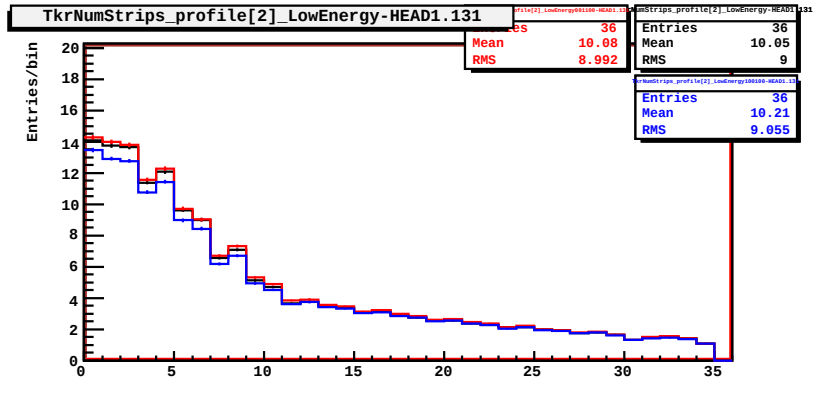


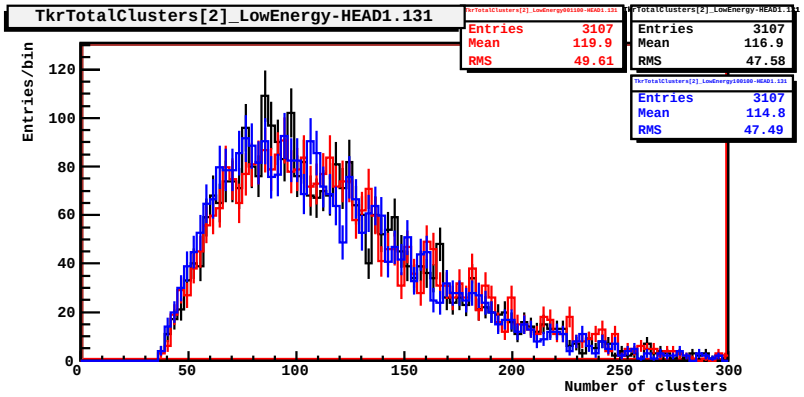


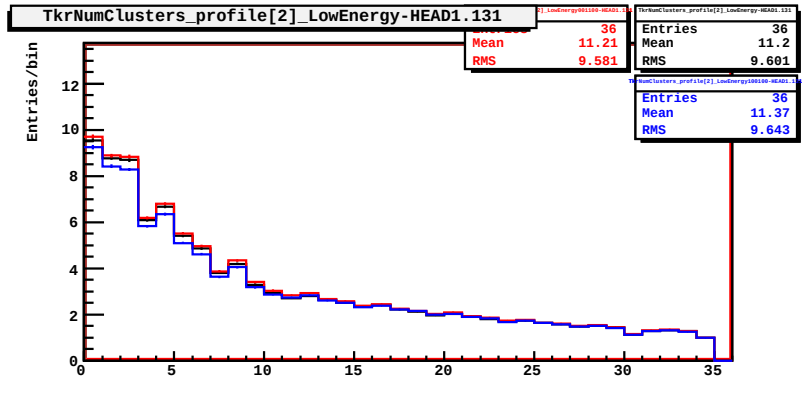


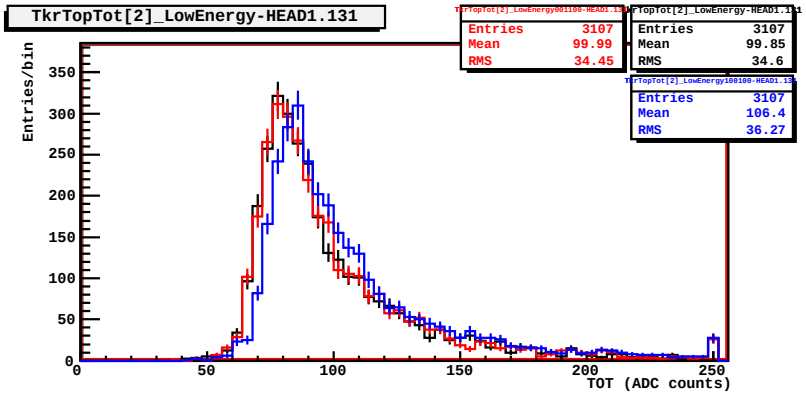
Comparing range cut for LowEnergy - Tkr variable

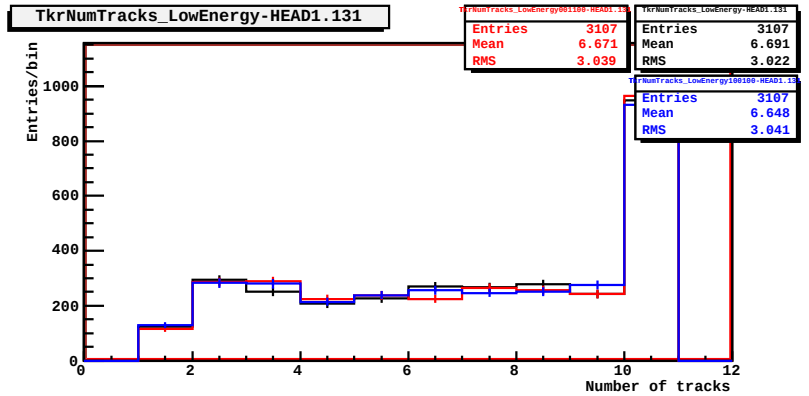








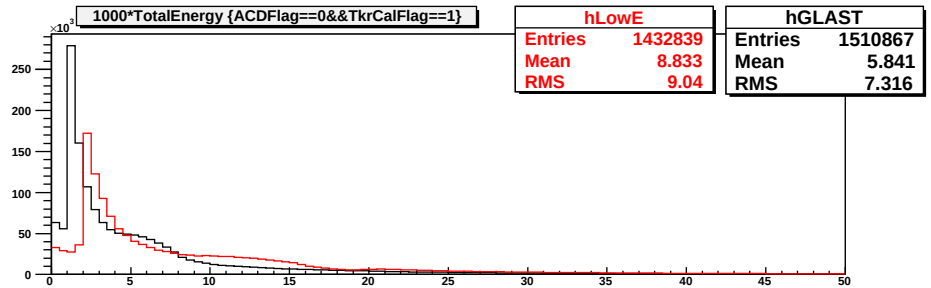


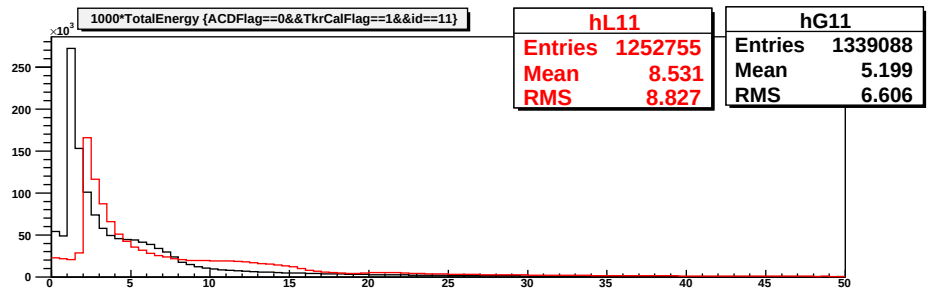


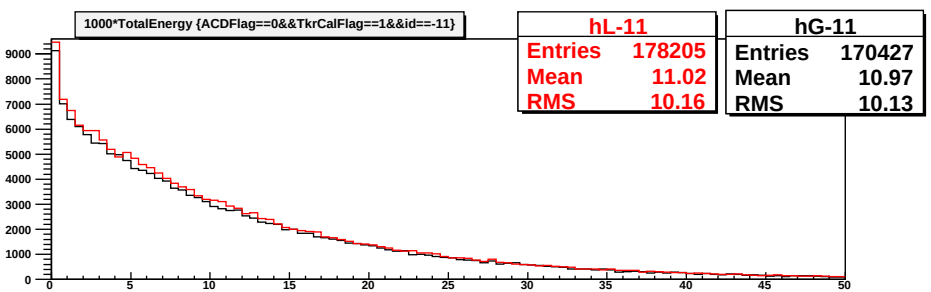
Summary

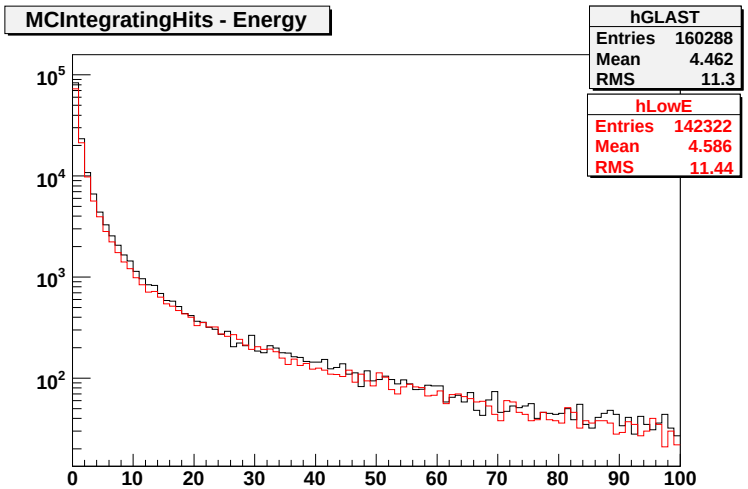
- The range cut seems to have a small effect.
- Remember that *Auger* and *Fluorescence* were OFF.
- Need to understand the strange ToT behavior.
  - We tried to look in the MC file to understand the difference in the deposited energy.
  - The following slide shows a comparison between the GLAST and the LowEnergy Physics choice for the first 300 events of run 2082

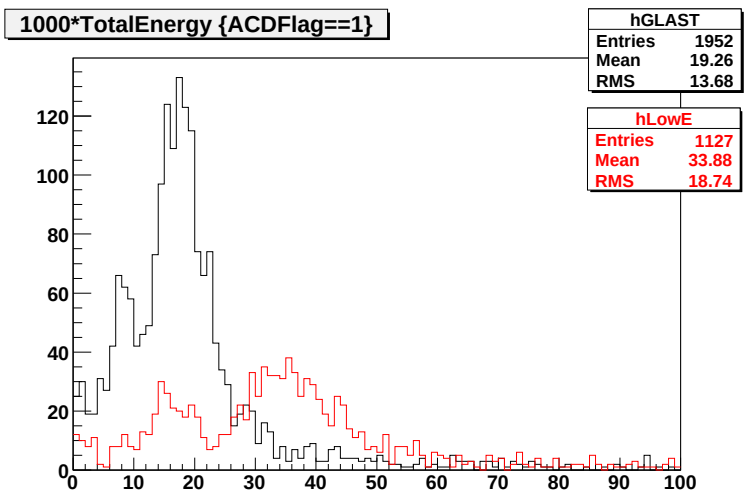
Deposited energy: MCPositionHit and MCIntegratedHit











Conclusions

- The LowEnergy physics seems to be promising but needs to be thoroughly checked
- We have an increase in the total energy in the Cal
- The shape of the shower is narrower
- Energy deposition in the Tkr need to be understood (especially for electrons)
- Ideas (and people) on this activity are welcome

Planned activity:

- Generate hadronic runs with LE and compare
- Investigate LE physics in G4 standalone (Francesco, Johan)
- Test on MIP (μ) on going
- Test on e^- with QGSP_BERT on going