

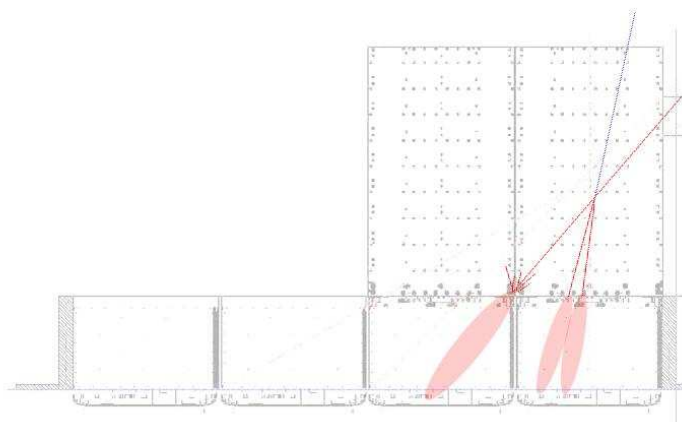
GLAST CERN 2006 Beamtest



DRAFT - Status Report

J. Bregeon for the Beamtest Team

GLAST Collaboration Meeting
November 15th, 2007



Instrument

Understood

- Angular resolution
- Energy resolution
- Backsplash
- Trigger efficiency: TKR, CAL, ACD
- CAL calibration (pedestals, xtalk, non-linearities)
- Ions : Quenching, CNO, Cluster width

Not Understood

- Absolute energy scale
- Number of TKR hits and Clusters
- TKR Cluster size
- Number of CAL Csl logs hit

MC Simulation

Understood

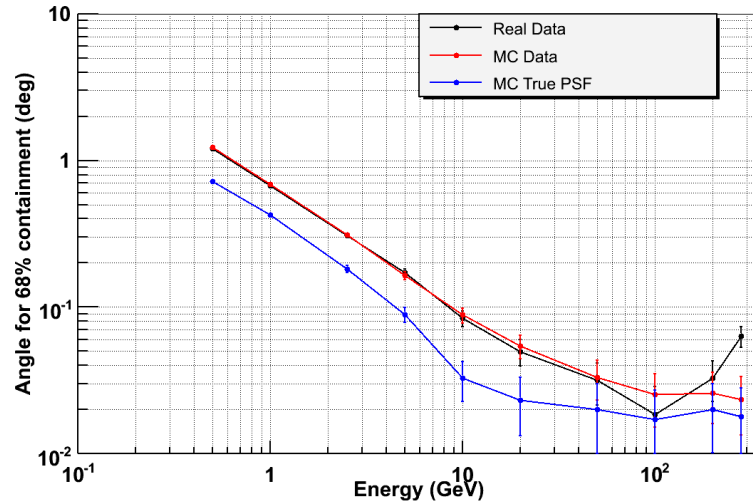
- Material audit: TKR and CAL
- Beam line geometry
- Hadronic physics list
- LowEnergy physics list and range cuts
- GEANT4 compared to other MC codes (GEANT3, EGS5)

Not Understood

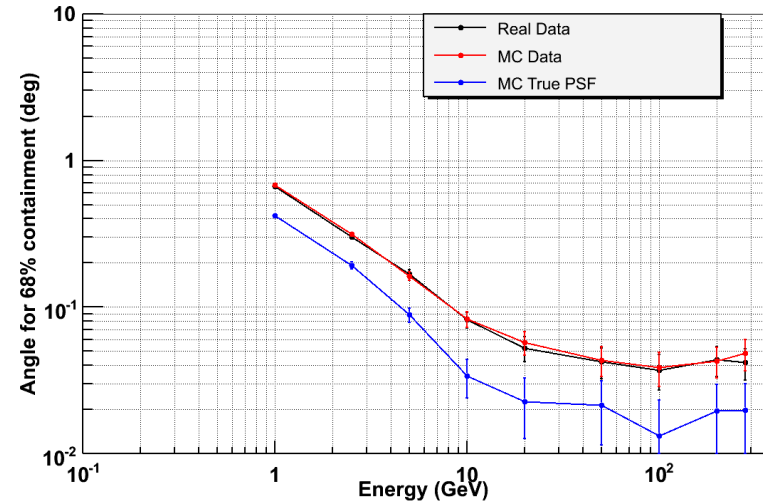
- Possible extra material along beam line
- Review of the CU grid geometry
- Remove the 4th calorimeter
- EM shower profile

Angular resolution

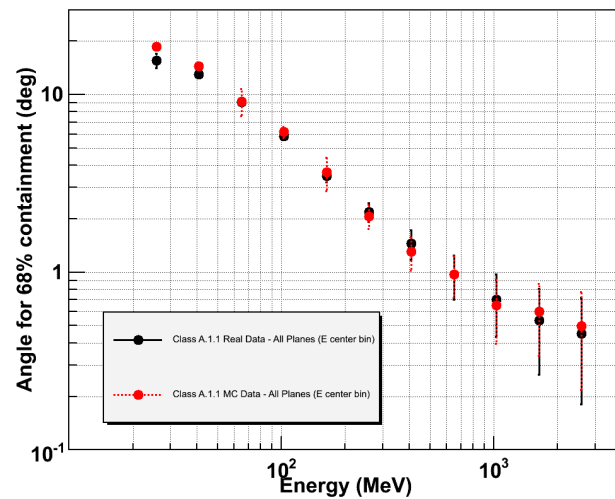
Angle for 68% containment (deg), Beam Incidence Angle = 0 deg



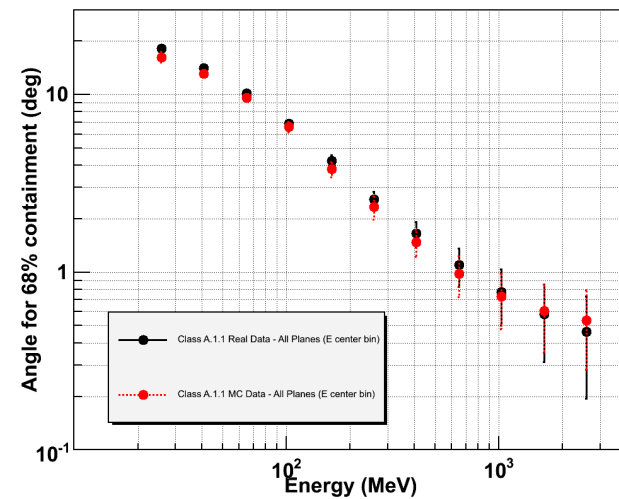
Angle for 68% containment (deg), Beam Incidence Angle = 30 deg



Tower 2 - Angular Resolution Vs. Reconstructed Energy at Normal Incidence (2.5 GeV Electron beam)



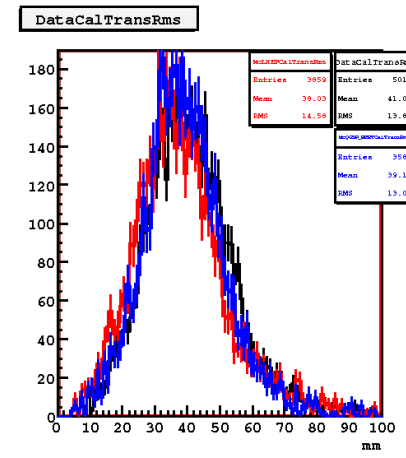
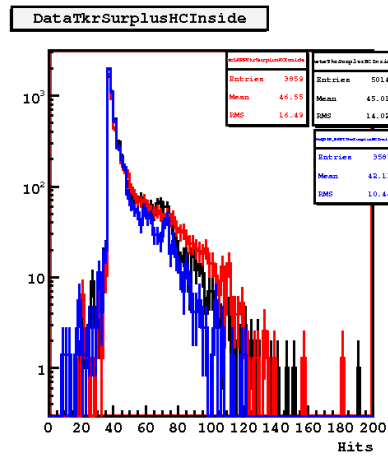
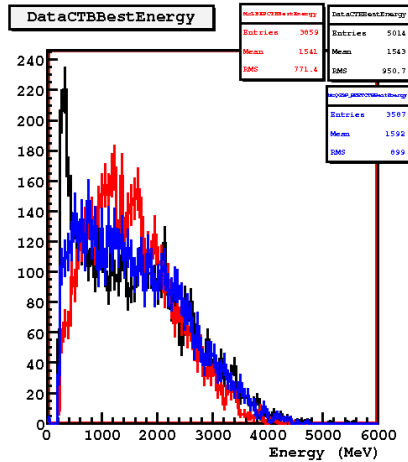
Angular Resolution Vs. Reconstructed Energy at 30 deg Incidence (2.5 GeV Electron beam)



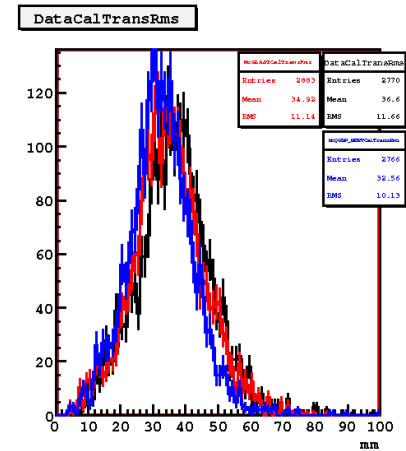
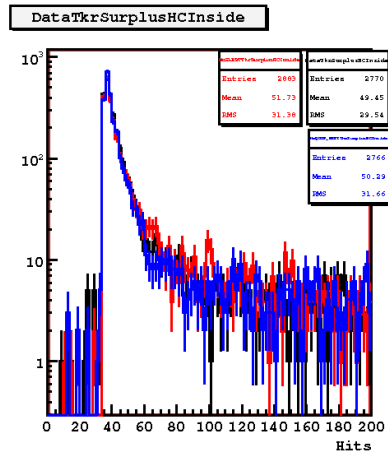
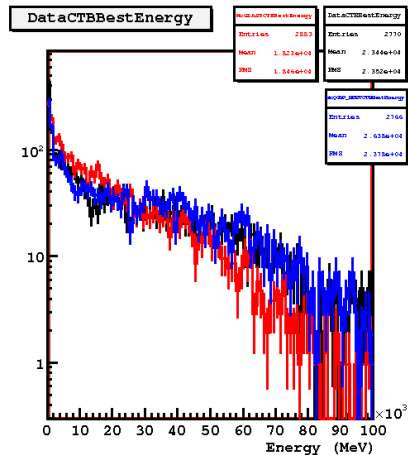
Hadronic physics list

- Bertini ($E < 10\text{GeV}$) and QGSP ($E < 10\text{GeV}$) models validated with beamtest data and tested to simulate a background run : no significant effect on the background rejection

6GeV

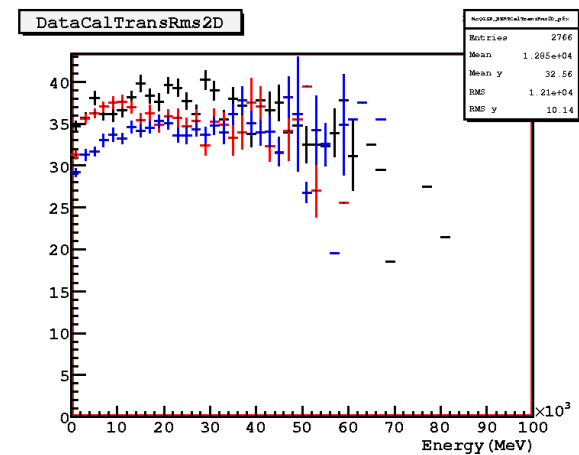
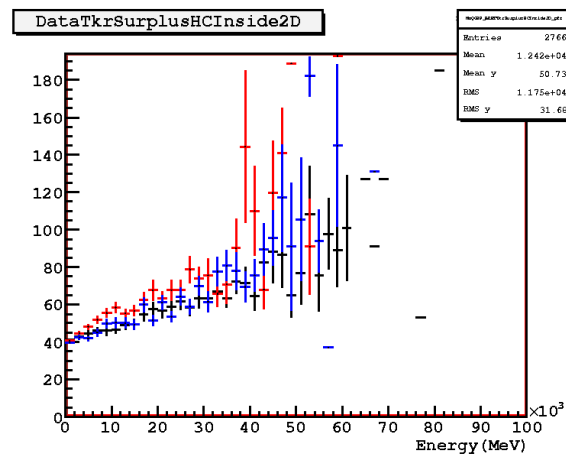
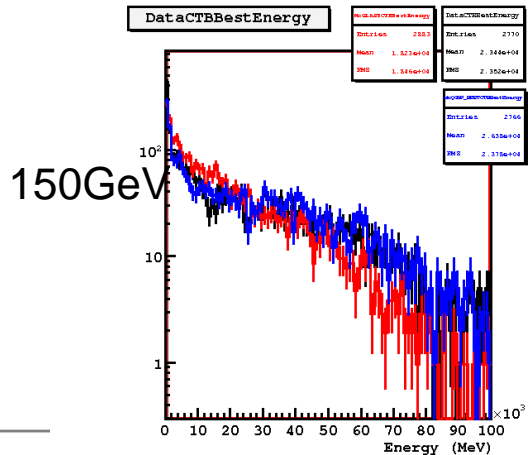
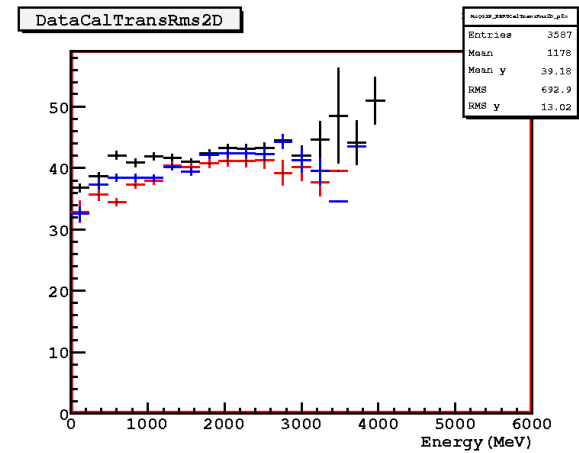
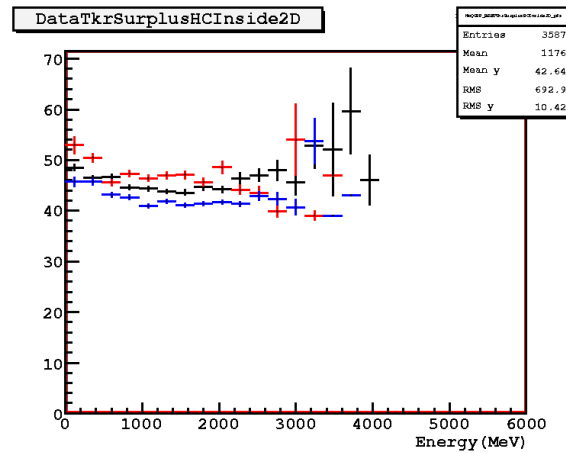
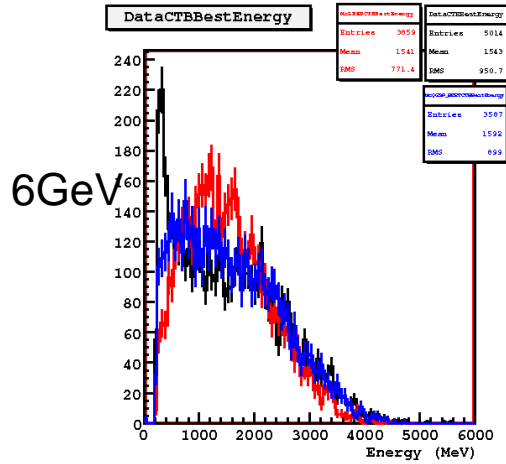


150GeV



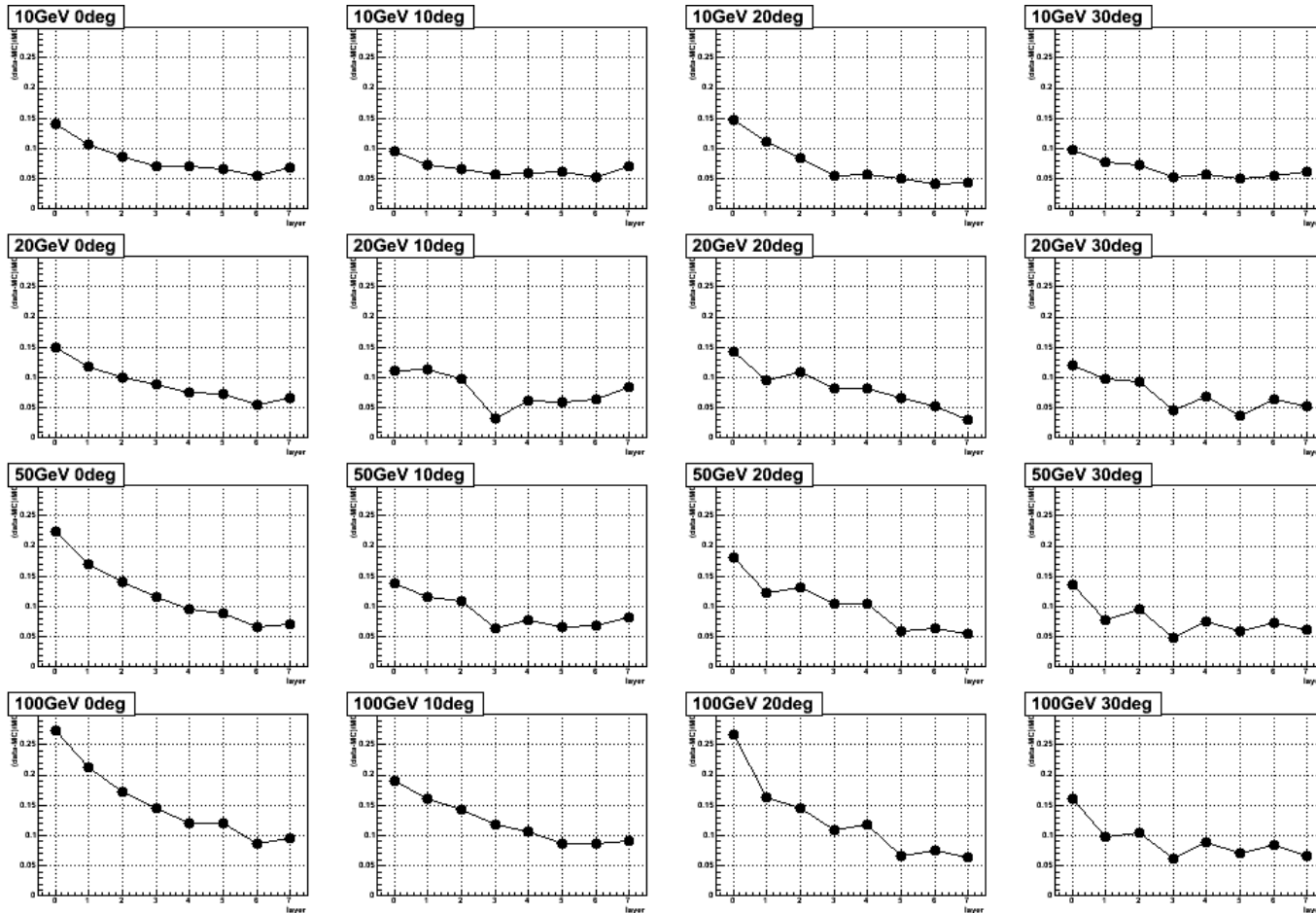
Hadronic physics list

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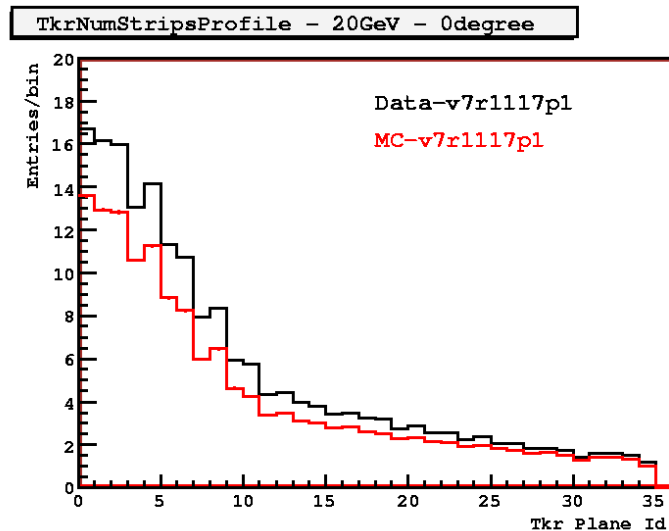
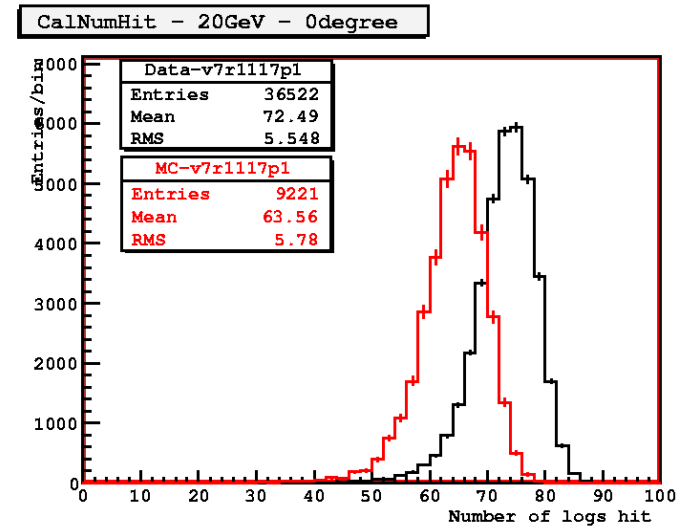
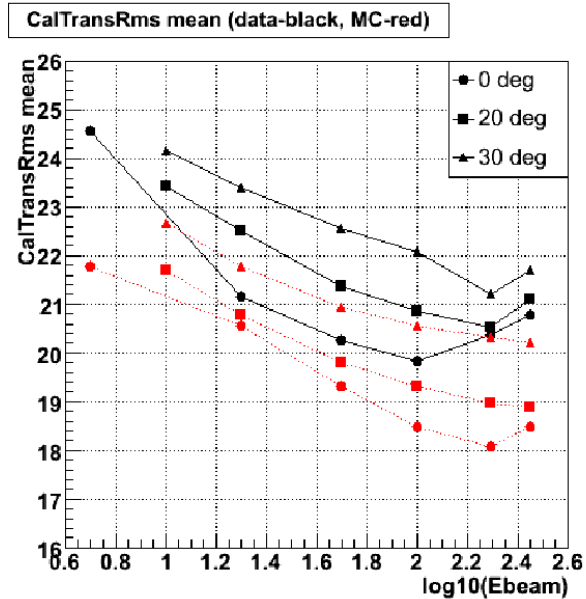


Absolute energy scale

● < 5%: Acceptable for $E < 2.5\text{GeV}$, but > 5%: an issue for $E > 2.5\text{GeV}$



EM Shower profile



- The simulated EM shower profile is different from the one measured in both the TKR and CAL.
- The difference is really significant for the transverse profile.

HE Electron and BT systematics

Quantify the effects of the residual differences on the *final science products*

- Working on the merit tuple background v11r2
 - Apply basic cuts to select a reasonable set of electrons
 - 10% p, 90% e^- and 20% efficiency for e^-
 - *Scale* tuple according to beamtest data knowledge
 - △ Simple $\sim 10\%$ shift on the variables used for the cut : CalTransRms, CalXtalMaxEne, CalXtalsTrunc, CalEnergyRaw, CalLRmsAsym, CalCfpEnergy
 - Apply the same cuts on the *scaled* tuple
 - 20% p, 80% e^- and 10% efficiency for e^-
- ⇒ Selection efficiency and contamination are worse by a factor of 2 on the *scaled* tuple
- ⇒ In this simple case, Data-Mc discrepancies do have a **significant** impact on the analysis
- ⇒ This issue needs to be studied carefully

Plans

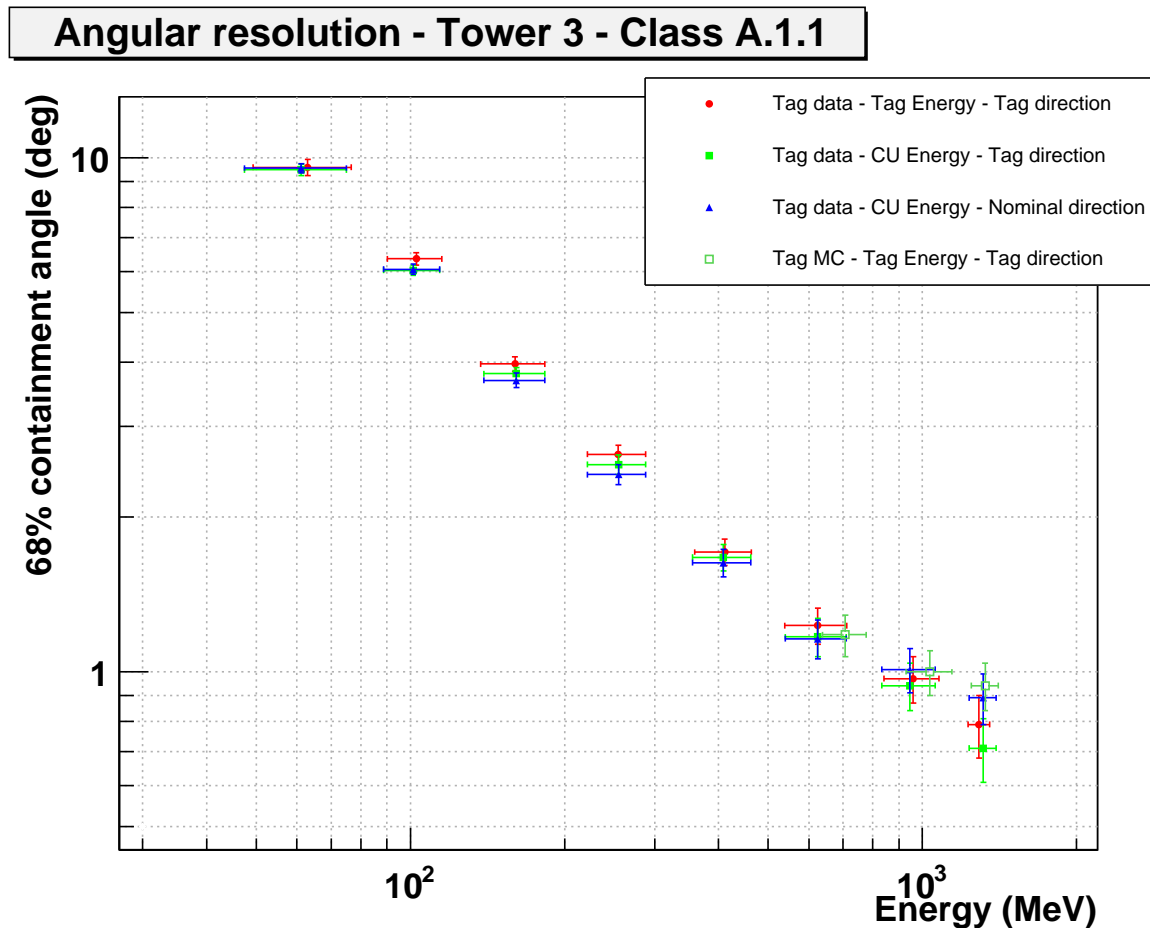
- effects of discrepancies on background rejection (data-like simulations, we MUST devise and show a plan here, we have been talking about this for too long now)
- how do we play with shower shape in g4?
- Develop procedures to cross check the discrepancies with on-orbit data (long term action item).
- Open discussion now, to complete this slide

Backup slides

follows

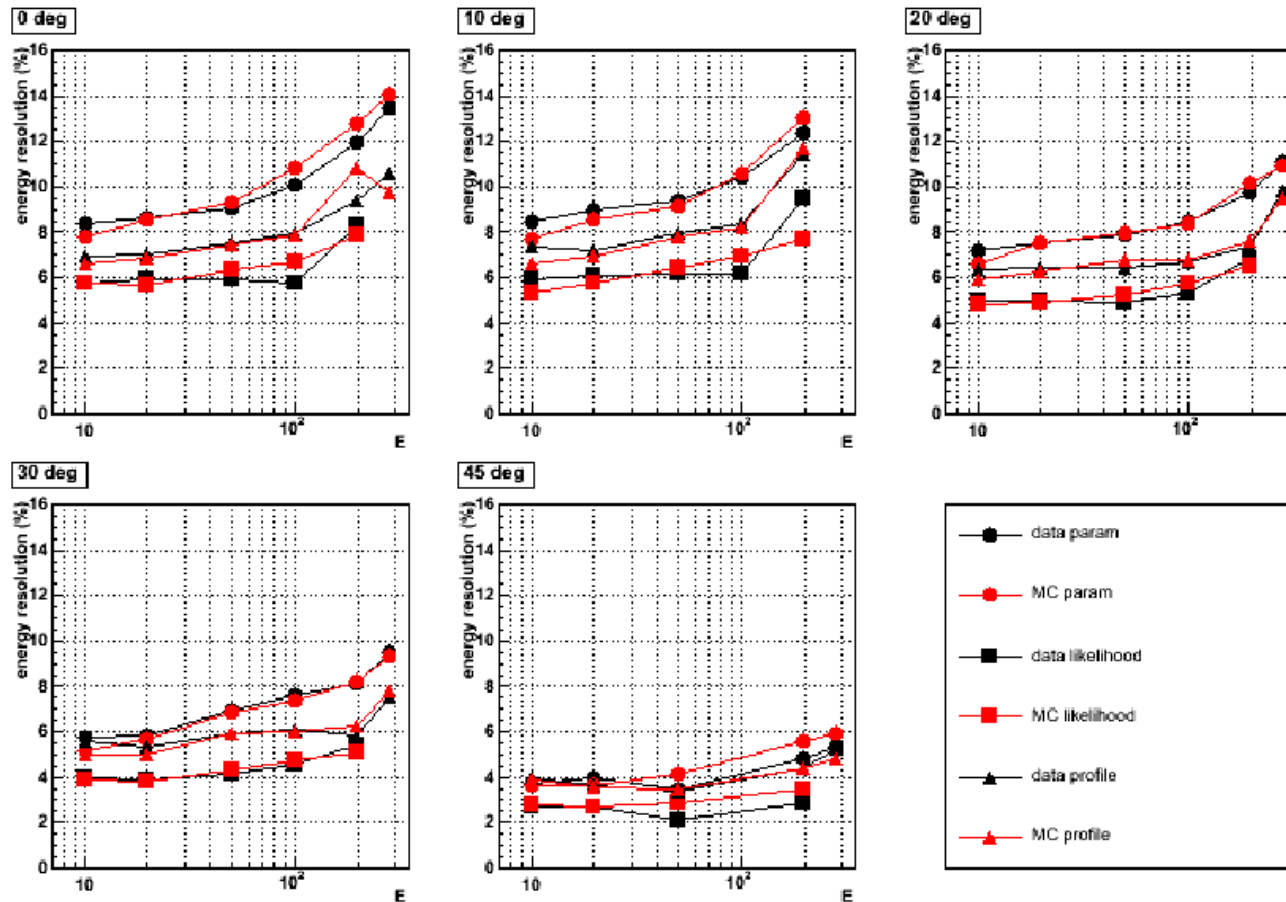
Photon Tagger

- PSF determined using Tagged photons is consistent with the one measured in FullBrehm mode.
- Tagged MC still to be understood



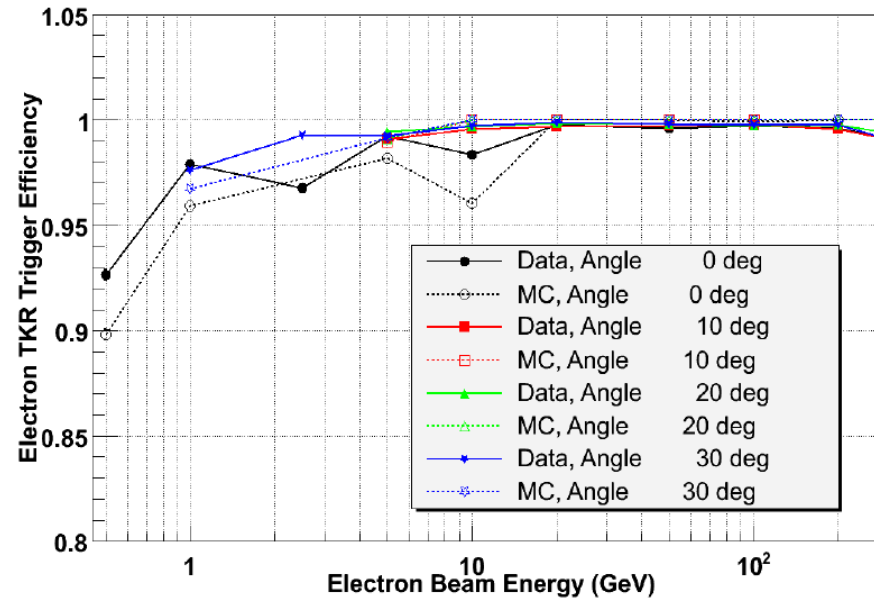
Energy Resolution

- Once you get rid of the systematic shift on the energy
- The energy resolution is within specs and well under controle



Trigger efficiency

- Estimate of the tracker trigger efficiency



GEANT4 vs EGS5

- Good Agreement for the EM shower development

Electrons 10 GeV

