

Reconstruction status; preparation for LCWS

David Ward

- Plans; timescales for having analysis results for LCWS
- Status of current MC/data reconstruction

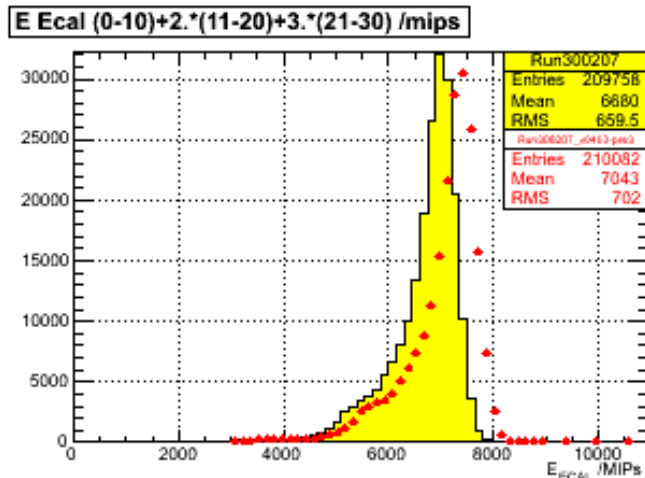
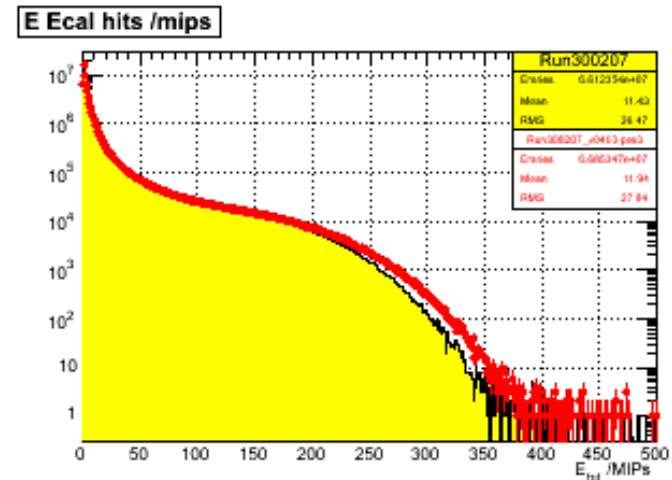
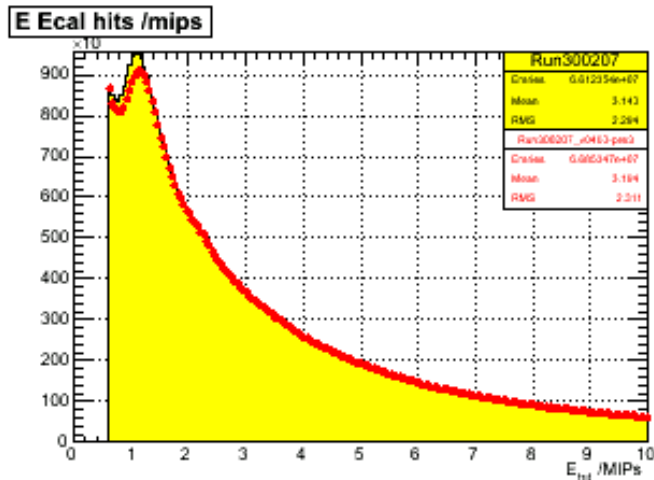
Timescales

- **LCWS** starts 30 May 2007. Includes **calorimetry review**.
- Calice general meeting **Kobe** May 10-12.
- Aim to produce two compendium Calice notes, on ECAL and HCAL analyses as basis for results shown at LCWS.
- New guidelines approved by Steering Board – in the case of test beam data, only results described (“blessed”) in approved Calice notes may be shown publicly. Anticipate needing ~ 2 weeks for editorial procedure/checking/circulation to Collaboration.
- Practice talks required, or else circulation of slides.
- Implies notes must to be essentially written before Kobe, and therefore analyses for input to these notes need to be completed by the end of April. i.e. ~ 5 weeks from now.

Data and MC

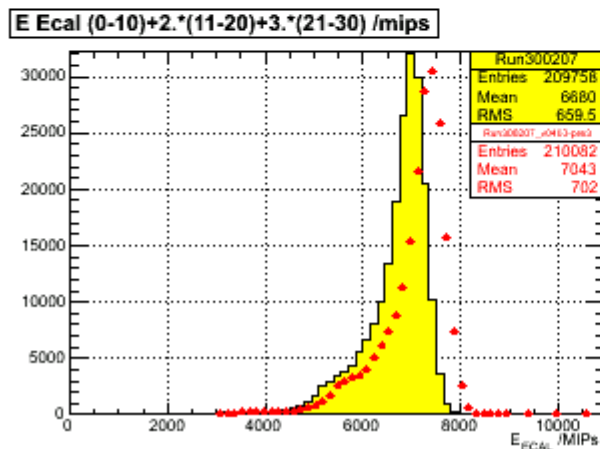
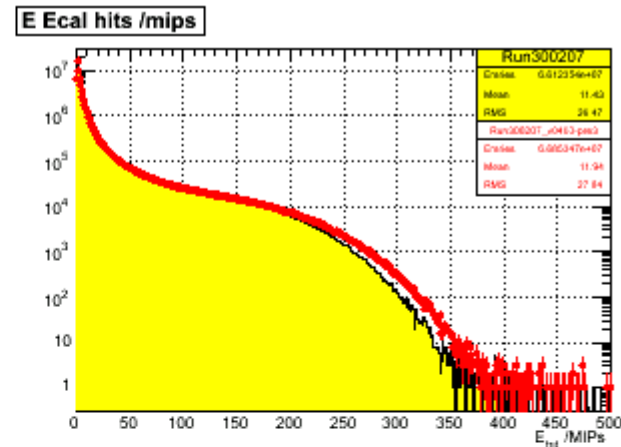
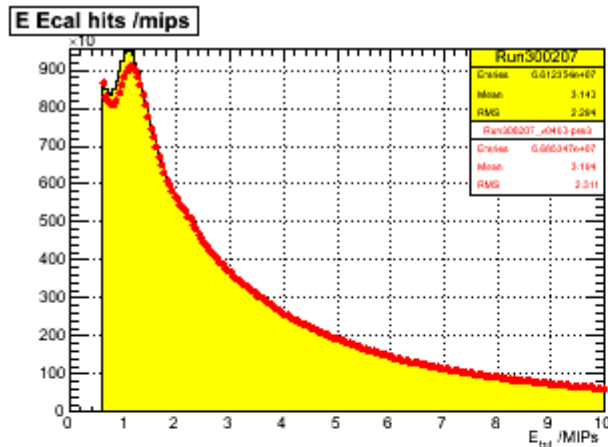
- Reconstructed data
 - Test samples of reconstruction v04-03-pre2 1/2/07. Included HCAL; new coordinate system. Revealed several problems.
 - New version v04-03-pre3 15/3/07. Fix some bugs. New calibrations. More test samples
 - ECAL normal incidence data seem usable.
 - Problems with ECAL geometry for inclined angles.
 - Still significant problems with HCAL
 - Still awaiting fixes to this reconstruction – full processing of all data.
- Monte Carlo
 - Mokka_6.3 released 27/2/07 (including new coordinate system)
 - Bug in geometry quickly identified and fixed – need Mokka_6.3.p01 released 2/3/07. Seems basically OK.
 - Nige Watson et al producing test samples on the Grid for general use. I also have private 10k samples – shown here.

New calibrations – 45 GeV e^-



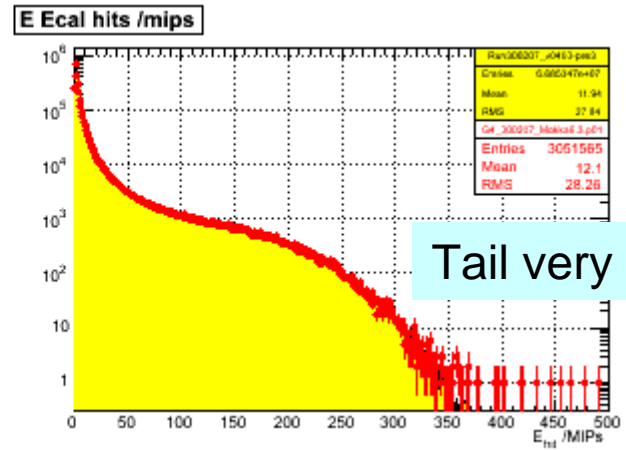
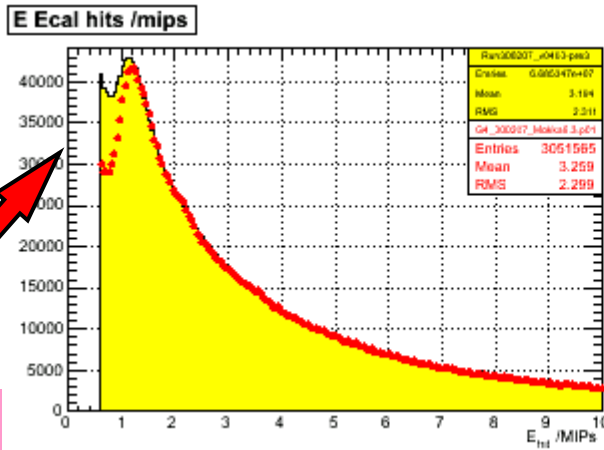
- Most obvious feature is that the hit energies have increased by $\sim 5.4\%$.
- Varies from layer to layer.
- Number of hits increases by $< 1\%$.

and at 30 GeV ...



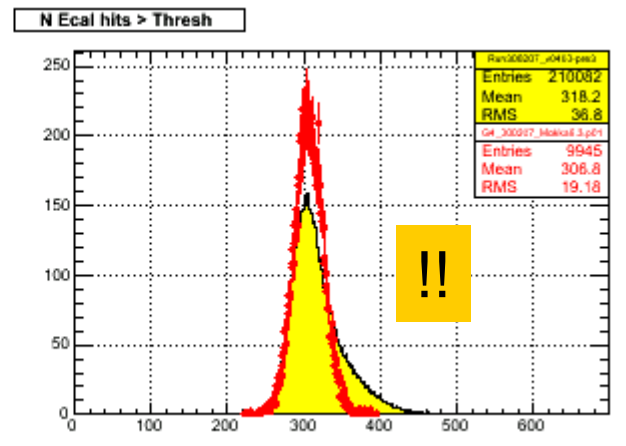
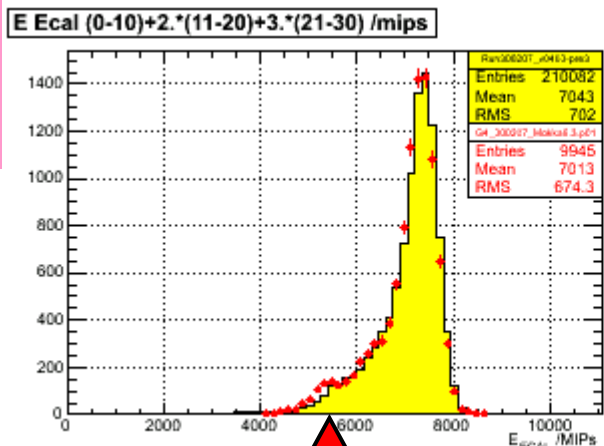
- ❖ Increase of $\sim 5\%$ seems to be basically the same at all energies (including DESY data)
- ❖ Therefore, in comparing with Mokka, I changed MIP value in MC from **0.155 MeV** to **0.147 MeV** for subsequent plots.

Data/MC $e^- 30 \text{ GeV } 0^\circ$



Tail very good.

Noise?
Crosstalk?
Pedestal shift?
MC digi needed?

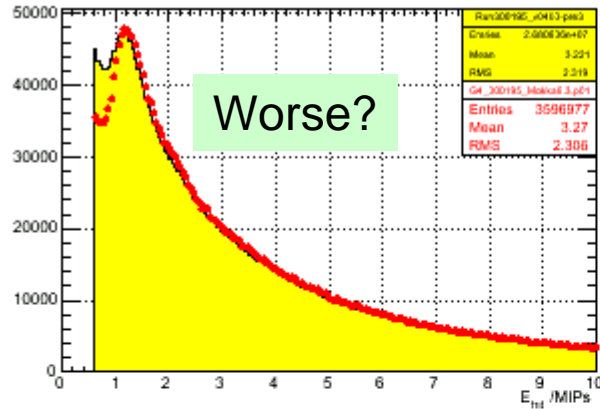


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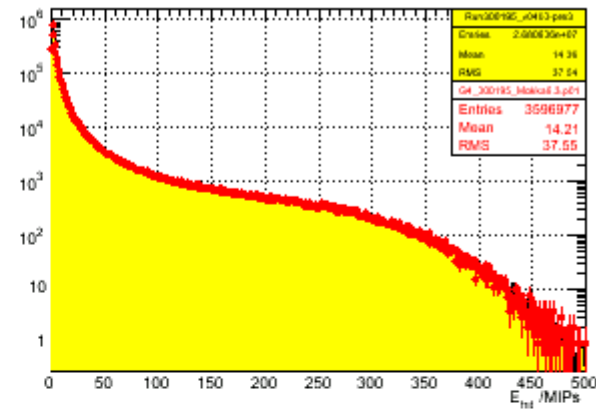
Shoulder – inter-wafer gaps

Data/MC e^- 45 GeV 0°

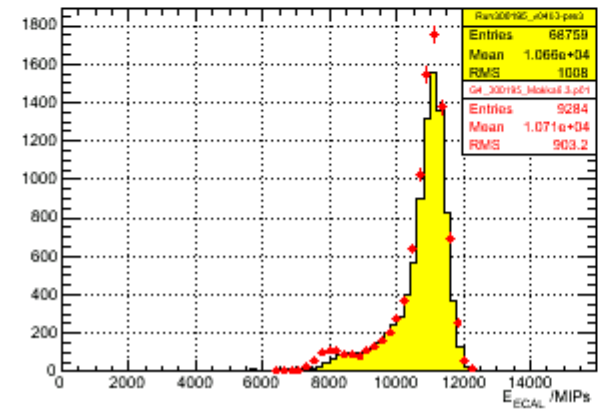
E Ecal hits /mips



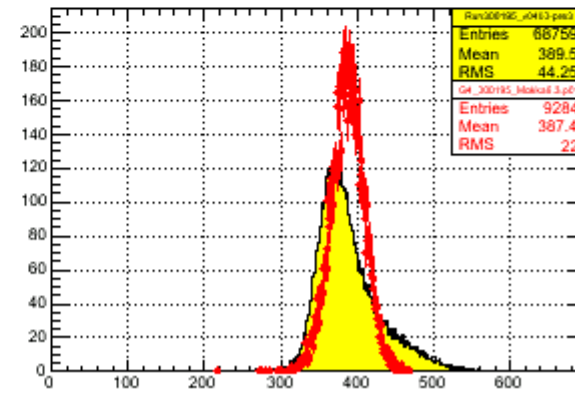
E Ecal hits /mips



E Ecal (0-10)+2.*(11-20)+3.*(21-30) /mips

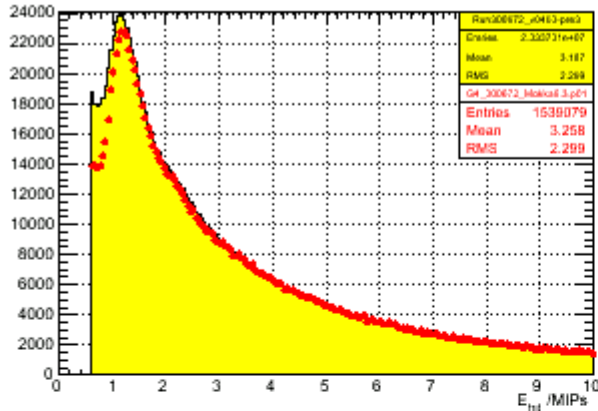


N Ecal hits > Thresh

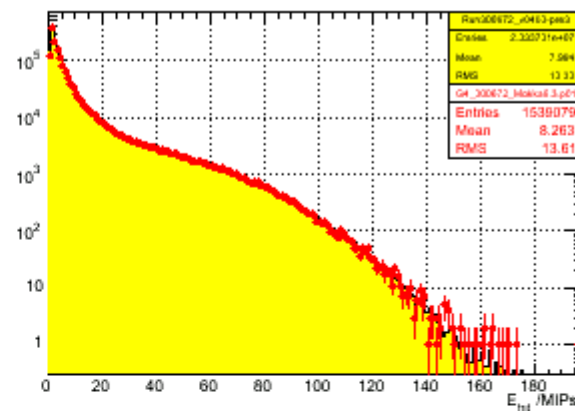


Data/MC $e^- 10 \text{ GeV } 0^\circ$

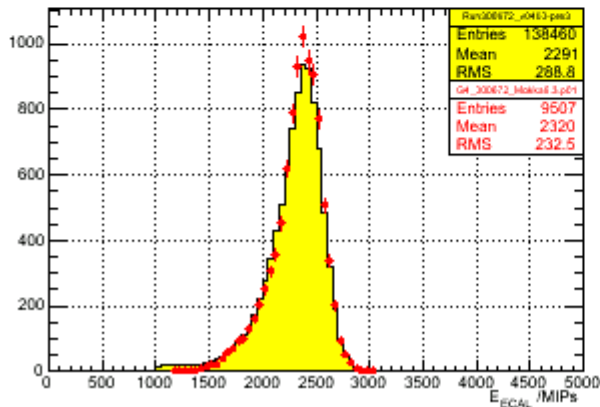
E Ecal hits /mips



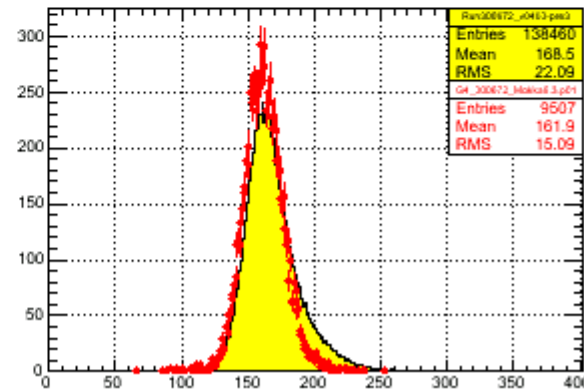
E Ecal hits /mips



E Ecal (0-10)+2.*(11-20)+3.*(21-30) /mips



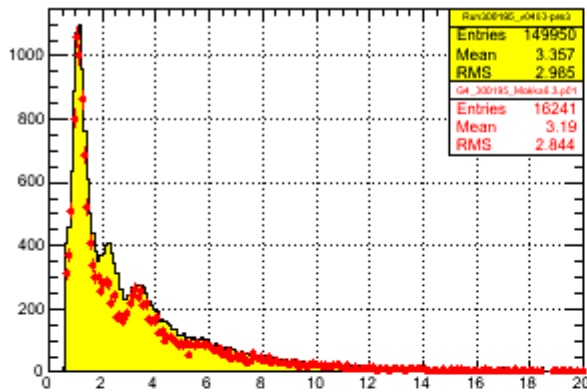
N Ecal hits > Thresh



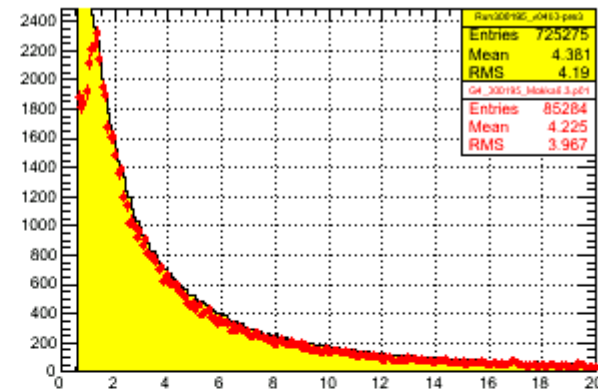
n.b. runs 300670-676 have a lot of pion contamination – use Cerenkov to cut this.

Data/MC hits by layer 45 GeV

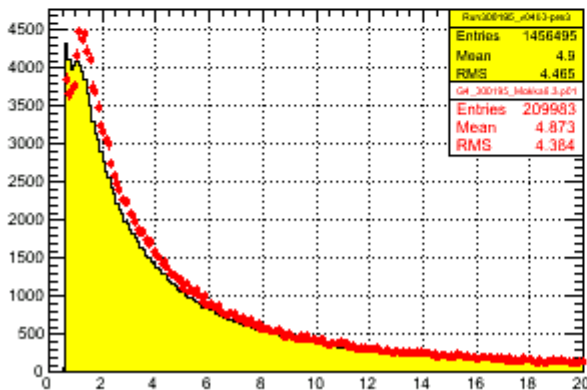
E Ecal hits /MIPs layer 1



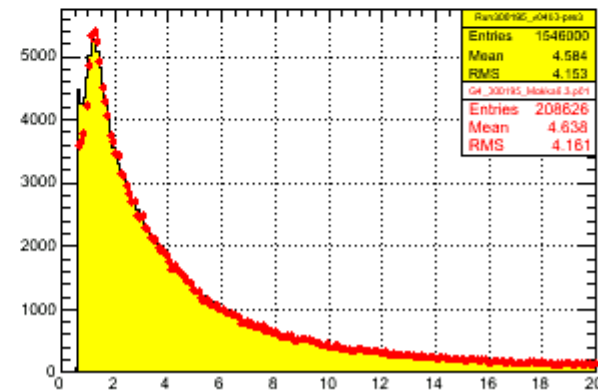
E Ecal hits /MIPs layer 8



E Ecal hits /MIPs layer 15

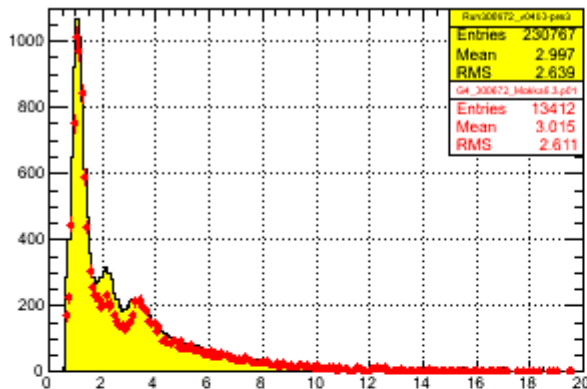


E Ecal hits /MIPs layer 21

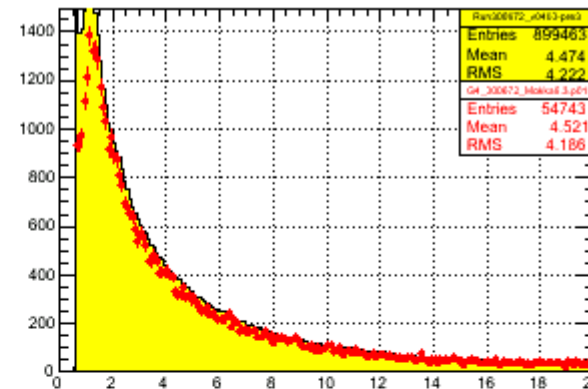


Data/MC hits by layer 10 GeV

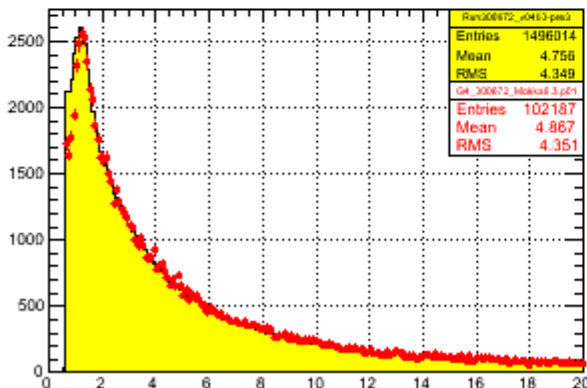
E Ecal hits /MIPs layer 1



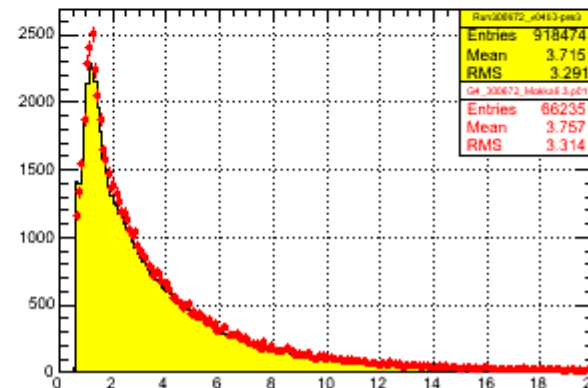
E Ecal hits /MIPs layer 8



E Ecal hits /MIPs layer 15



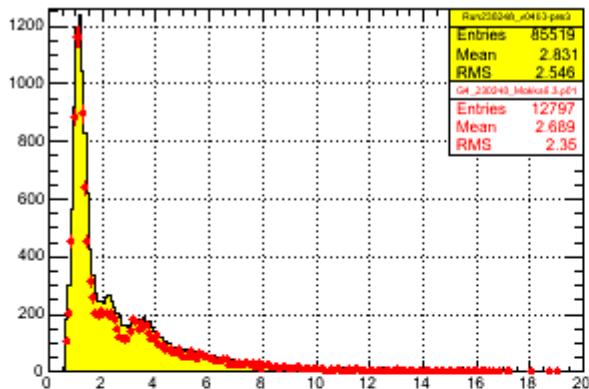
E Ecal hits /MIPs layer 21



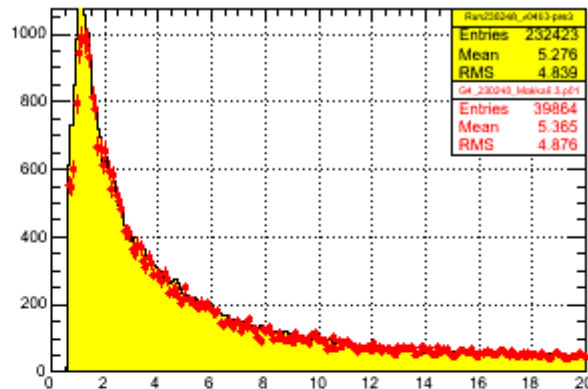
A bit better?

Data/MC hits by layer 3 GeV

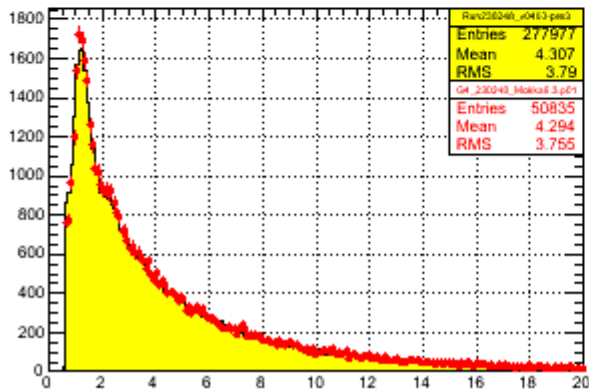
E Ecal hits /MIPs layer 1



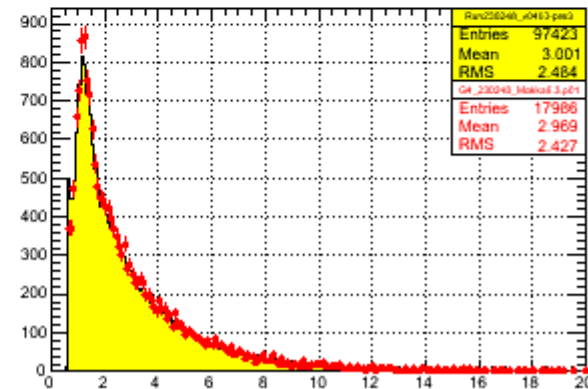
E Ecal hits /MIPs layer 8



E Ecal hits /MIPs layer 15



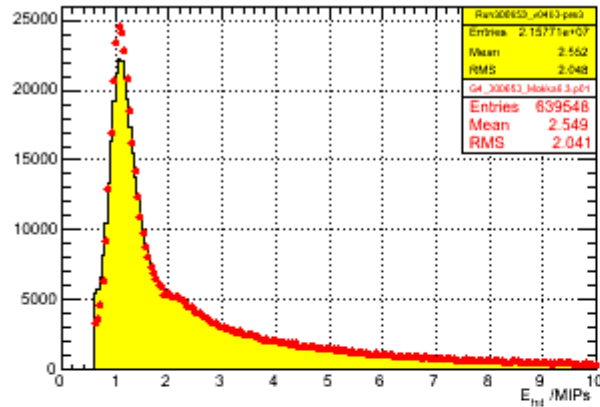
E Ecal hits /MIPs layer 21



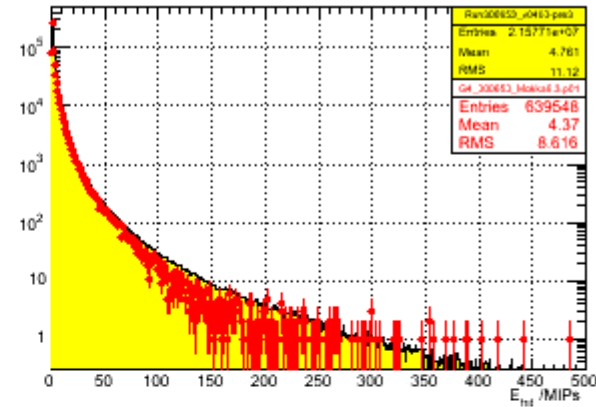
DESY
Much better

Data/MC π 12 GeV ECAL

E Ecal hits /mips

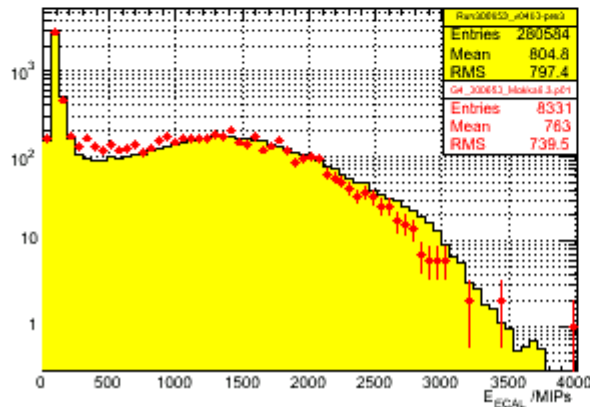


E Ecal hits /mips

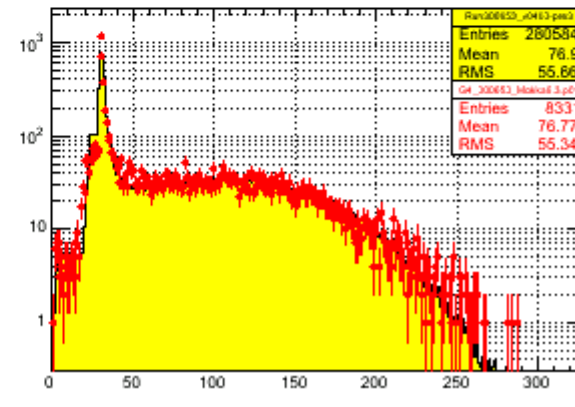


MIP peak good; tail less good.

E Ecal (0-10)+2.*(11-20)+3.*(21-30) /mips



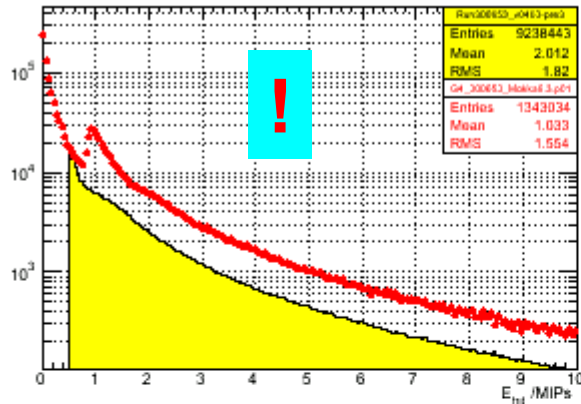
N Ecal hits > Thresh



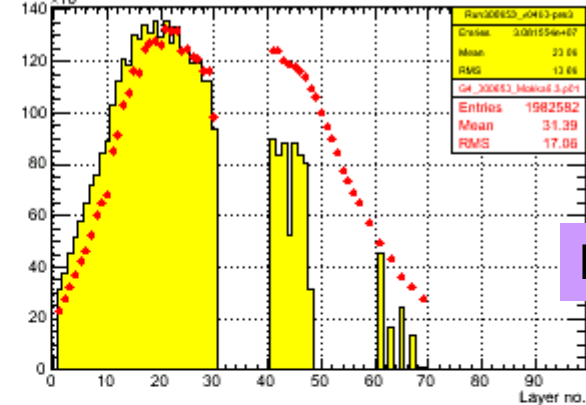
LCPhys physics list. Not too bad?

Data/MC π 12 GeV HCAL

E Hcal hits /mips

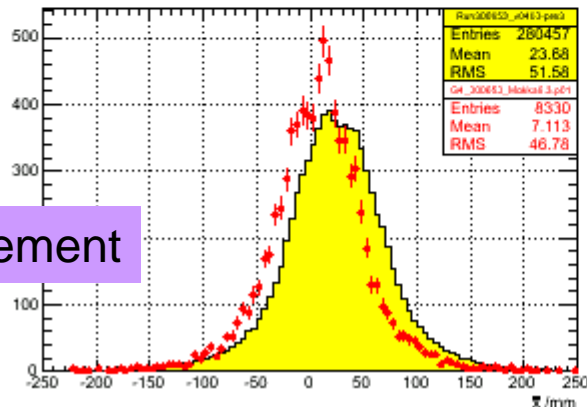


Energy v Plane



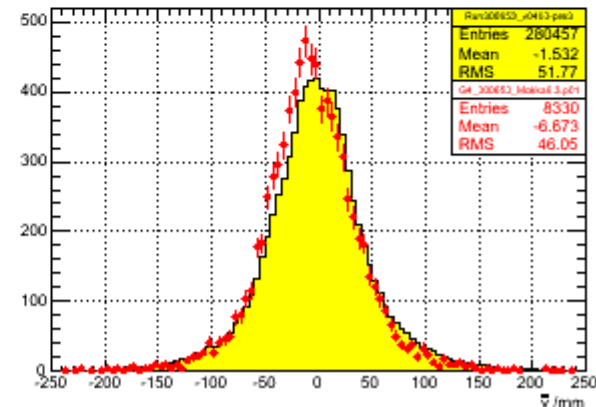
Missing layers

x average HCAL

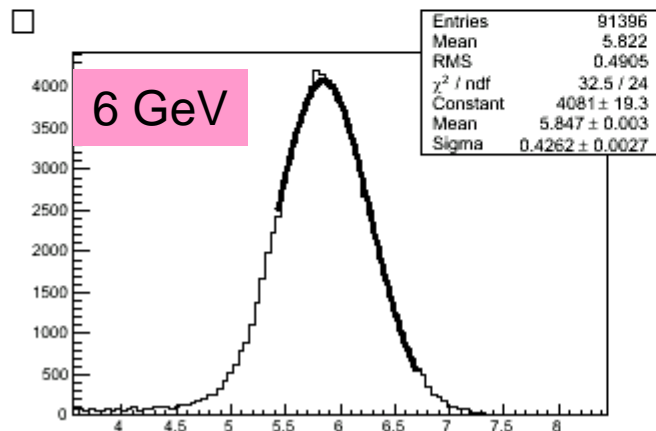
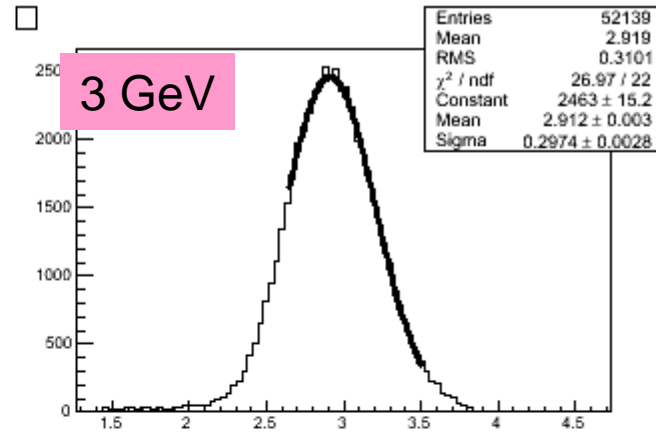
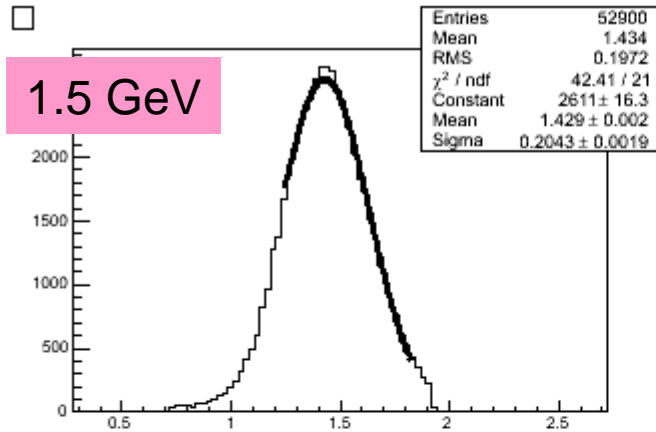


Displacement

y average HCAL

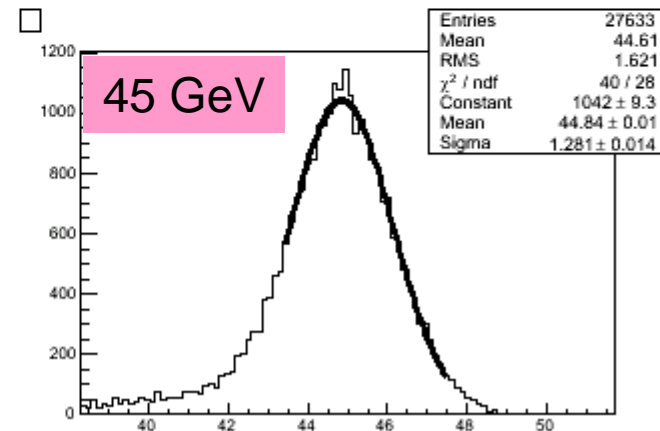
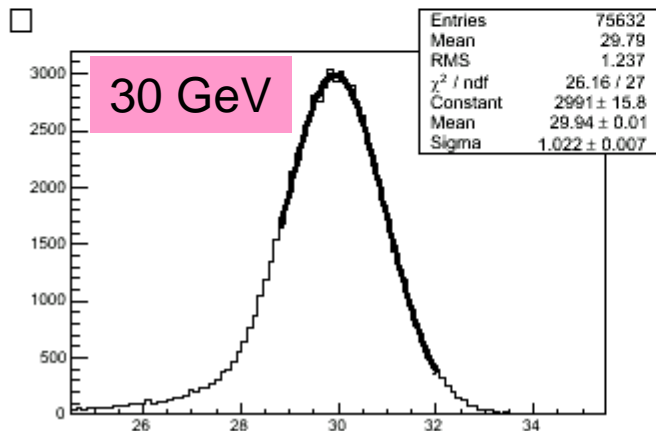
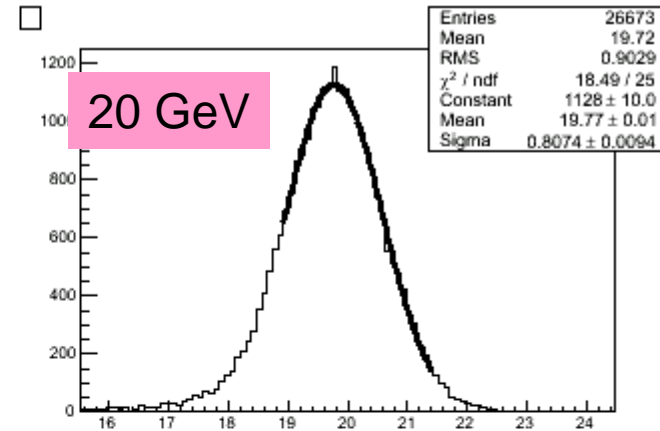
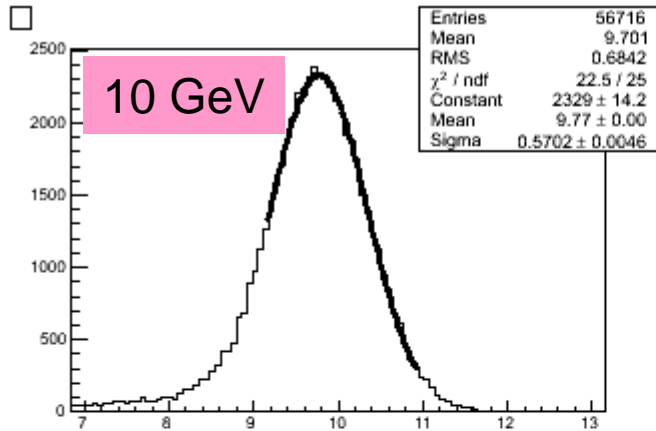


Energy scale/resolution - DESY

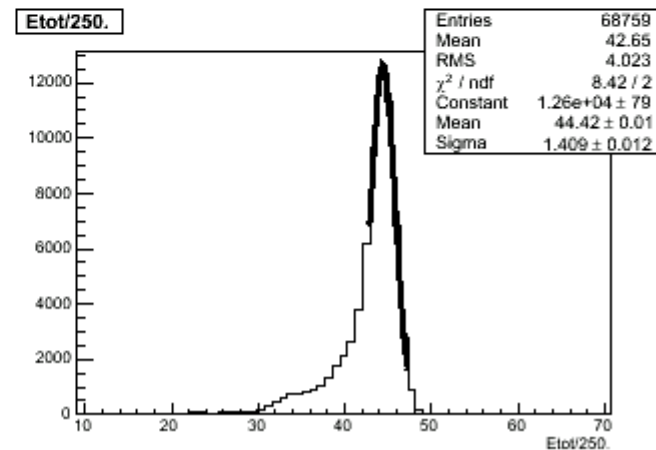
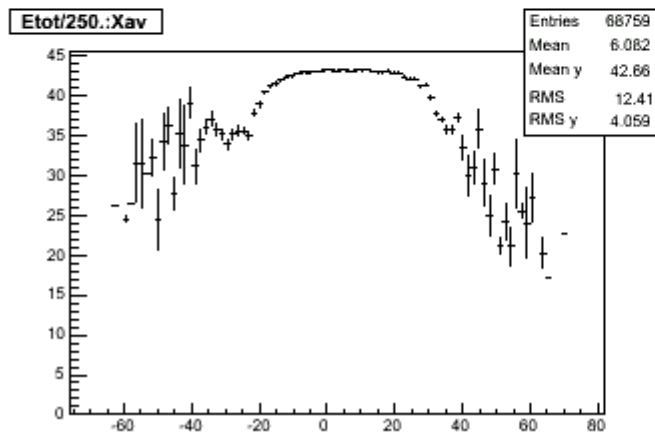
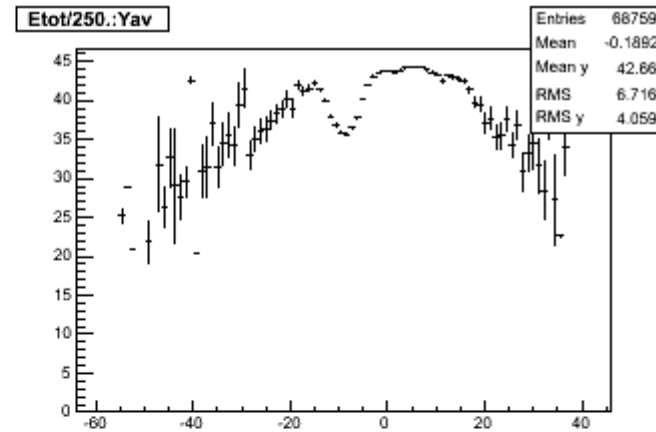
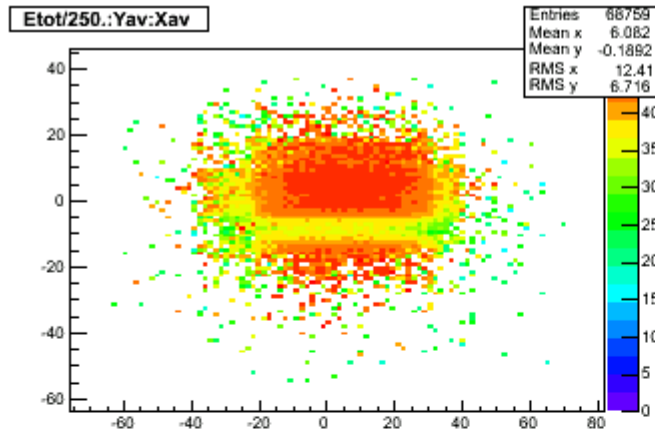


- Cut in wafer centre (20x20mm region) to remove gaps
- Calibration 250MIP = 1 GeV
- Fit Gaussian in range $[-1\sigma, +2\sigma]$
- No correction for missing layers.

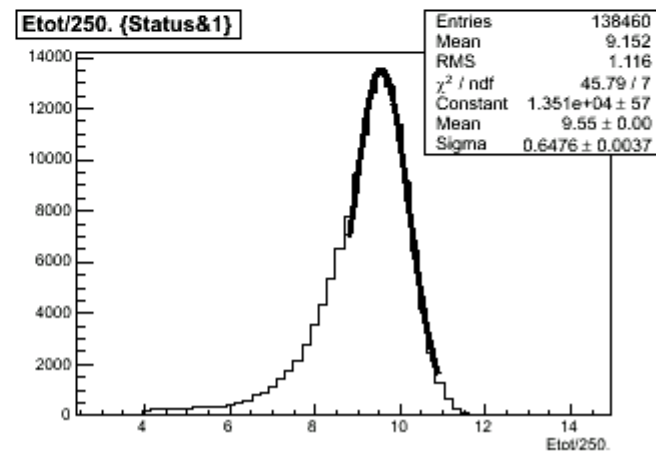
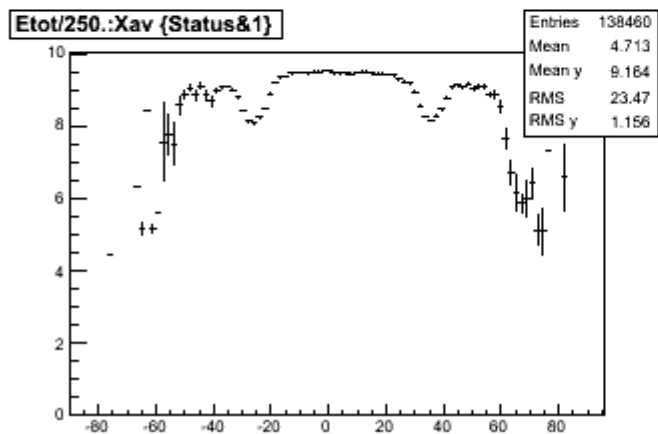
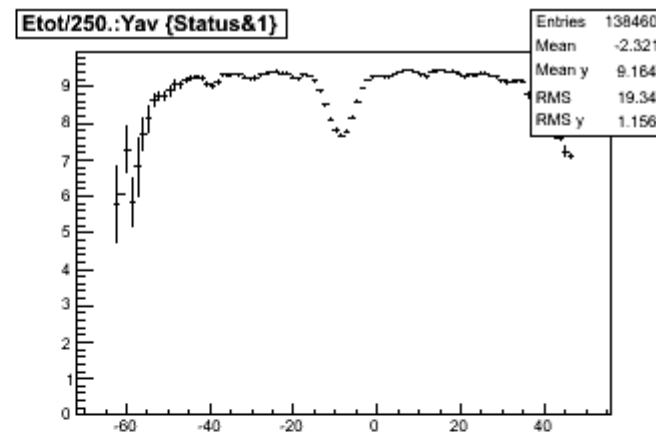
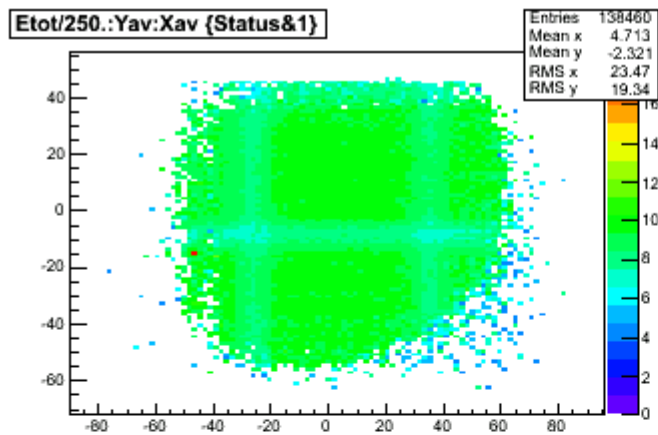
Energy scale/resolution - CERN



The gap problem – 45 GeV

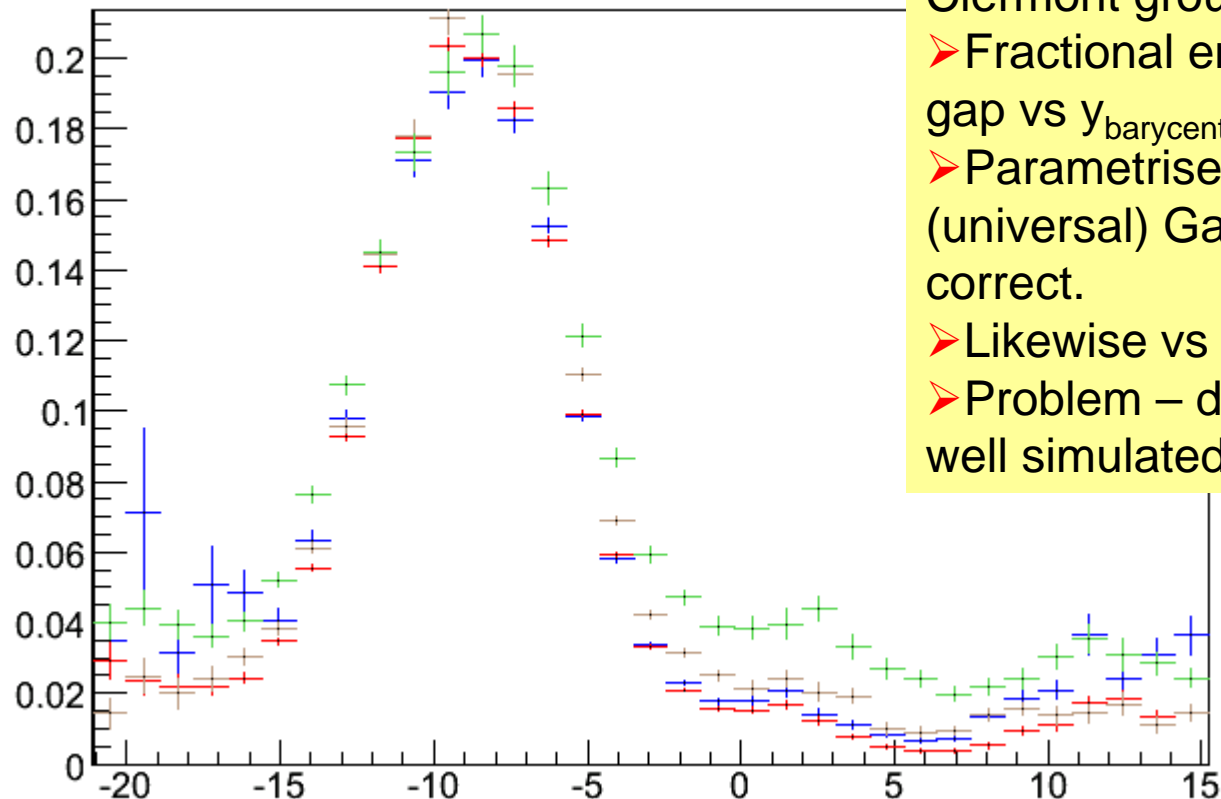


The gap problem – 10 GeV



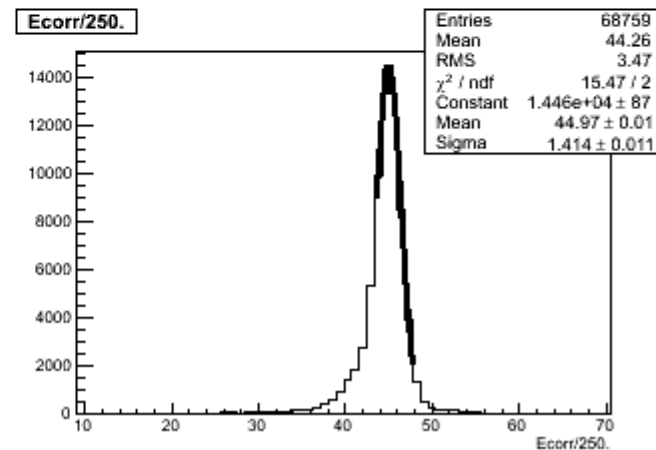
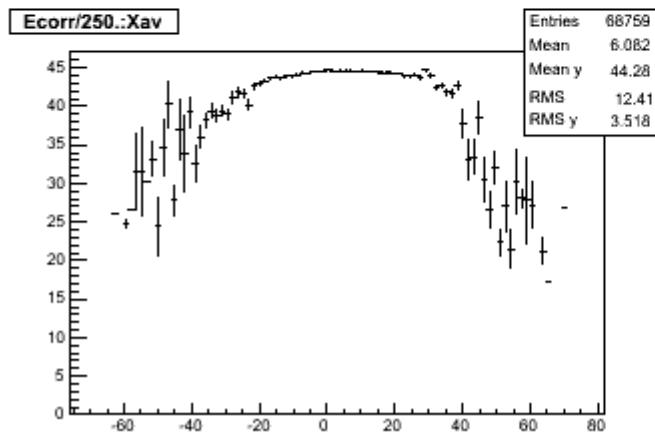
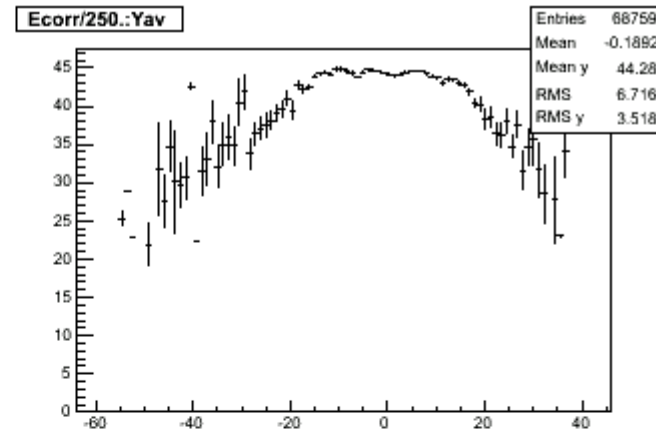
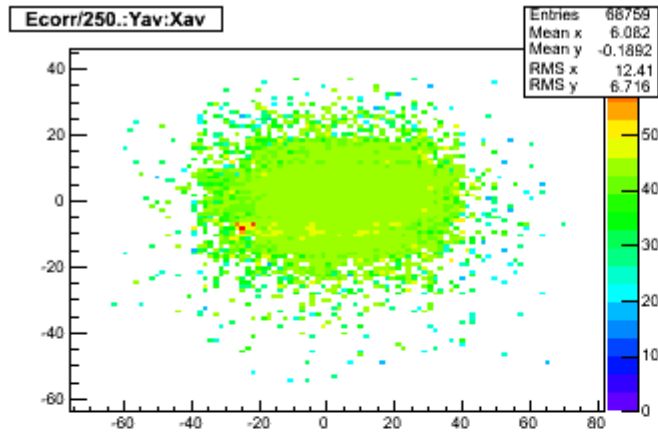
Gaps. Global correction?

1.-Etot/250./45.:Yav {Xav>-11&&Xav<21}

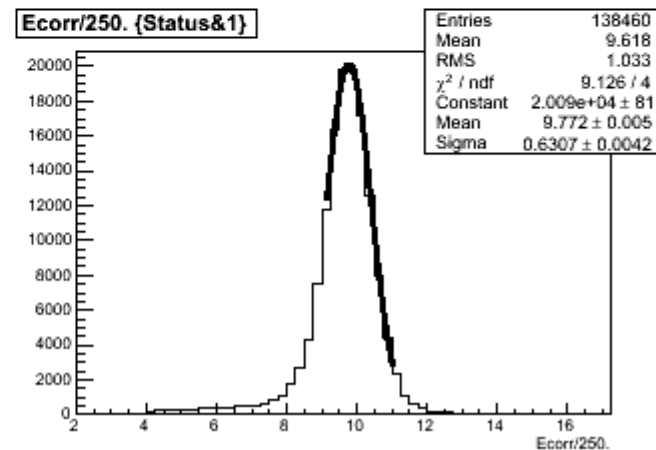
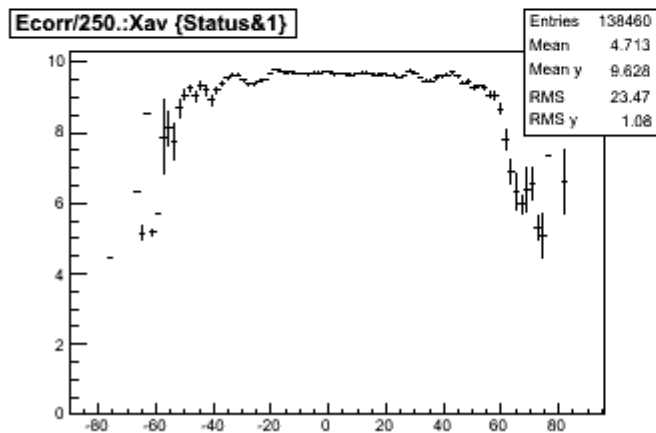
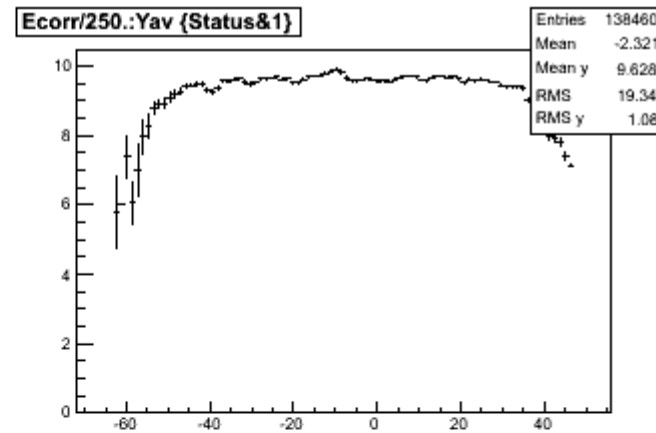
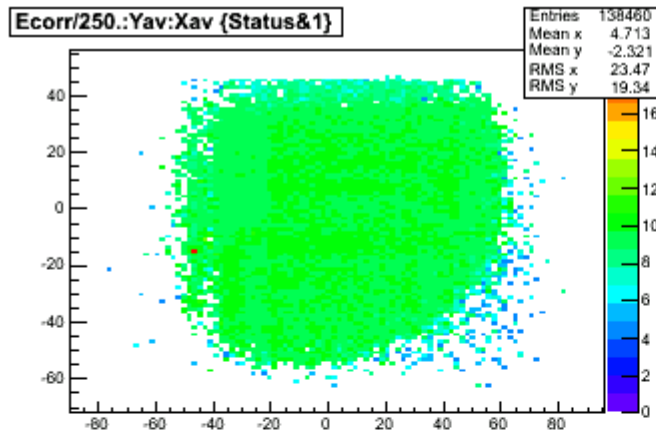


- Method suggested by Clermont group.
- Fractional energy lost in gap vs $y_{\text{barycentre}}$
- Parametrise with (universal) Gaussian and correct.
- Likewise vs x .
- Problem – distribution not well simulated by MC.

After global correction 45 GeV

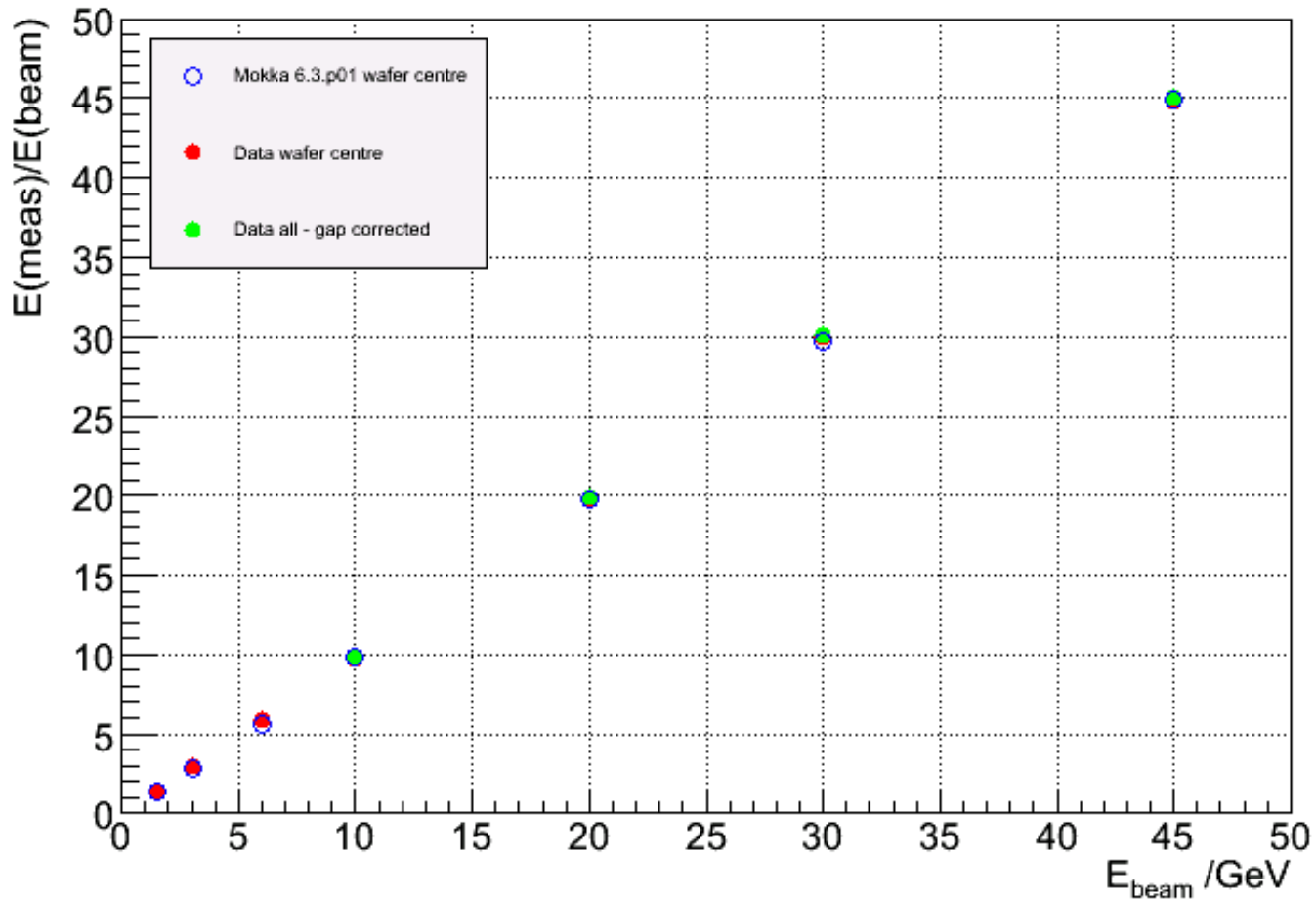


After global correction 10 GeV



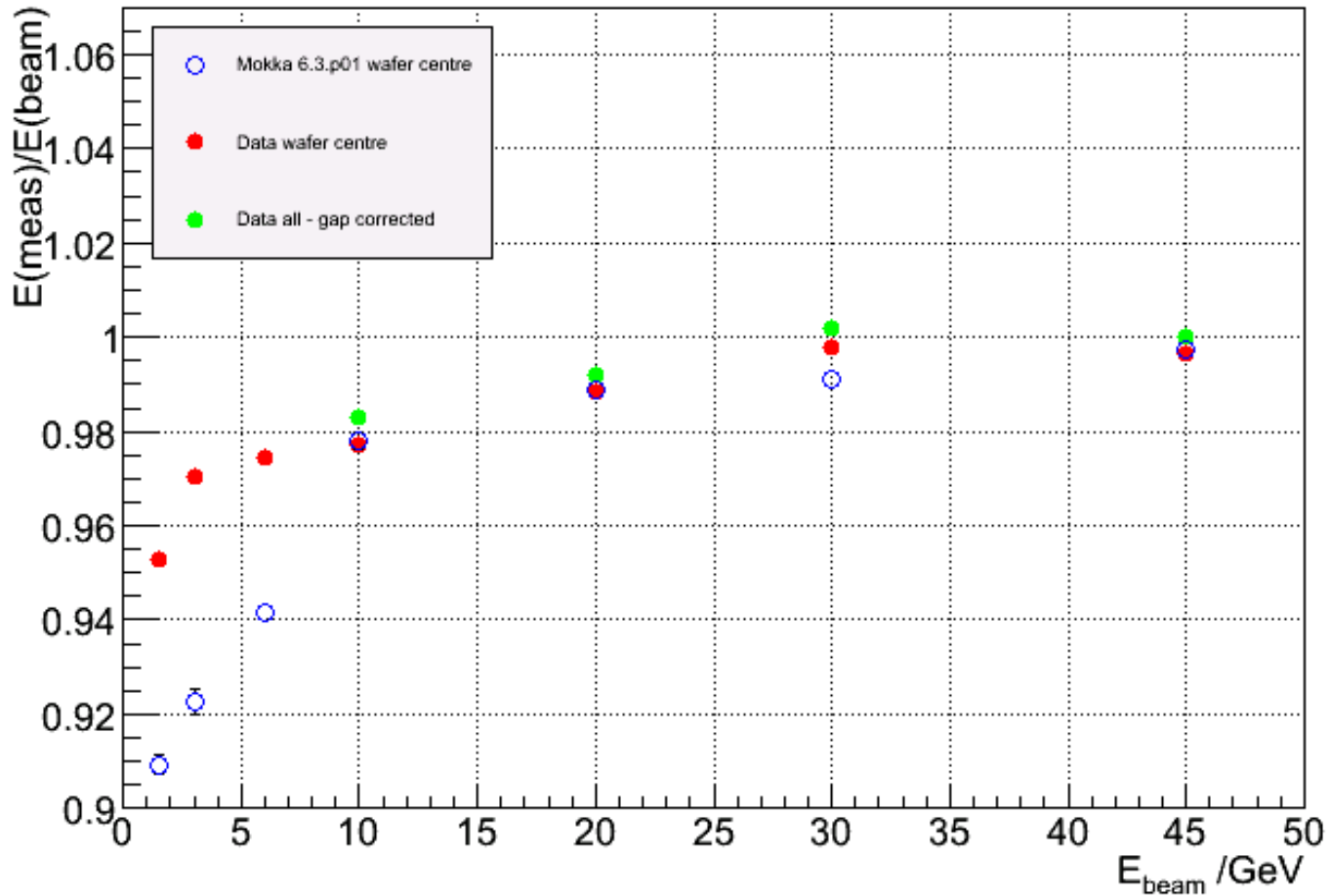
Linearity

Linearity



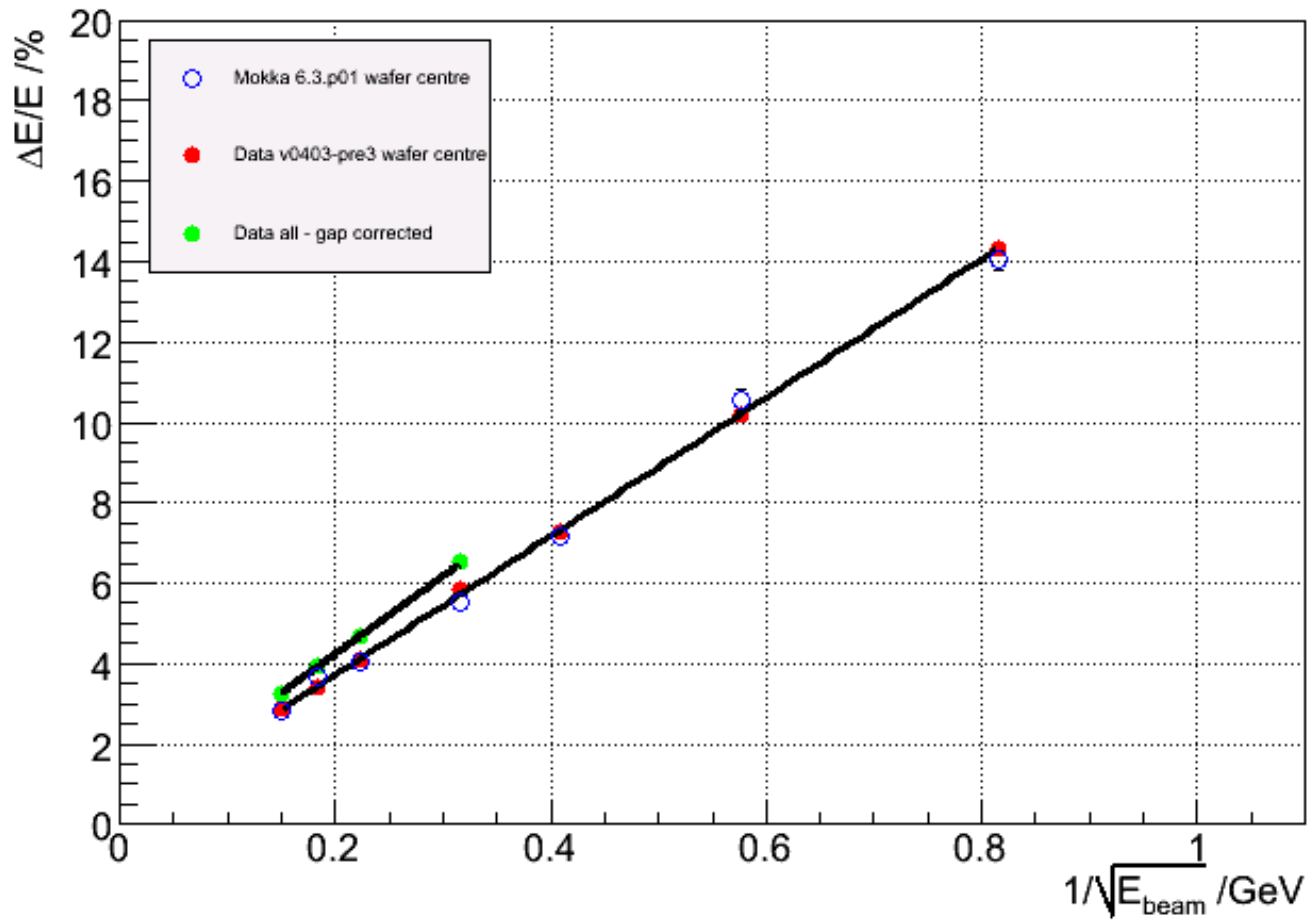
Linearity

Linearity



Resolution

Resolution



Summary

- Time getting very tight to have results for LCWS.
- Reconstructed files still have problems, but are usable for many purposes, for the ECAL.
- HCAL reconstruction progressing, but still not usable by non-experts.
- Change of coordinate system still not sorted out properly.
- Mokka seems in reasonable shape, even before digitization.
- Far too few people looking at data.