A quick look at May'06 data

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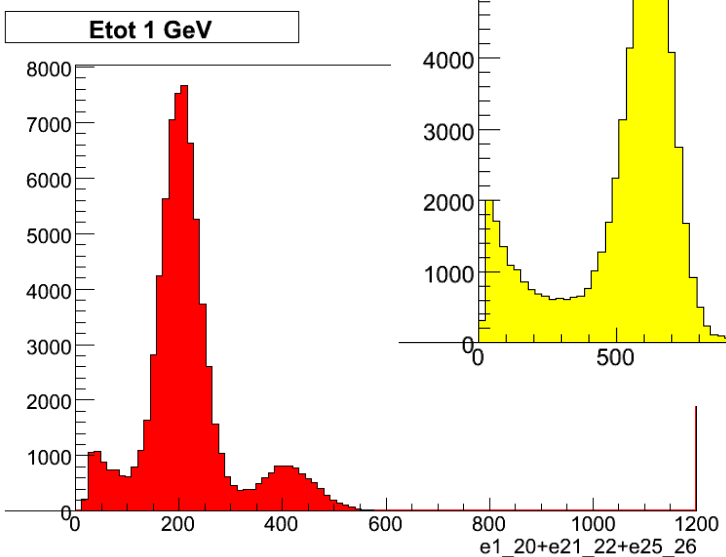
- Look at reconstructed data files.
- First comparisons with Monte Carlo

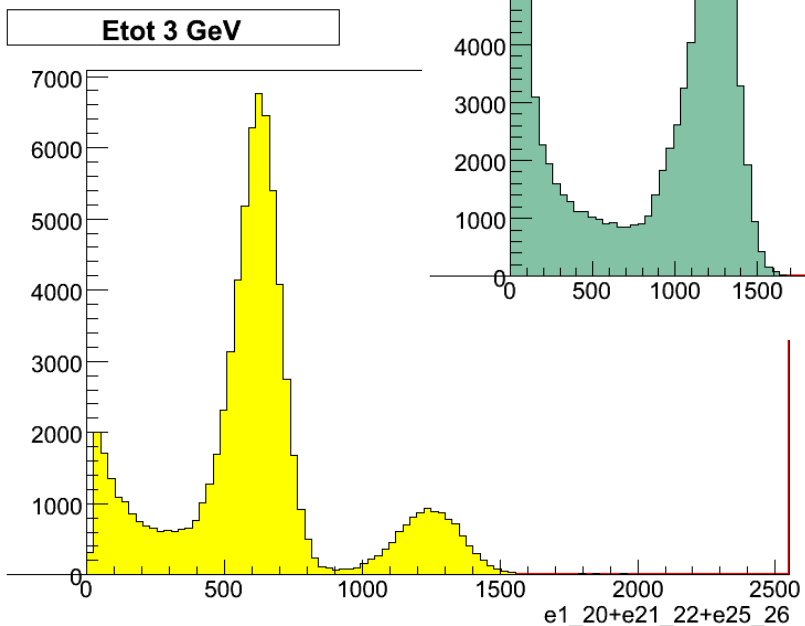
DESY running May'06

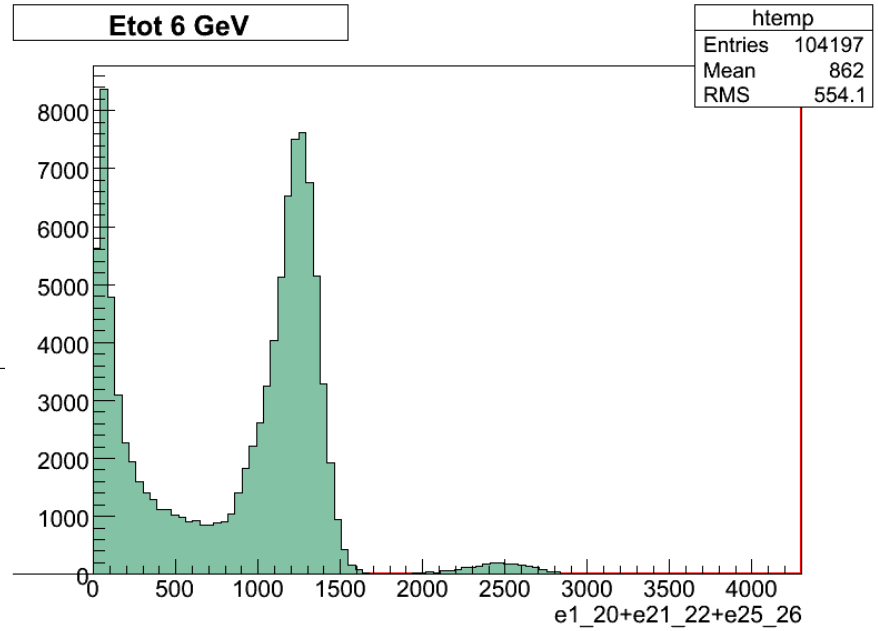
- ECAL electron data recorded 1-6 GeV at 4 beam positions, angles from 0 to 45^{o}
- Data were converted to "raw LCIO" routinely. All stored at DESY dCache and accessible via Grid tools.
- "Reconstruction job" was run on all the useful data. Code mainly from Götz. This performed the following steps:
  - ECAL mapping applied – hit indices and positions.
  - Pedestal calculation and subtraction.
  - Zero suppression (S/N>5)
  - Trigger information is stored in event header, to flag pedestal, calibration, beam data etc. Peds and calib data still included in the output stream.
  - No gain correction – no cosmic calibration data available. LCIO CalorimeterHits are in ADC counts.
  - No Drift Chamber reconstruction. Raw data are copied.
- Monte Carlo issues:
  - Stagger of slab positions was changed in 2006. This has been fixed in Mokka (new model TBDesy0506). But not consistent with reconstructed data files.
  - New layout of upstream detectors – F.Salvatore has implemented these in Mokka.

Total raw energy

- Apply naïve 50ADC=1MIP gain correction for all channels.
- Look at 1, 3, 6 GeV electrons at normal incidence.
- Much less clean than 2005. Proportion of junk increases with energy

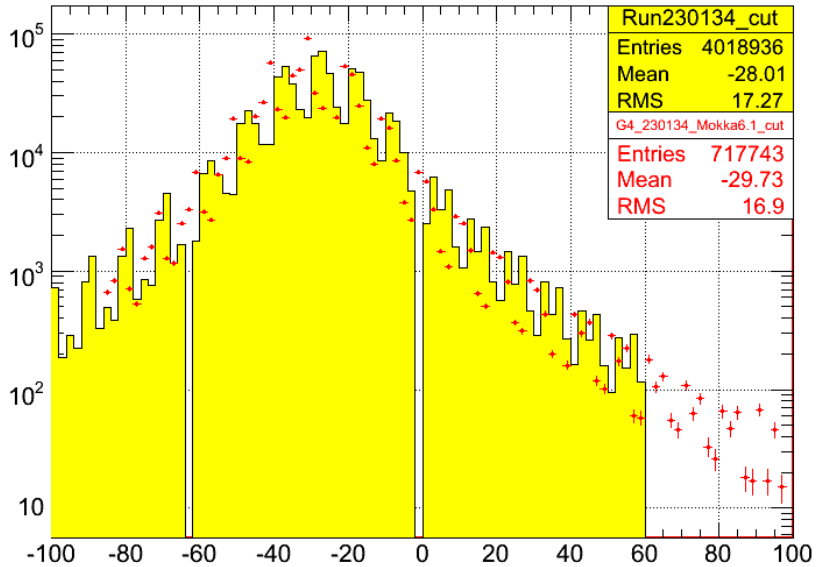




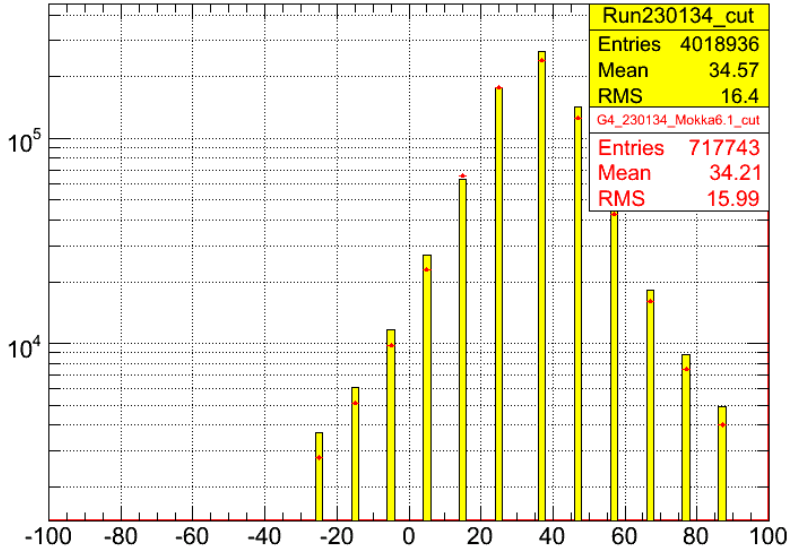


Monte Carlo

x Ecal > Thresh

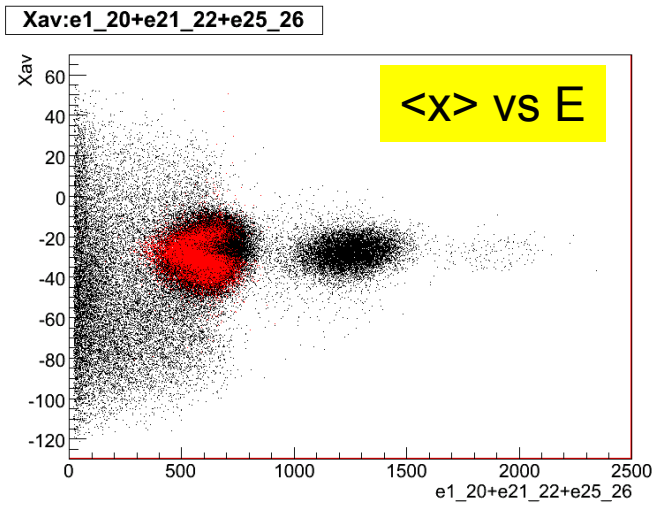


y Ecal > Thresh

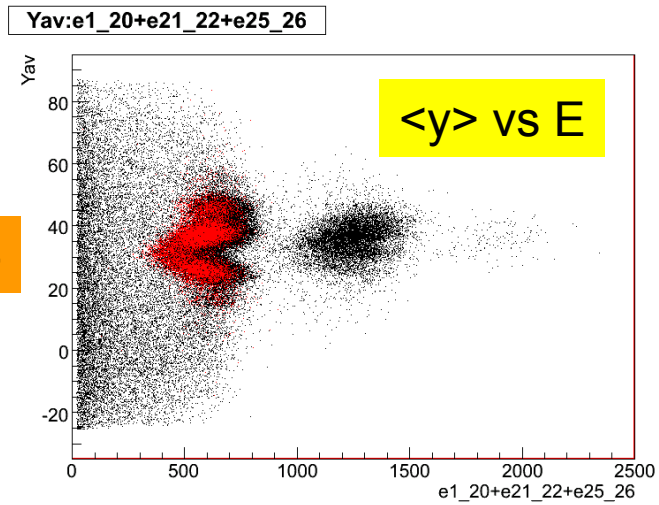


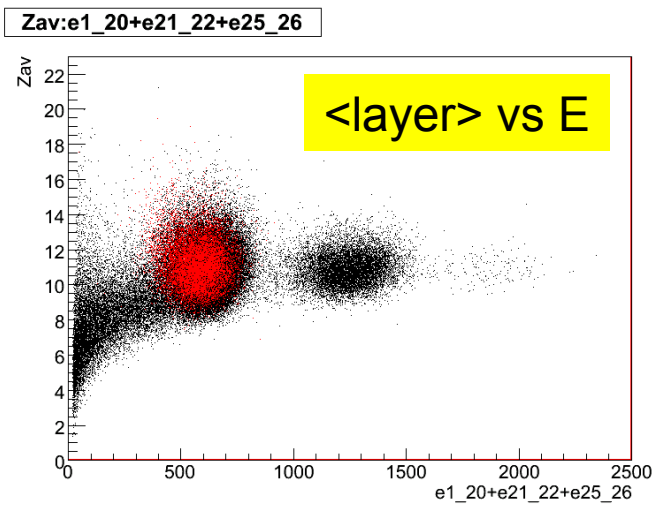
- Warning - cell positions in data/MC don't agree at present. Overall displacement in x by ~30mm. Layer-to-layer stagger goes in the opposite direction in data/MC.
- Götz/Gabriel aware and working to rectify this.

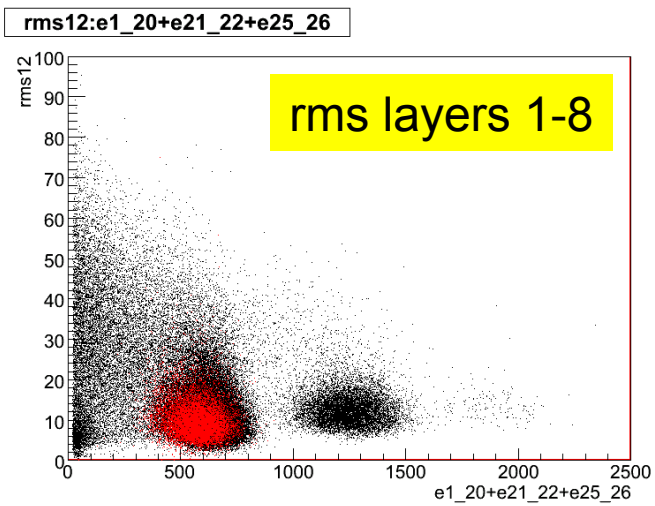
Separation of junk from signal?



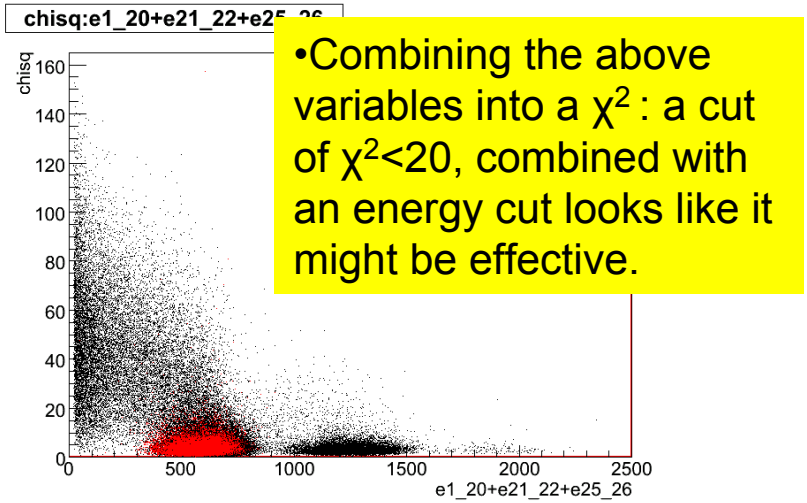
3 GeV e-



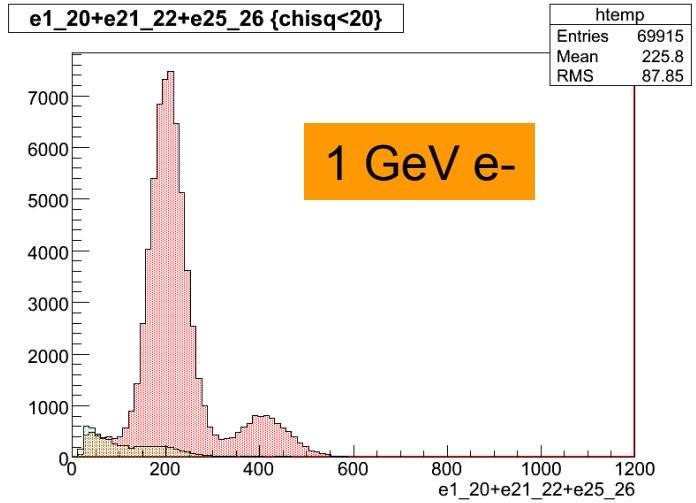


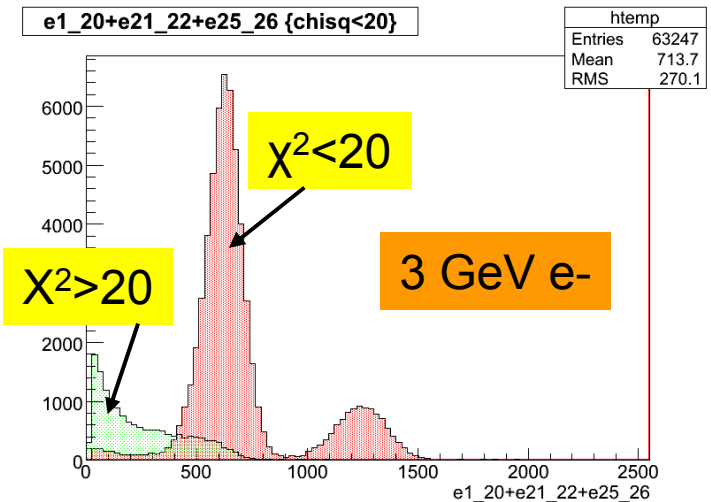


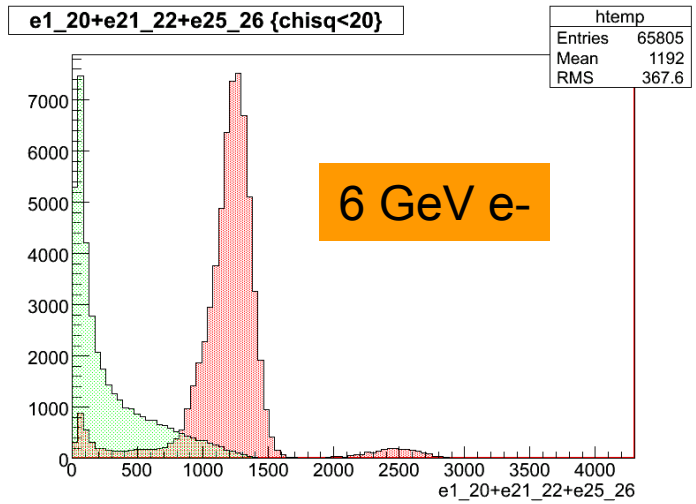
Possible separation of junk?



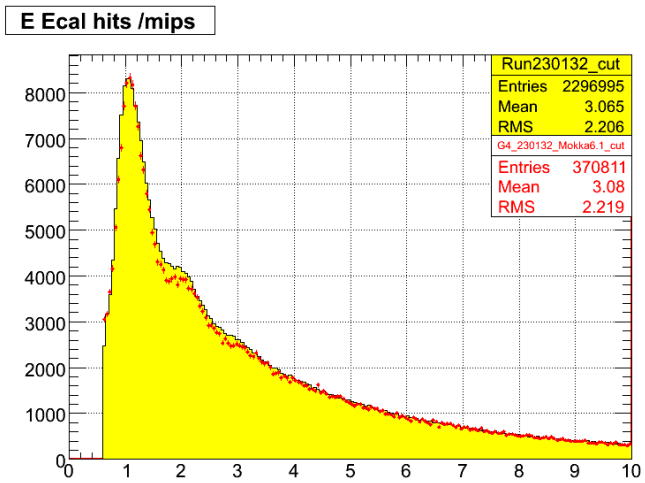
•Combining the above variables into a χ^2 : a cut of χ^2<20, combined with an energy cut looks like it might be effective.

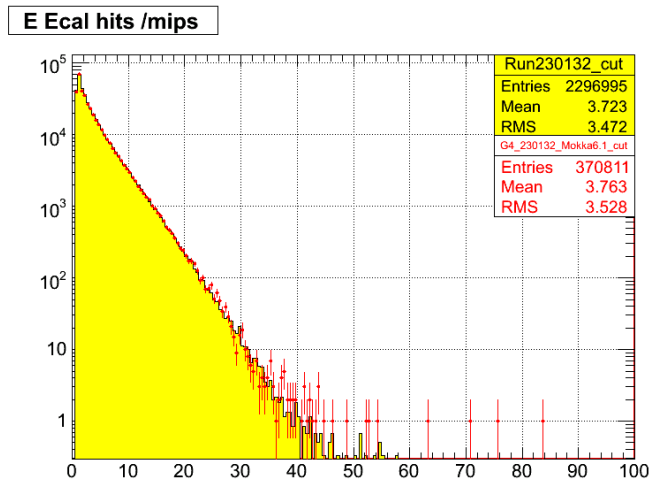






1 GeV


E Ecal hits /mips
Run230132_cut
Entries 2296995
Mean 3.065
RMS 2.206
G4_230132_Mokka6.1_cut
Entries 370811
Mean 3.08
RMS 2.219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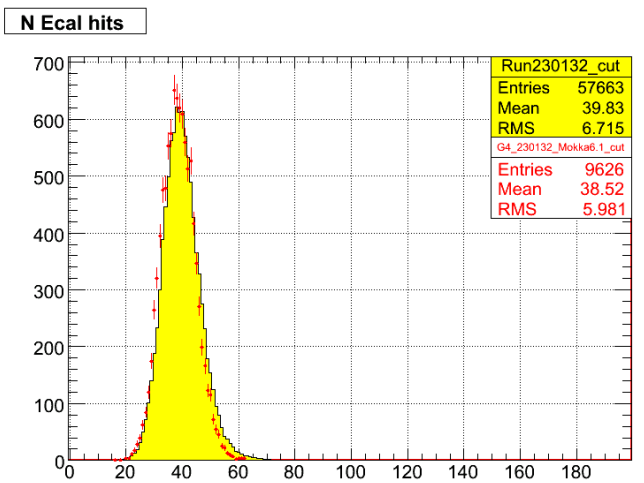
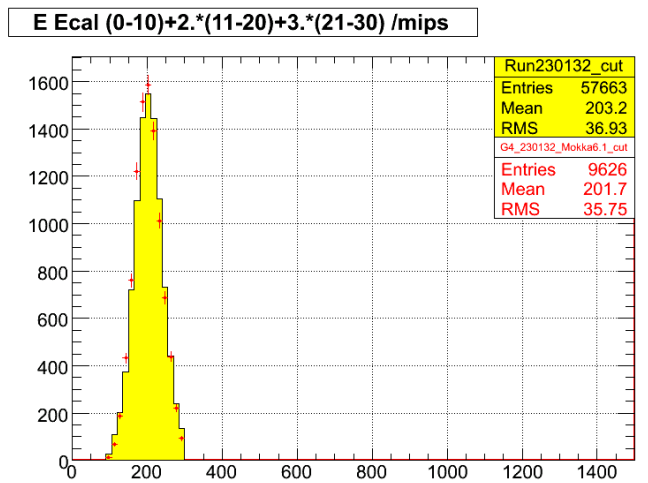
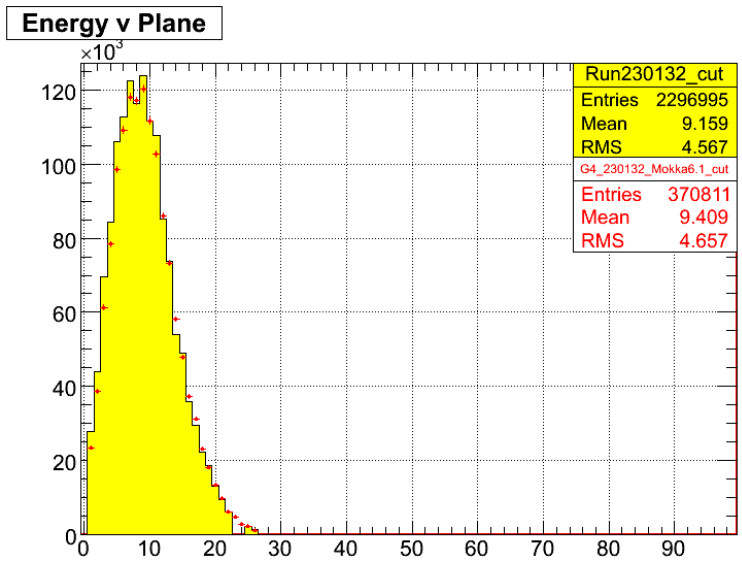
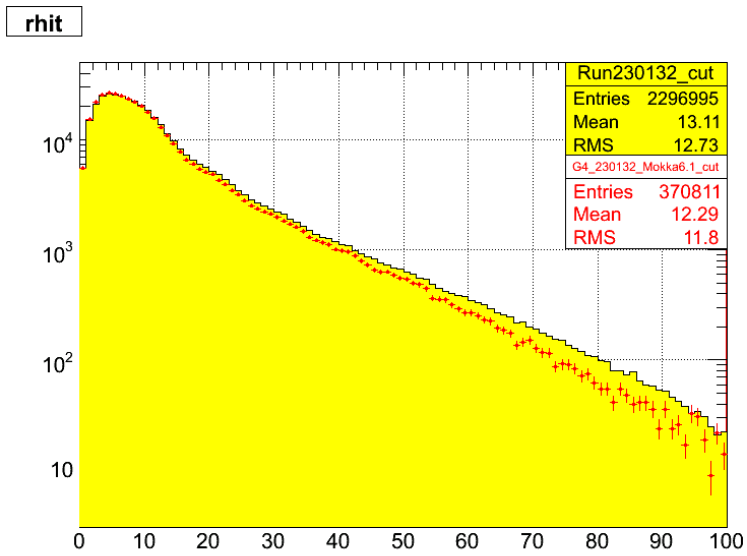
RMS 3.472
G4_230132_Mokka6.1_cut
Entries 370811
Mean 3.763
RMS 3.528


N Ecal hits
Run230132_cut
Entries 57663
Mean 39.83
RMS 6.715
G4_230132_Mokka6.1_cut
Entries 9626
Mean 38.52
RMS 5.981


E Ecal (0-10)+2.*(11-20)+3.*(21-30) /mips
Run230132_cut
Entries 57663
Mean 203.2
RMS 36.93
G4_230132_Mokka6.1_cut
Entries 9626
Mean 201.7
RMS 35.75

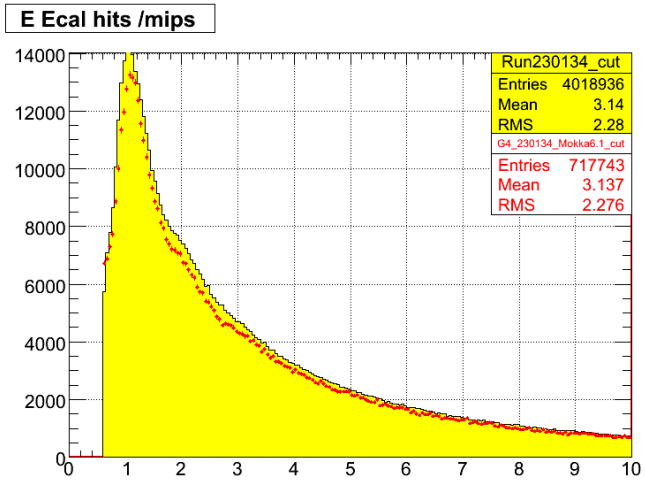
1 GeV

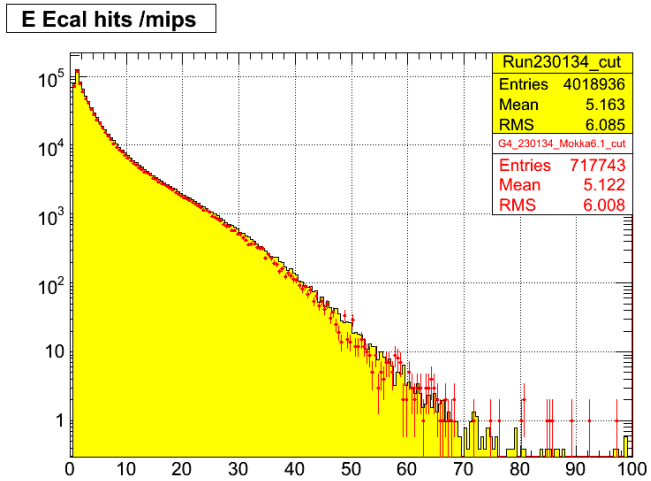




- Generally quite reasonable agreement.
- Data show some excess in earlier layers, and at large transverse distances – residual background?

3 GeV


E Ecal hits /mips
Run230134_cut
Entries 4018936
Mean 3.14
RMS 2.28
G4_230134_Mokka6.1_cut
Entries 717743
Mean 3.137
RMS 2.276


E Ecal hits /mips
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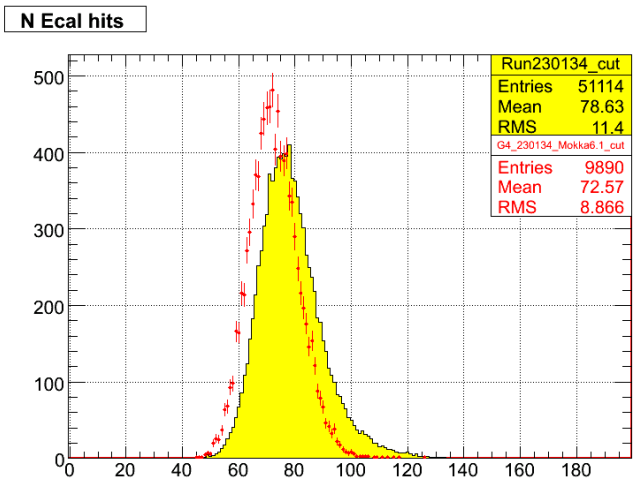
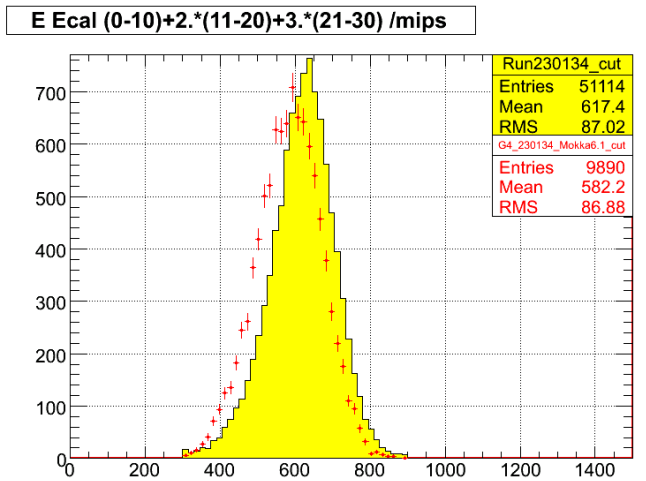
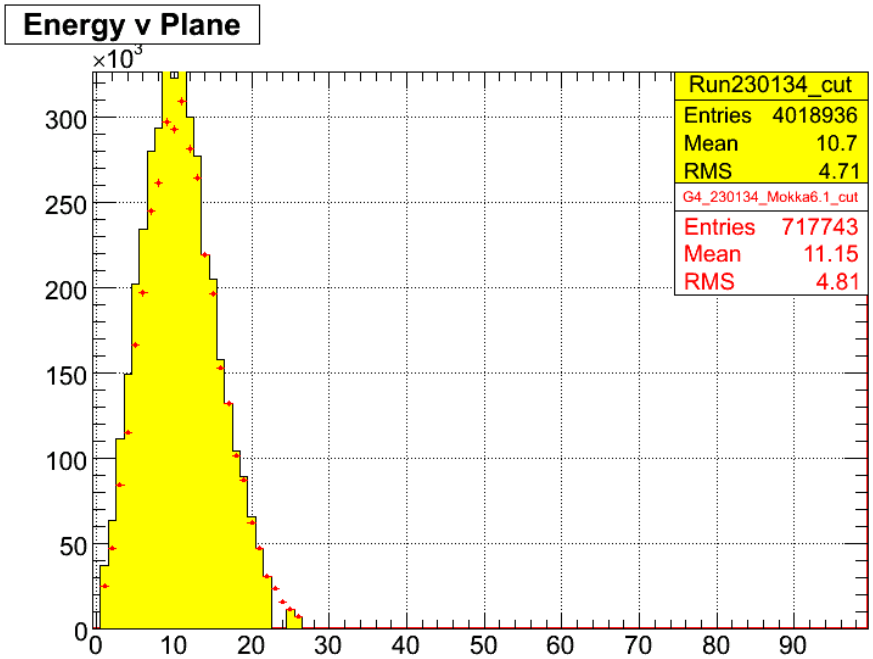
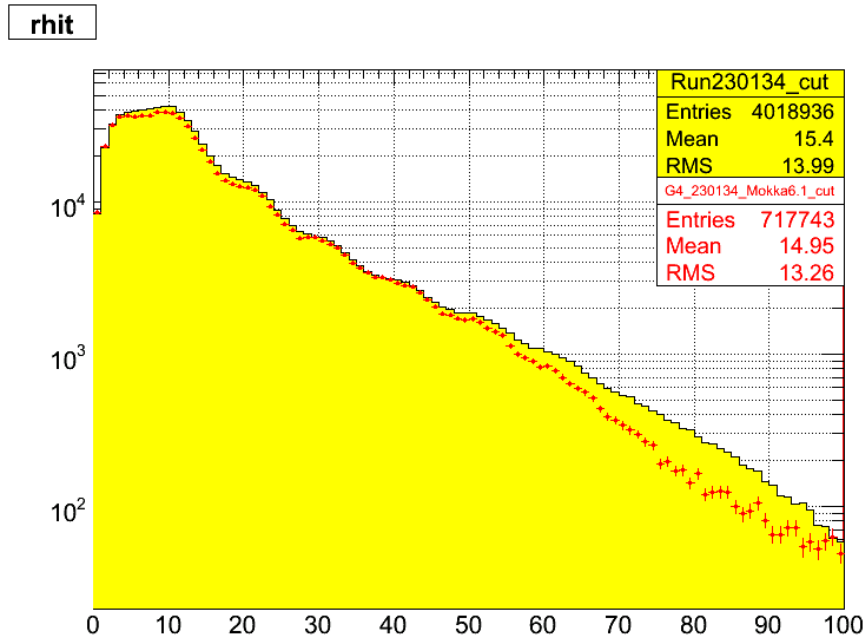
Entries 4018936
Mean 5.163
RMS 6.085
G4_230134_Mokka6.1_cut
Entries 717743
Mean 5.122
RMS 6.008


N Ecal hits
Run230134_cut
Entries 51114
Mean 78.63
RMS 11.4
G4_230134_Mokka6.1_cut
Entries 9890
Mean 72.57
RMS 8.866


E Ecal (0-10)+2.*(11-20)+3.*(21-30) /mips
Run230134_cut
Entries 51114
Mean 617.4
RMS 87.02
G4_230134_Mokka6.1_cut
Entries 9890
Mean 582.2
RMS 86.88

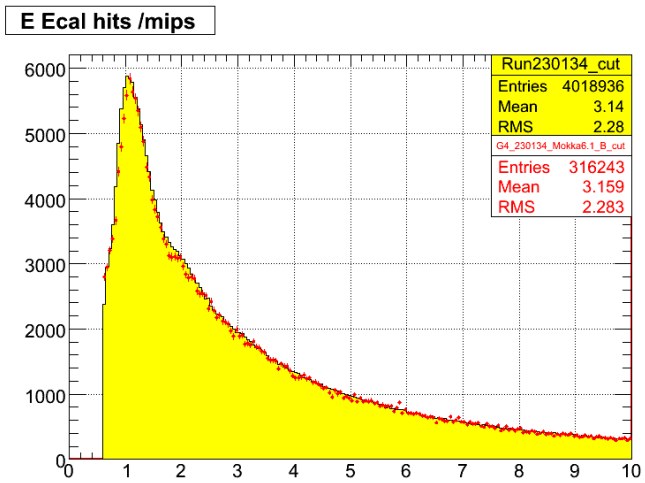
3 GeV

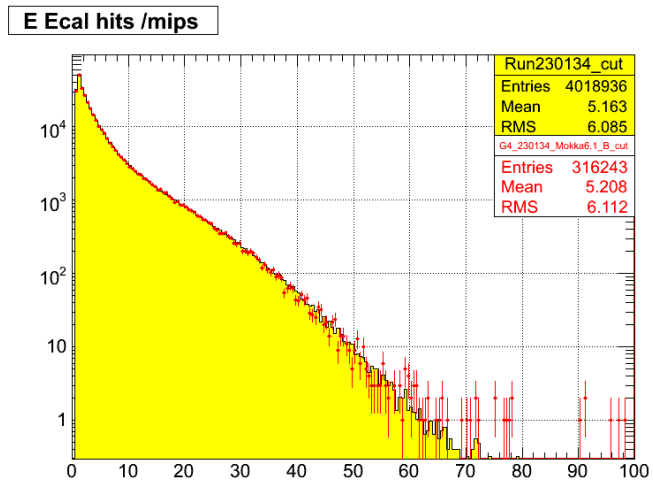


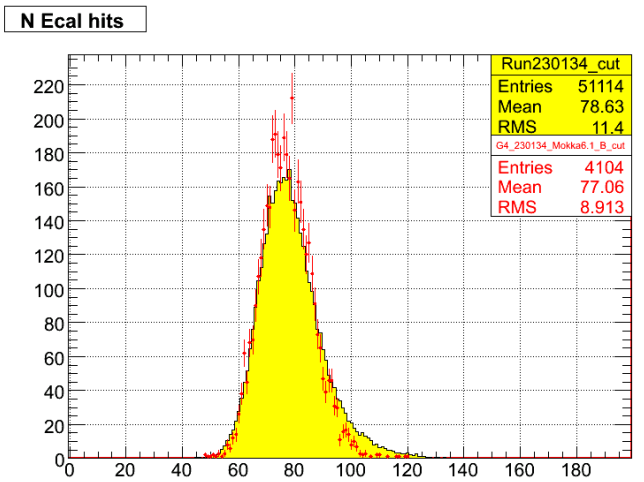


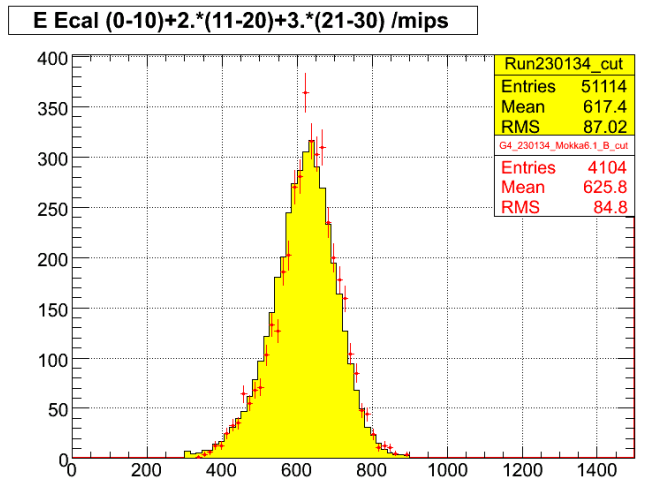
- Much less good than at 1 GeV.
- More residual background in selected sample?
- Maybe partially caused by geometry mismatch also? Check this by moving the beam to correspond to roughly correct relative position…

3 GeV (shifted beam)

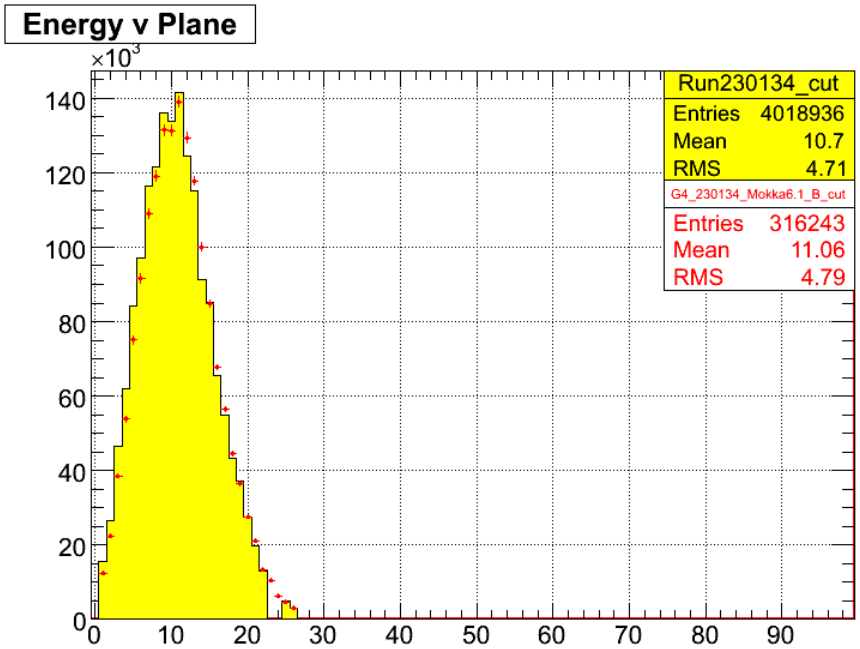


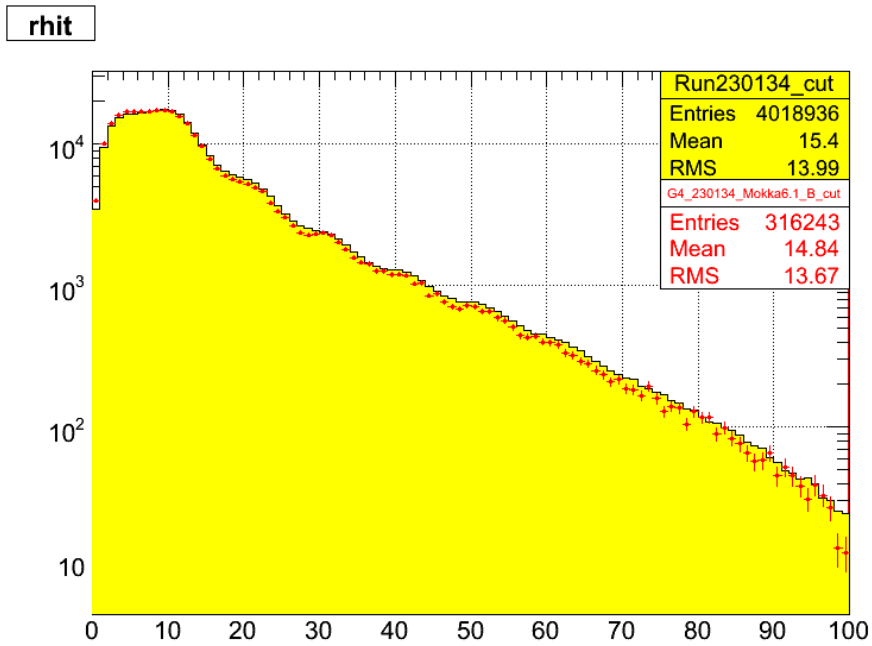






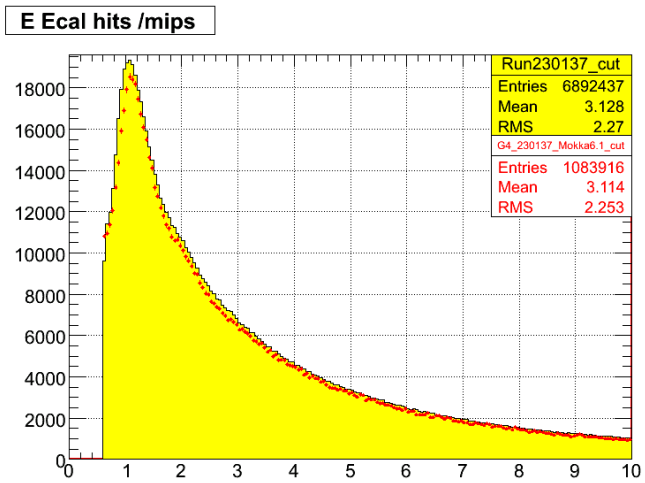
3 GeV (shifted beam)

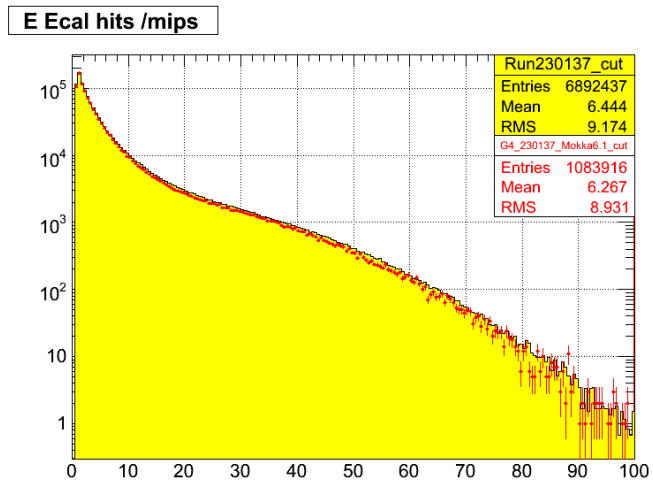


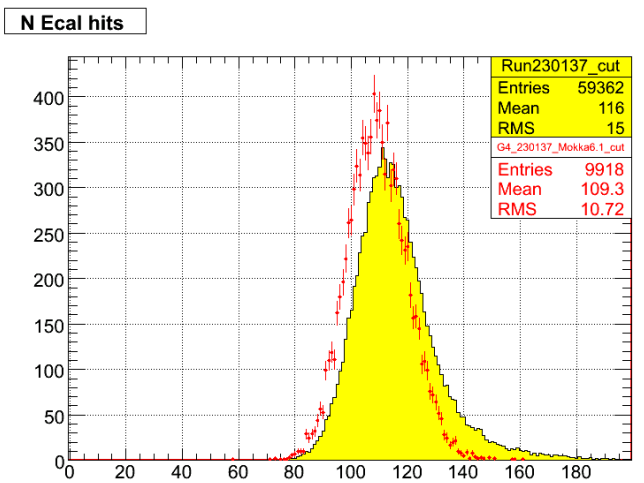


- Much better
- i.e. results are quite sensitive to getting the geometry correct.
- Still some discrepancies (e.g. Nhit distribution; longitudinal distribution a little deeper in MC than data (upstream material?)

6 GeV


E Ecal hits /mips
Run230137_cut
Entries 6892437
Mean 3.128
RMS 2.27
G4_230137_Mokka6.1_cut
Entries 1083916
Mean 3.114
RMS 2.253


E Ecal hits /mips
Run230137_cut
Entries 6892437
Mean 6.444
RMS 9.174
G4_230137_Mokka6.1_cut
Entries 1083916
Mean 6.267
RMS 8.931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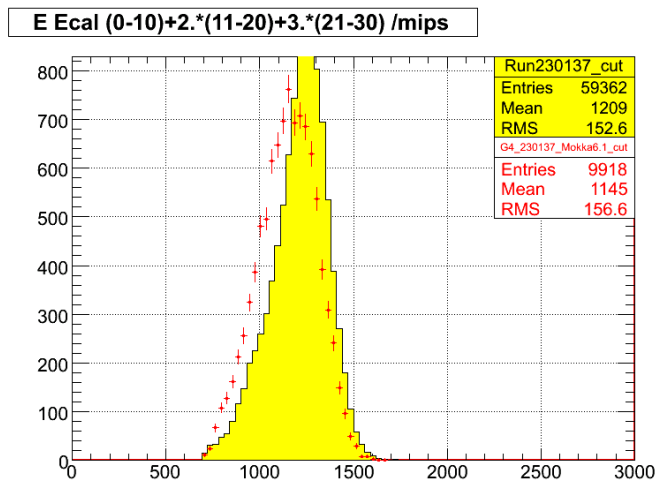
Run230137_cut
Entries 59362
Mean 116
RMS 15
G4_230137_Mokka6.1_cut
Entries 9918
Mean 109.3
RMS 10.72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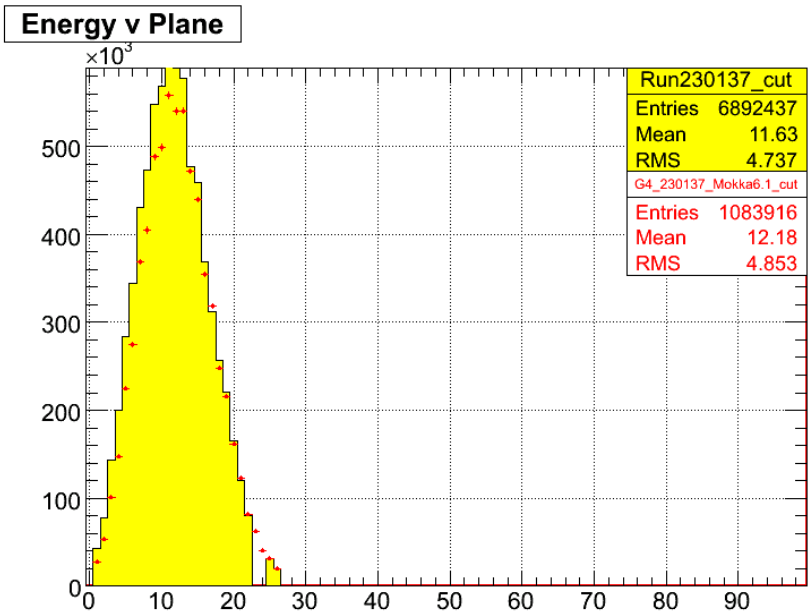
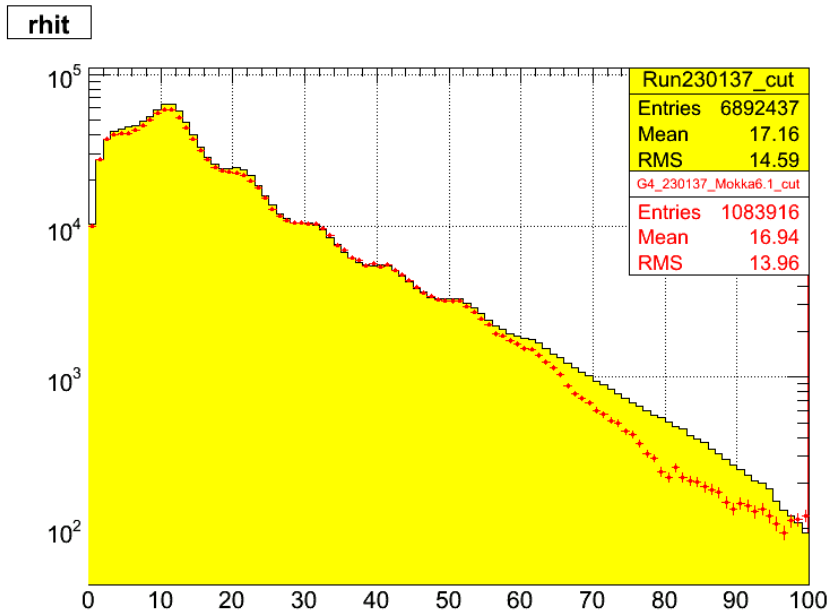
Run230137_cut
Entries 59362
Mean 1209
RMS 152.6
G4_230137_Mokka6.1_cut
Entries 9918
Mean 1145
RMS 156.6

6 GeV





- Much the same features as at 3 GeV.
- Longitudinal tail of shower quite well modelled, but data shows excess hits/energy, mainly at early planes and high radius.
- Here I haven't yet fixed the beam position correctly – guess this is the main problem.

Summary

- Still work in progress.
- Clear that the beam is dirtier than in 2005; more multiple beam particles; accompanied by low energy stuff.
- Quite some work needed to get a clean and unbiassed sample of electrons.
- Maybe get useful info from upstream detectors?
- No calibrations yet; not clear that this is much of a problem up to now.
- Work needed to ensure compatibility between data and MC geometry. Results quite sensitive to this.
- Just starting to get some level of agreement between data and MC.