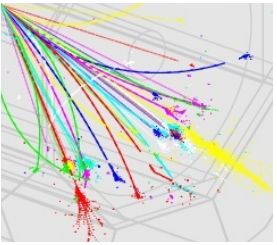
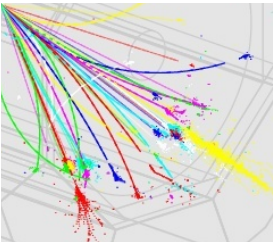


CALICE Meeting

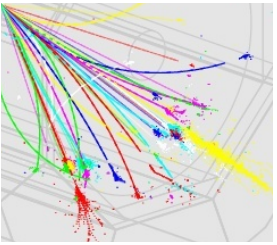
RAL 16.07.2007

M. Stanitzki
J. Ballin



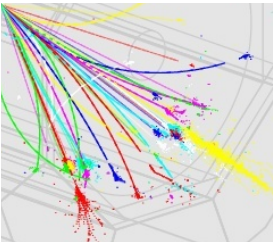
What is on today ?

- Laser <-> DAQ communication
- Tungsten purchases
- DAQ computers
- Pandora Work



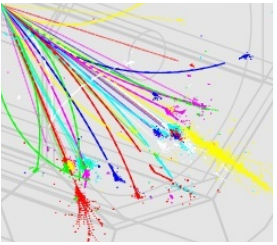
Laser <-> DAQ

- Protocol has been outlined, there is document available
- There will be POSIX-Style Timestamps
- Start putting the LabView pieces together next week



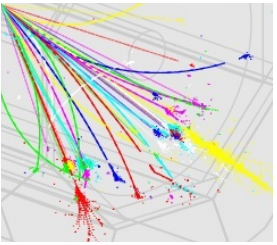
Tungsten

- Got several quotes
  - 1 kg ~ 160-200 US-$
  - Delivery time 30-50 days
- Minimum quantity ~ 5-10 plates
- How many of each do we want ?
  - 100 x 100 x 5 mm
  - 100 x 100 x 10 mm
  - 100 x 100 x 20 mm

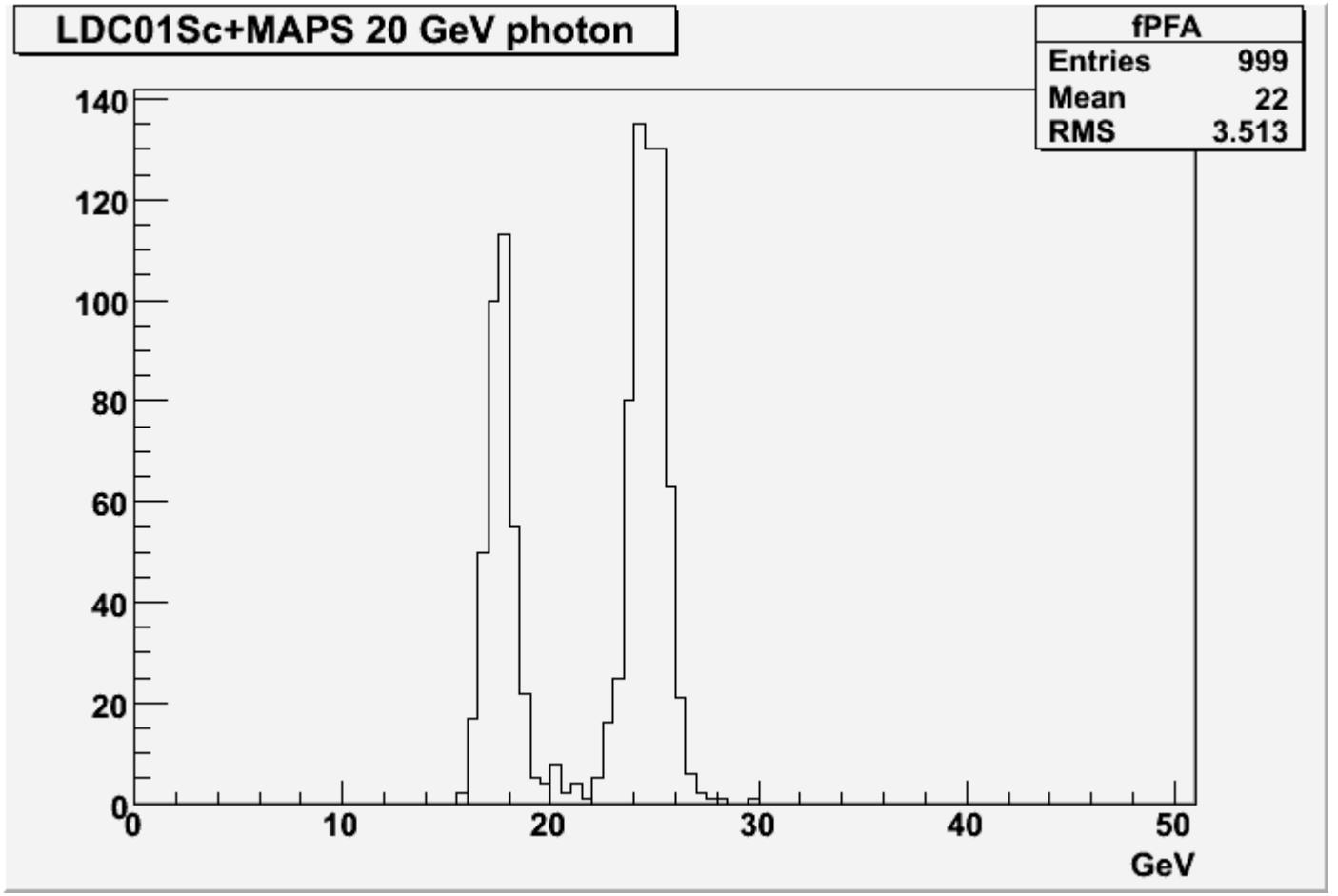


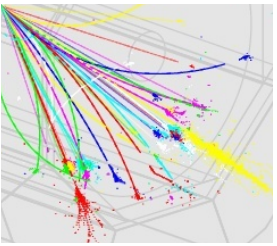
Pandora with AM-Digitze

- Did not work at all
- Several problems found
  - `OrganiseCells::processEvent(EVENT::LCEvent*): Assertion `J[i] > 0' failed.`
  - annoying, so commented it out
- Code was running, but
- Sending a 20 GeV photon yields



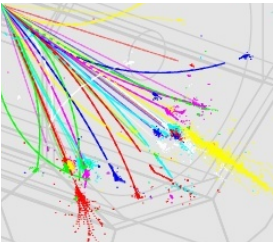
This ...


LDC01Sc+MAPS 20 GeV photon
fPFA
Entries 999
Mean 22
RMS 3.513
140
120
100
80
60
40
20
0
0
10
20
30
40
50
GeV

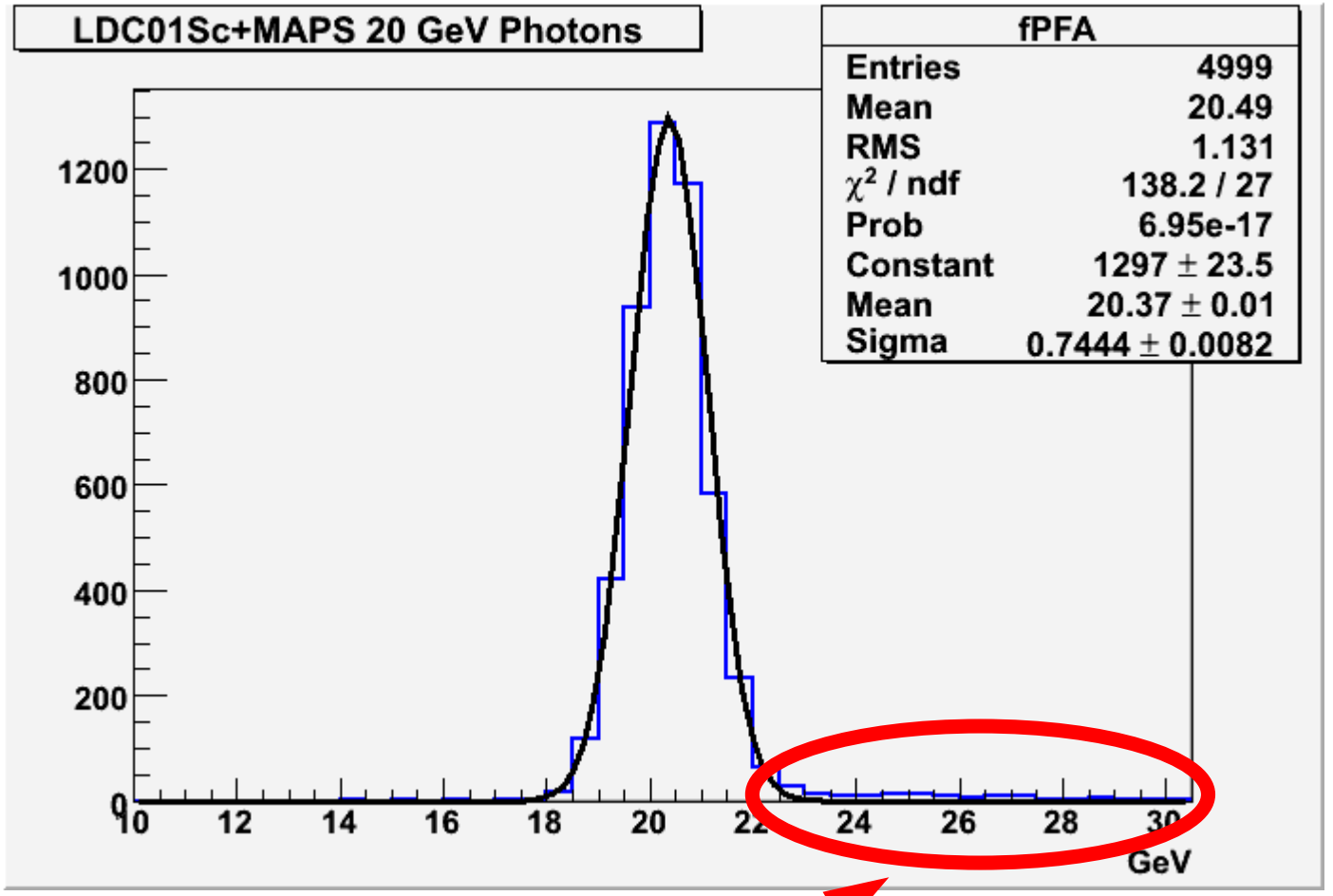


What is happening

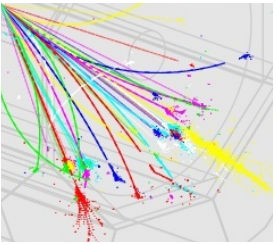
- Looking through the log files
  - Pandora identifies Photons as Hadrons ...
  - `*  HADRON  : 33.7653 (4.69703,1618.99,-7.8224) 1266 3:31+22 20 d0.999964 11.1911 mipf 0.308057 20.5475`
  - This are supposed to be 20 GeV Photons ...
  - Response function for hadronic and em response very different
- Mark and I came to the same conclusion
  - The ParticleID is not really good for MAPS
  - Small adjustment in one cut makes things better (Tested by me and Jamie)
  - Still not optimal ...
  - Needs work ...



Ok, try again

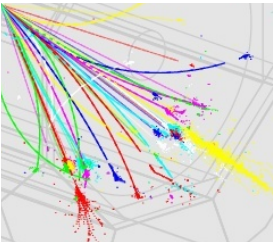


Still some Mis-IDs

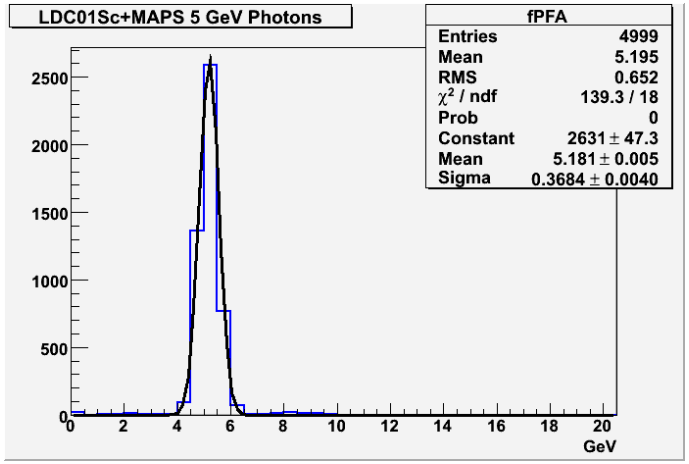


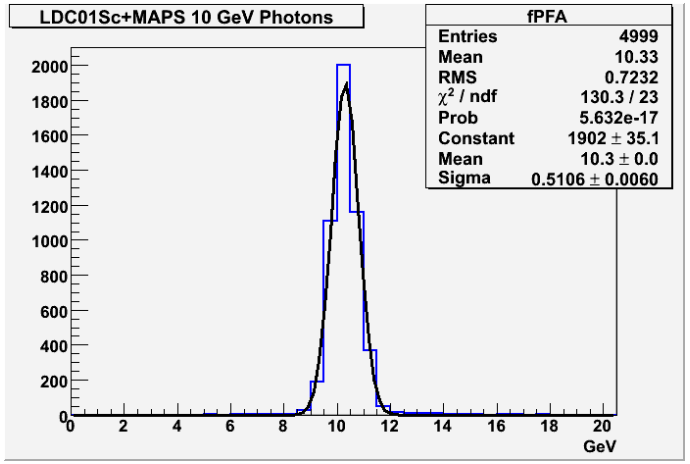
Calibrate Pandora

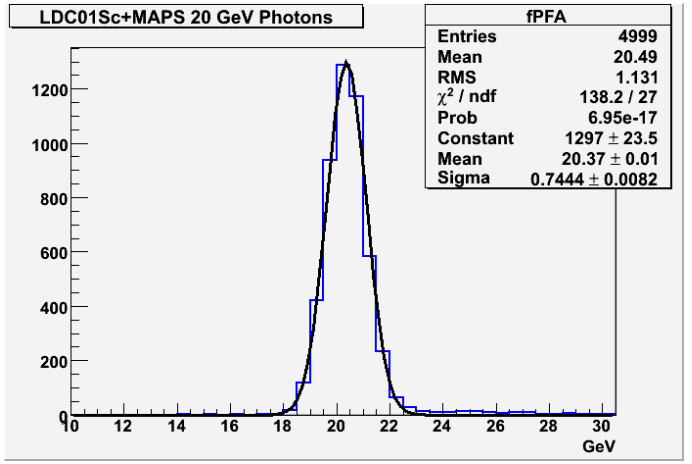
- EM response with Photons 5,10,20 GeV
  - this is easy
- Hadronic response with Neutrons and Anti-Neutrons
  - again 5,10,20 GeV samples
  - more tricky
  - calibrating both ECAL and HCAL
  - certainly not very linear
- Also inverse Problems, Hadrons as Photons ...



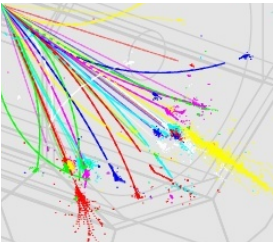
Some Plots



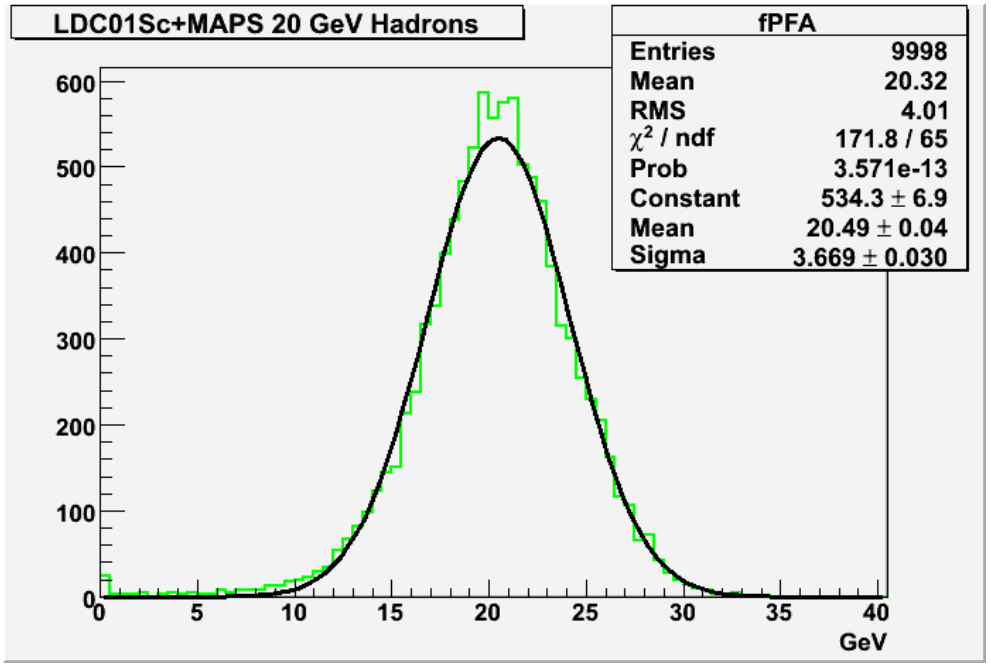


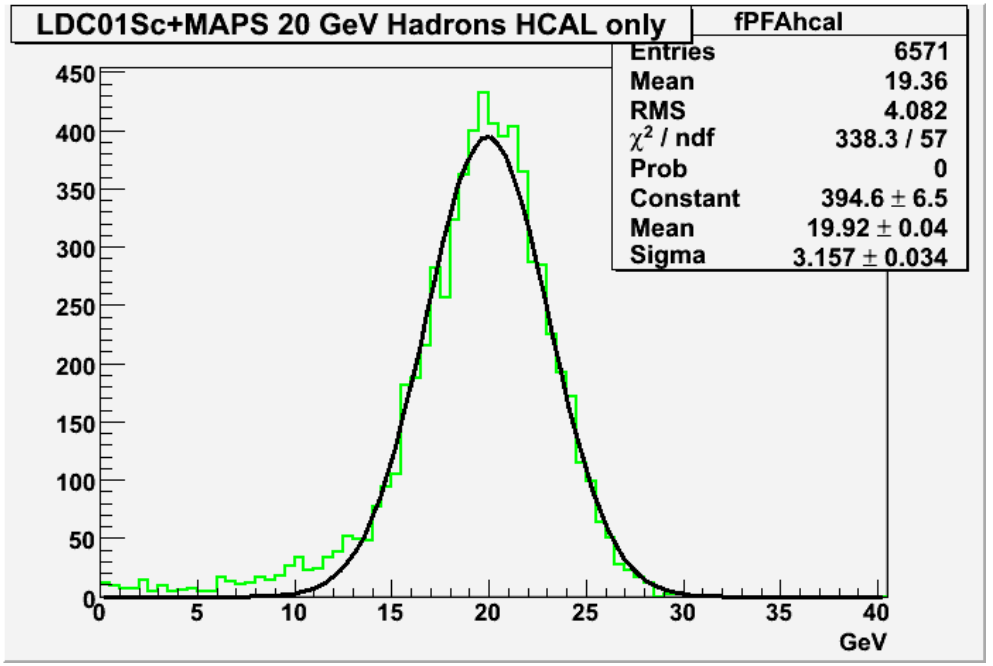


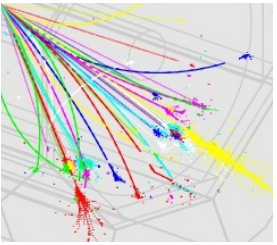
Photons are pretty much spot on already,
may need one more round of calibrations



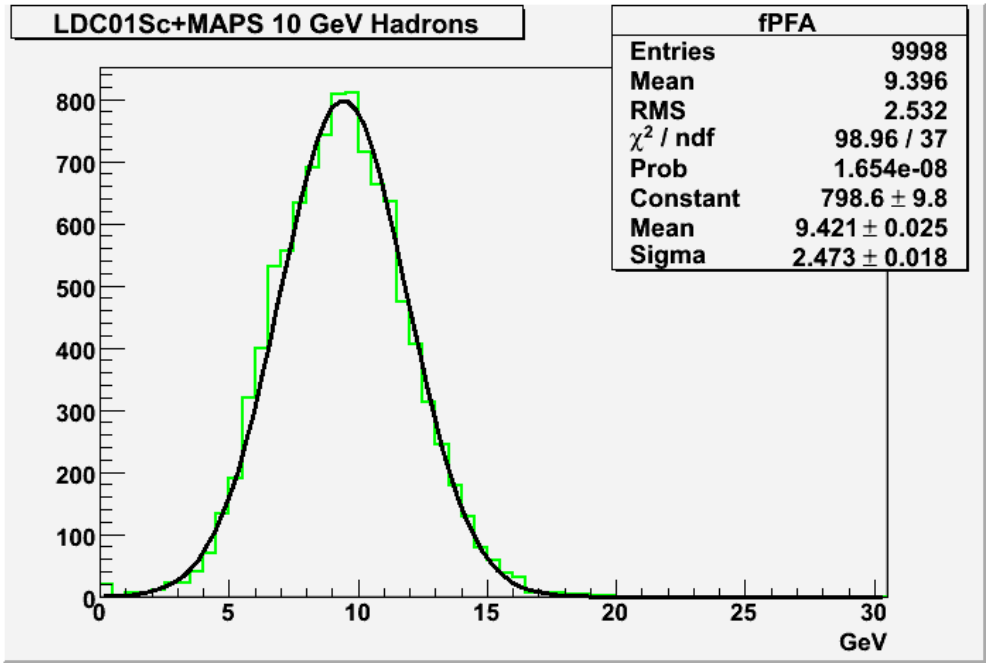
More Plots

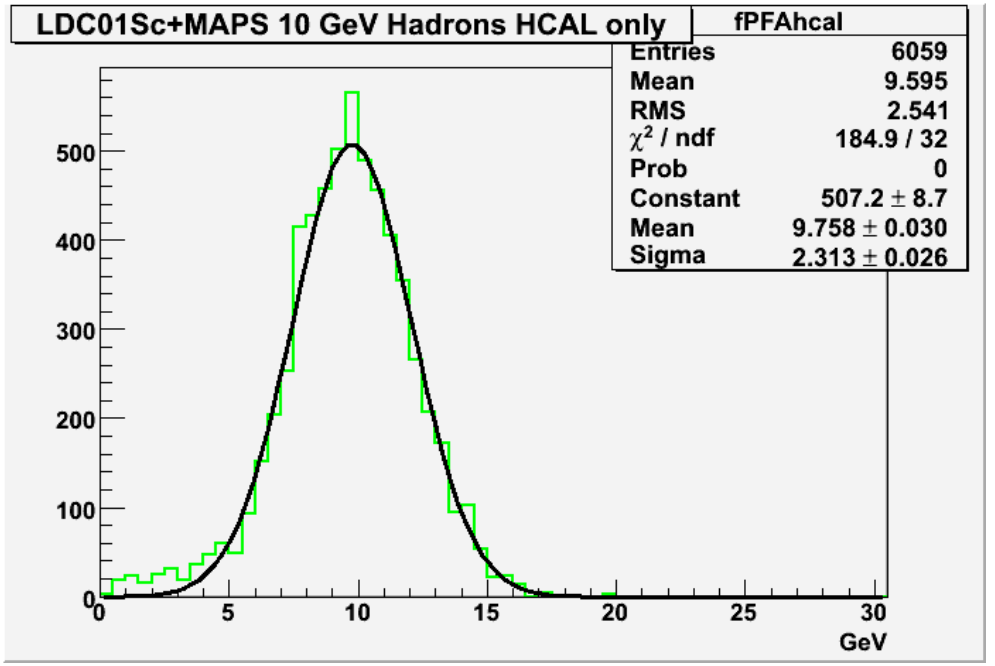

LDC01Sc+MAPS 20 GeV Hadrons
fPFA
Entries 9998
Mean 20.32
RMS 4.01
χ² / ndf 171.8 / 65
Prob 3.571e-13
Constant 534.3 ± 6.9
Mean 20.49 ± 0.04
Sigma 3.669 ± 0.030
600
500
400
300
200
100
0
0 5 10 15 20 25 30 35 40
GeV

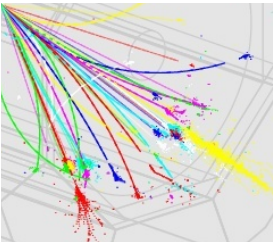

LDC01Sc+MAPS 20 GeV Hadrons HCAL only
fPFAhcal
Entries 6571
Mean 19.36
RMS 4.082
χ² / ndf 338.3 / 57
Prob 0
Constant 394.6 ± 6.5
Mean 19.92 ± 0.04
Sigma 3.157 ± 0.034
450
400
350
300
250
200
150
100
50
0
0 5 10 15 20 25 30 35 40
GeV



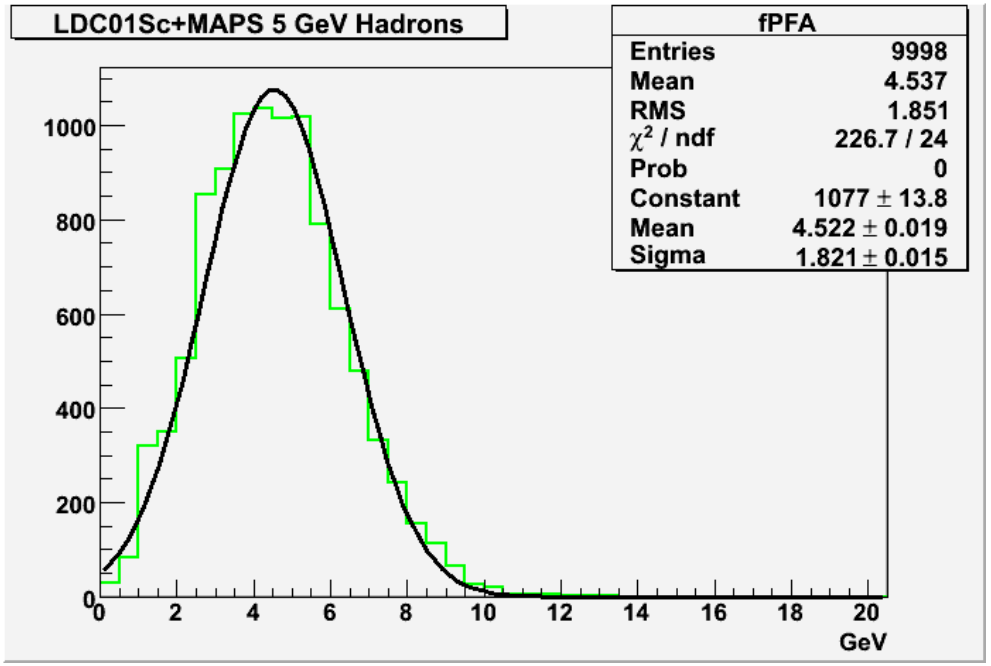
and more

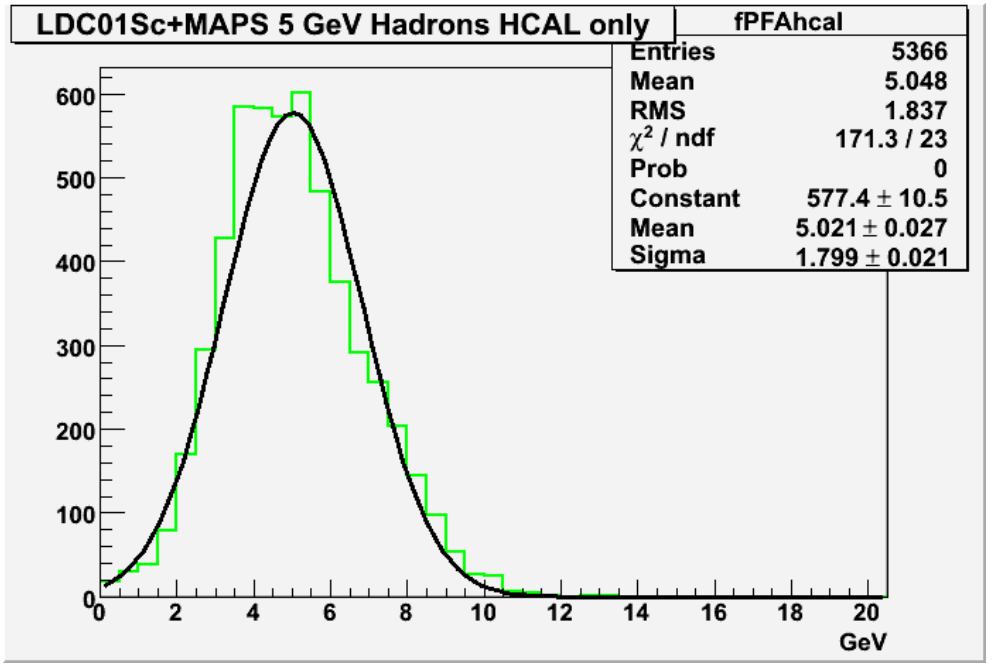

LDC01Sc+MAPS 10 GeV Hadrons
fPFA
Entries 9998
Mean 9.396
RMS 2.532
χ² / ndf 98.96 / 37
Prob 1.654e-08
Constant 798.6 ± 9.8
Mean 9.421 ± 0.025
Sigma 2.473 ± 0.018
GeV


LDC01Sc+MAPS 10 GeV Hadrons HCAL only
fPFAhcal
Entries 6059
Mean 9.595
RMS 2.541
χ² / ndf 184.9 / 32
Prob 0
Constant 507.2 ± 8.7
Mean 9.758 ± 0.030
Sigma 2.313 ± 0.026
GeV

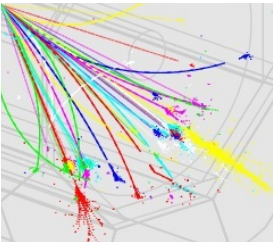


More Plots

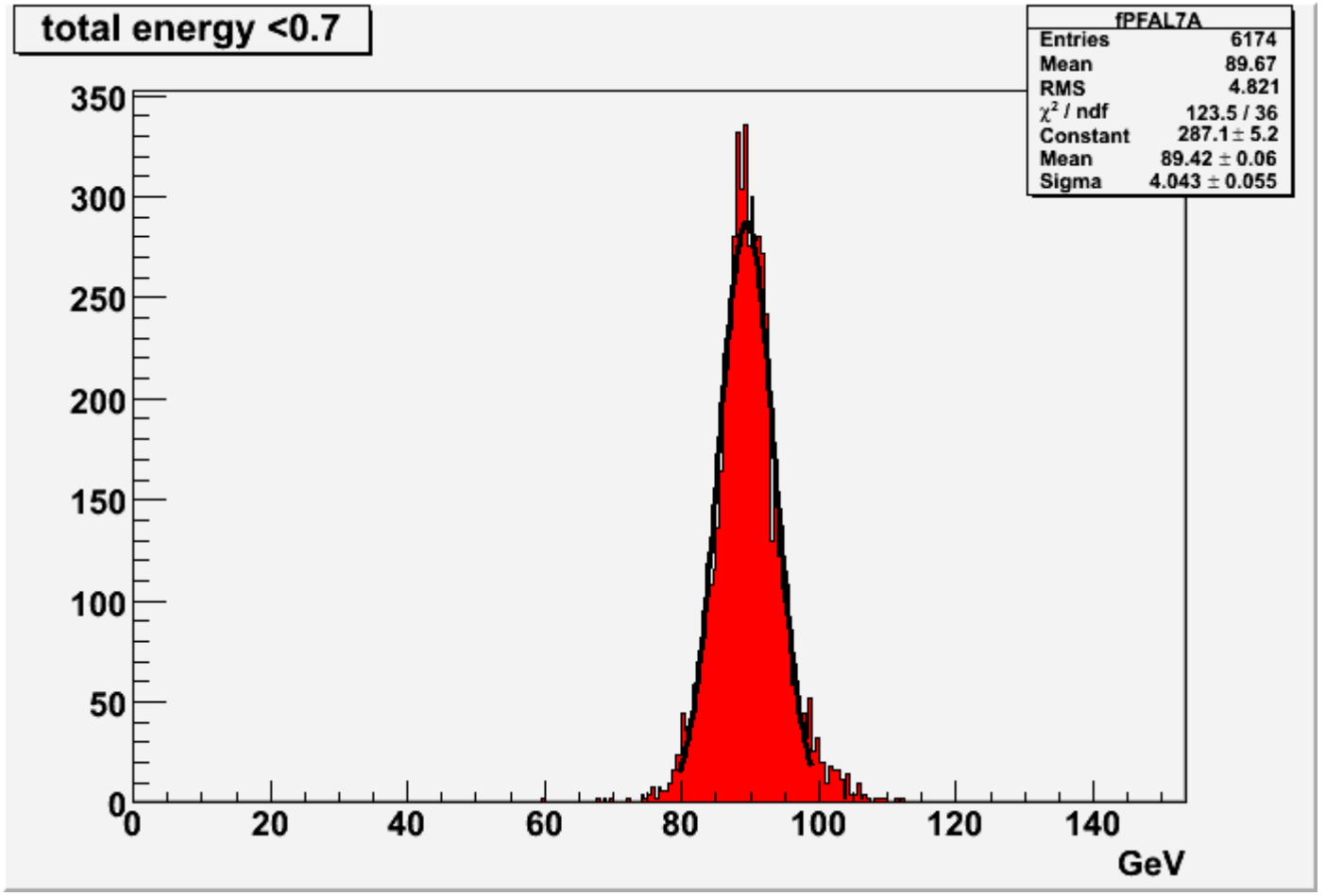




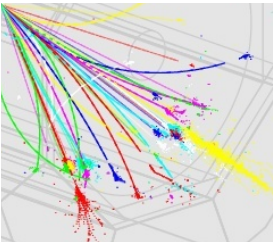
Hadrons are not too bad either, but do need more work



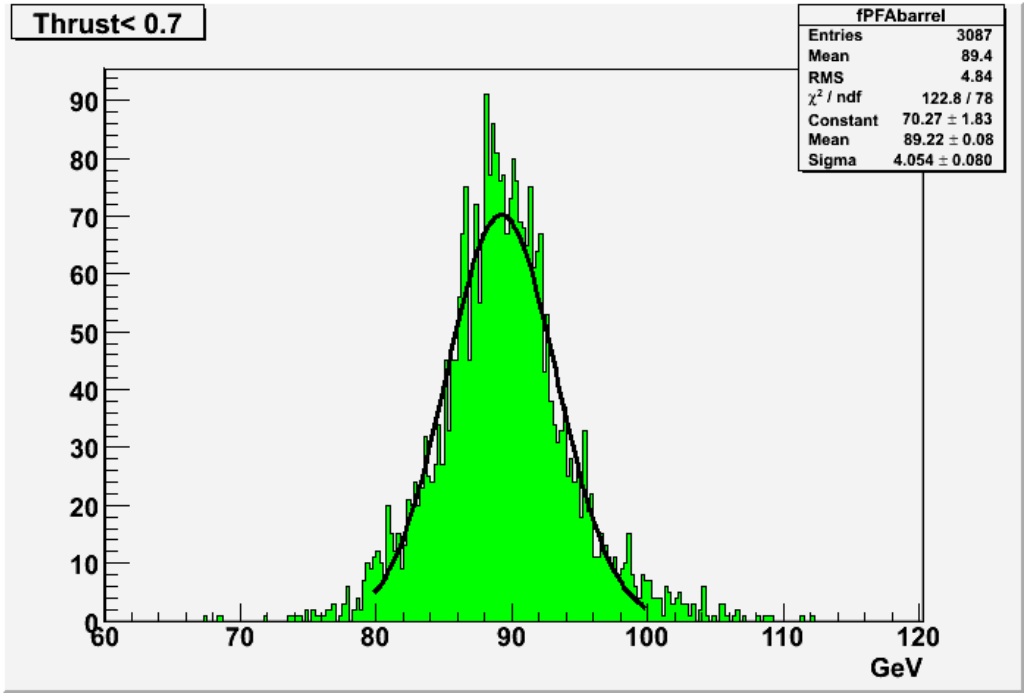
And now to the Z



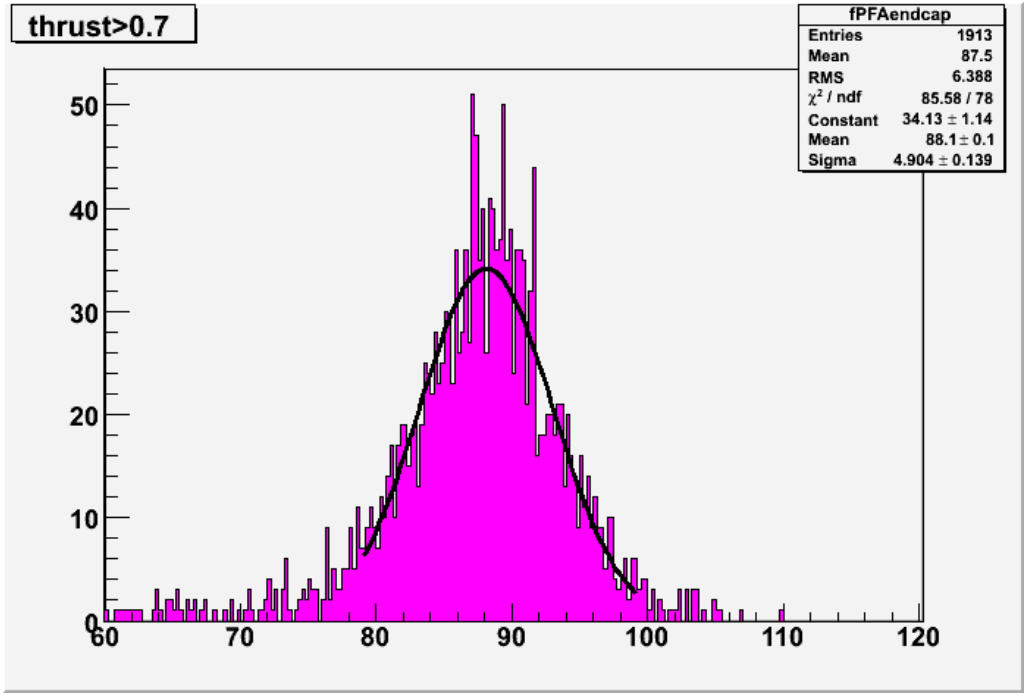
36.7 %/sqrt(E) using Mark's Definition



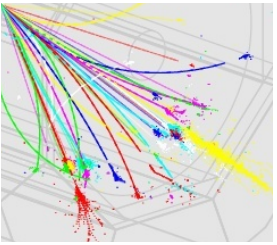
Some more bits



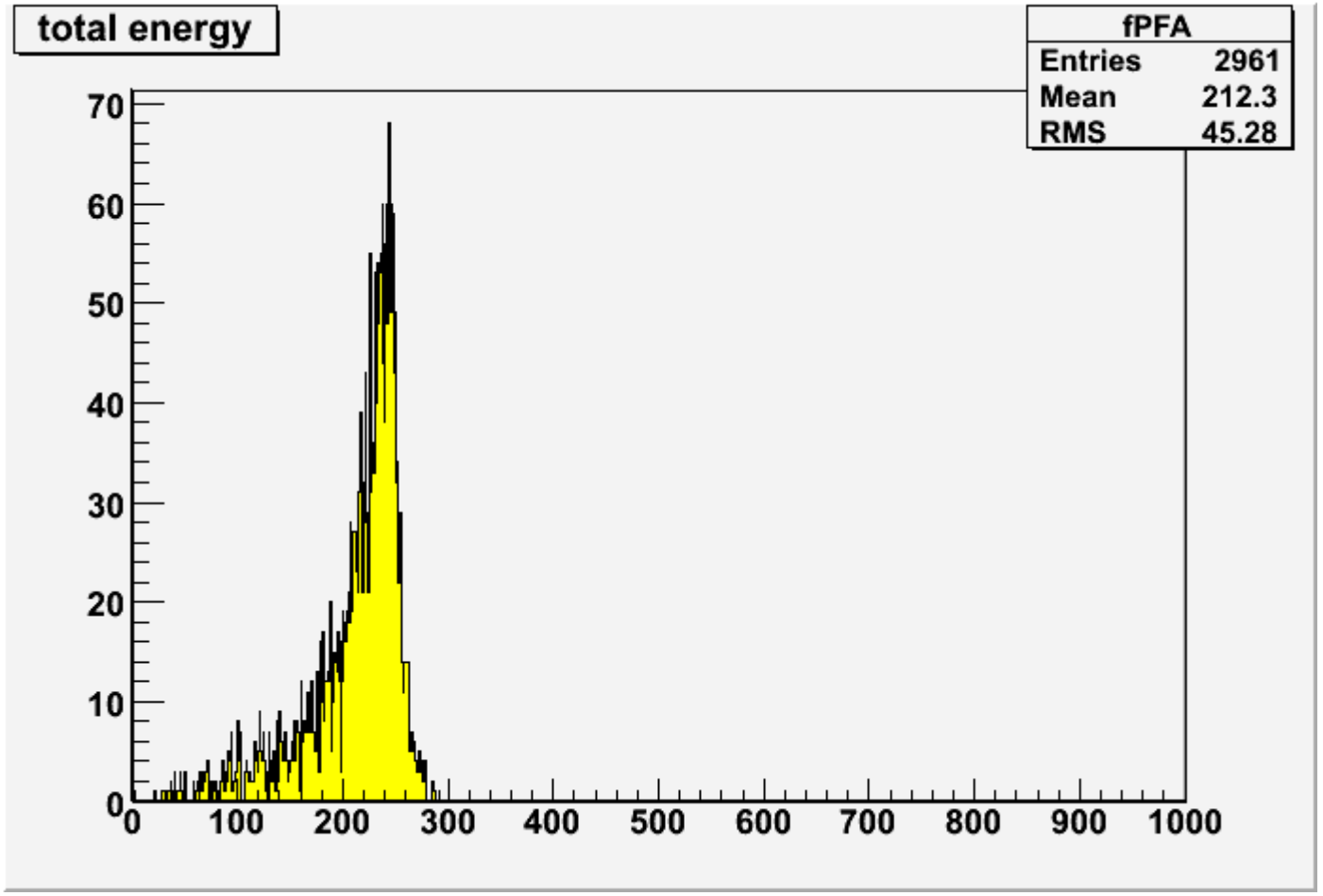
barrel-like



endcap-like

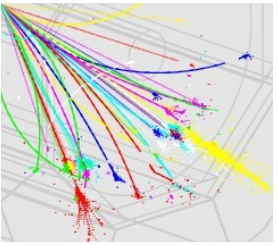


Some tests with ZZ

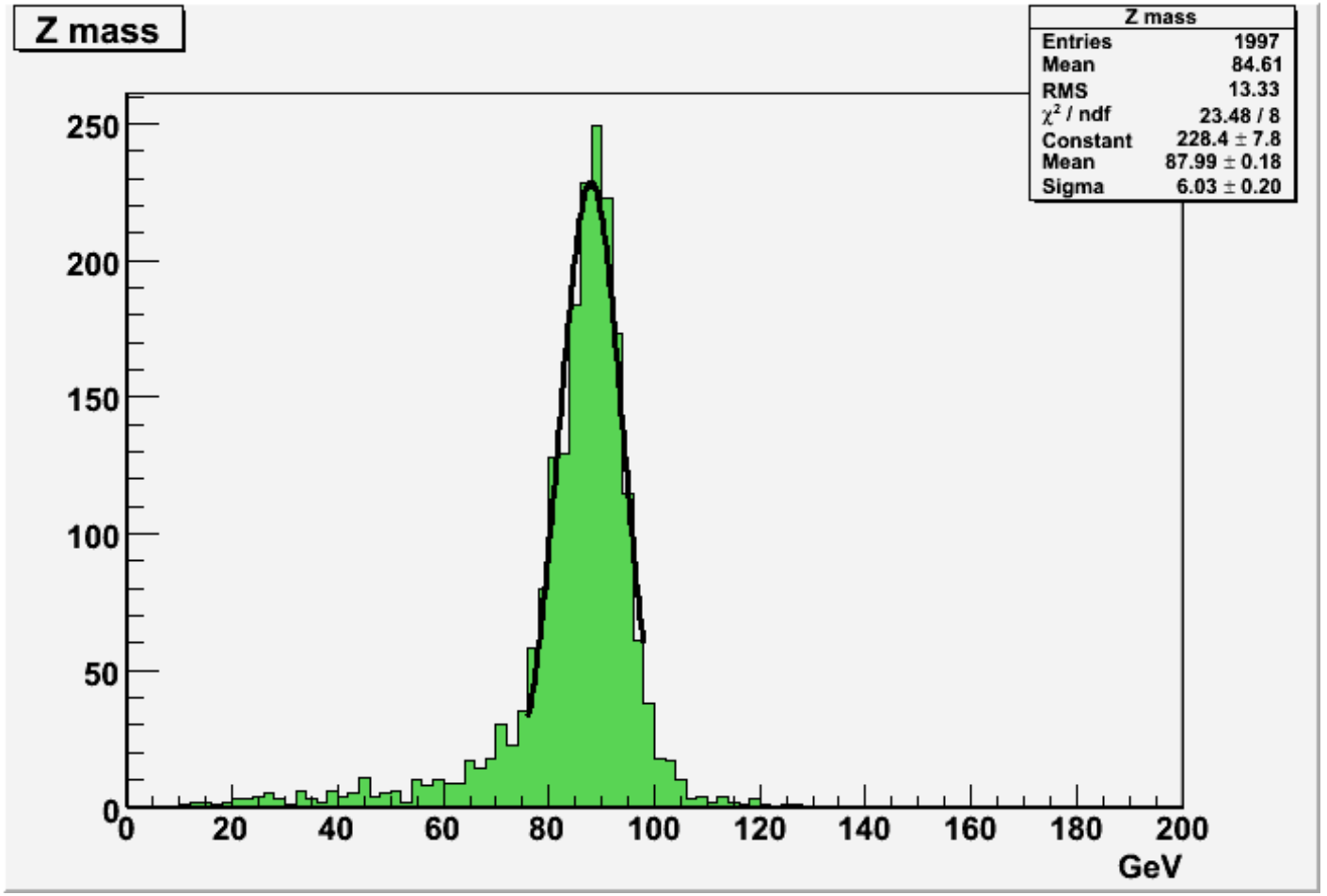


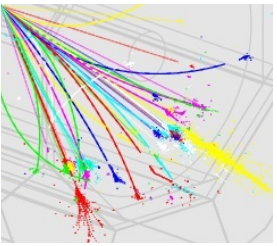
$$e^+ e^- \to ZZ \to qq\,\nu\,\nu$$
$$q = u\,,\,d\,,\,s$$

with ISR and Beamstrahlung



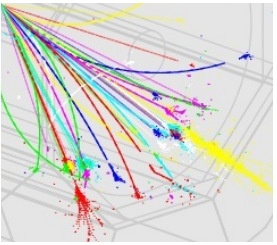
Z mass


Z mass
Z mass
Entries 1997
Mean 84.61
RMS 13.33
χ² / ndf 23.48 / 8
Constant 228.4 ± 7.8
Mean 87.99 ± 0.18
Sigma 6.03 ± 0.20
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200
GeV



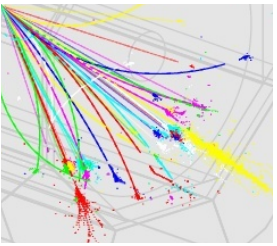
A word on our simulation

- Mokka gets extremely slow for 5 mu pitch
  - not a big problem for single particles
  - A big problem for physics
  - 400 tt events :1700 minutes on a Xeon 5150 @ 2.66GHz
  - approx 4.3 minutes per event with a “simple” detector description in GEANT
- We need to do something about this !
  - Simplify digitize ?
  - extend LCIO (this would be the way to go, I guess !)
- Detector optimization will be limited by this ...
  - we need a few thousand events for each study ...



An example

```
VXDCollection from the VXD sensitive detector has 250 hits.
SITCollection from the SIT sensitive detector has 275 hits.
FTDCollection from the FTD sensitive detector has 254 hits.
LumiCalCollection from the LumiCal sensitive detector has 63 hits.
TPCCollection from the TPC sensitive detector has 13045 hits.
FCHCollection from the FCH sensitive detector has 85 hits.
EcalBarrelCollection from the EcalBarrel sensitive detector has 75549 hits.
EcalEndcapCollection from the EcalEndcap sensitive detector has 8215 hits.
HcalBarrelRegCollection from the HcalBarrelReg sensitive detector has 1727 hits.
HcalBarrelEndCollection from the HcalBarrelEnd sensitive detector has 0 hits.
HcalEndCapsCollection from the HcalEndCaps sensitive detector has 3522 hits.
```



What needs to be done ?

- Idea (by Nigel, Mike, Giulio myself)
  - For each cal hit store its position within the cell
  - that gives us almost infinite resolution (we don't need that really)
  - we could make a diffusion “library”, for each hit location, we know, how the diffusion looks like ...
  - That should save a lot of CPU time ...
- Nigel has been discussing the LCIO extension already with Frank Gaede.