# Tagger calibration

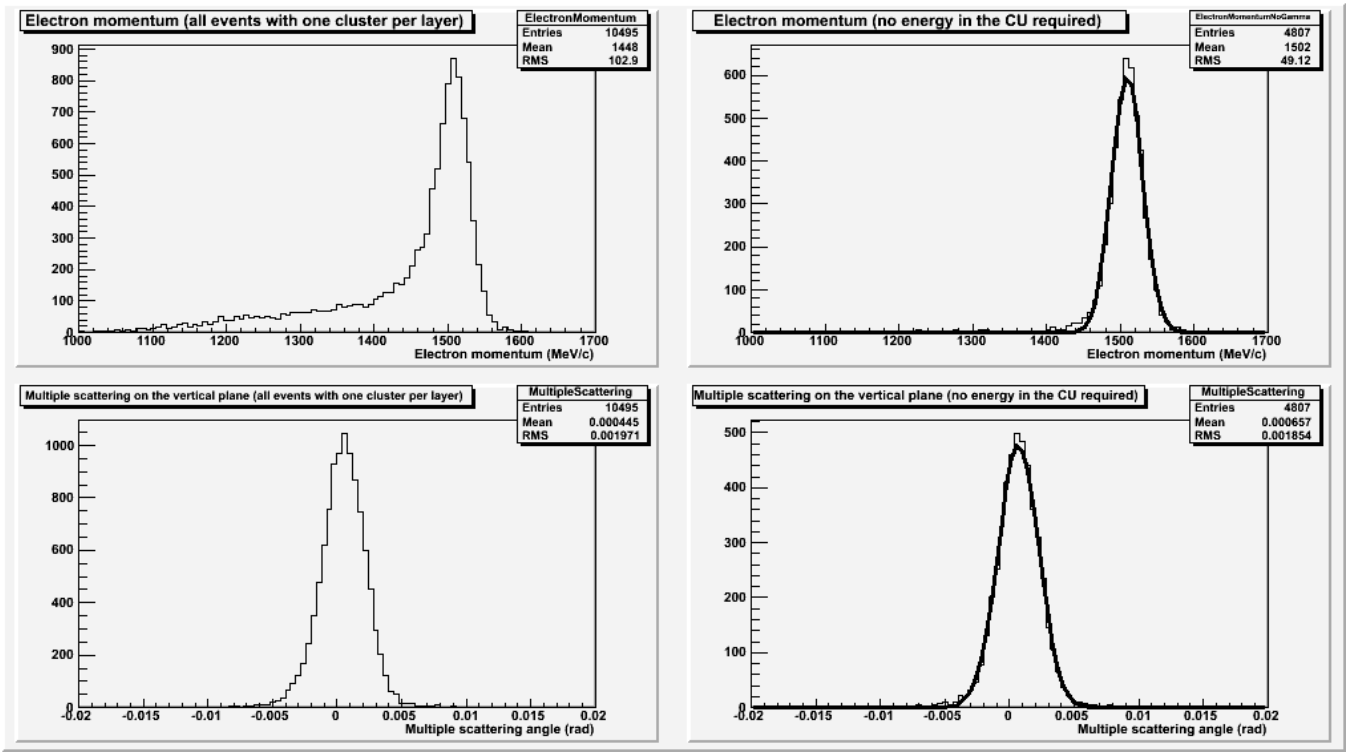
## Tagger Momentum resolution

The tagger calibration runs have been taken with the beam passing though the four chambers.

For each run the reconstucted electron momentum (4 cluster algorithm) has been fitted with a gaussian function after requiring no energy in the CU: the fit gives the offset in momentum reconstruction and the resolution.

For the same runs the  clusters position in the vertical (non bent) plane have been used to calculate the angle difference between the incoming and outcoming direction of the beam and therefore the multiple scattering

The picture below showes an example of this analysis with the 1.5 GeV beam.



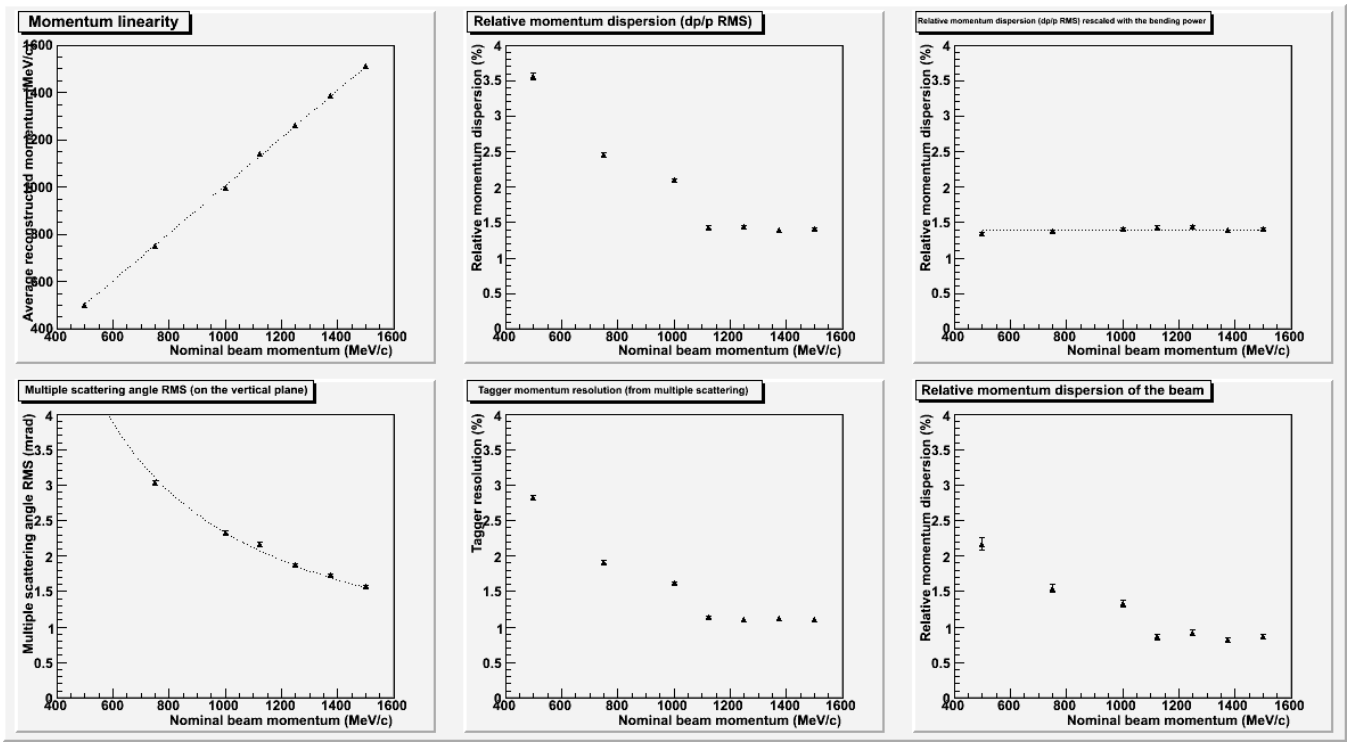

All the result from the calibration runs have been summarized in the following picture.

The tagger energy linearity plot has a slop of **1.004 +- 0.005**

The multiple scattering plot fit gives: **x/x0 = 2.94 +- 0.03**

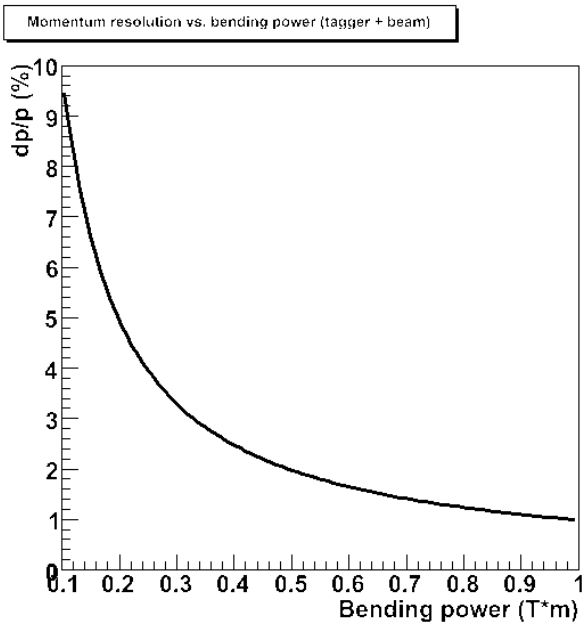
Notice that some of the runs have a different magnet current (this is necessary if we don't change the geometry), so a rescaling to the same bending power is needed.

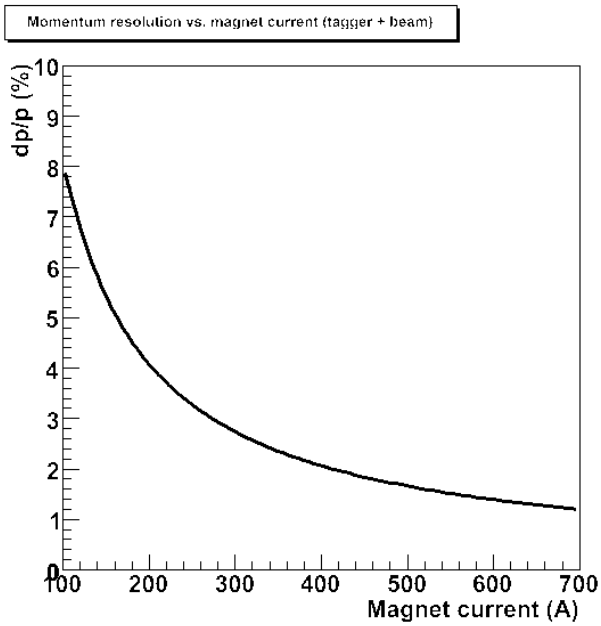
The (rescaled) momentum resolution fit gives a constant value: **c = (1.395 +- 0.007)%**




The momentum resolution, at different bending power, can be evalueted with:

```
dp/p(%) = c*BL_max/BL = 1.395*0.7089/BL
```




Here is a table of calculated tagger resolution for particular current settings:

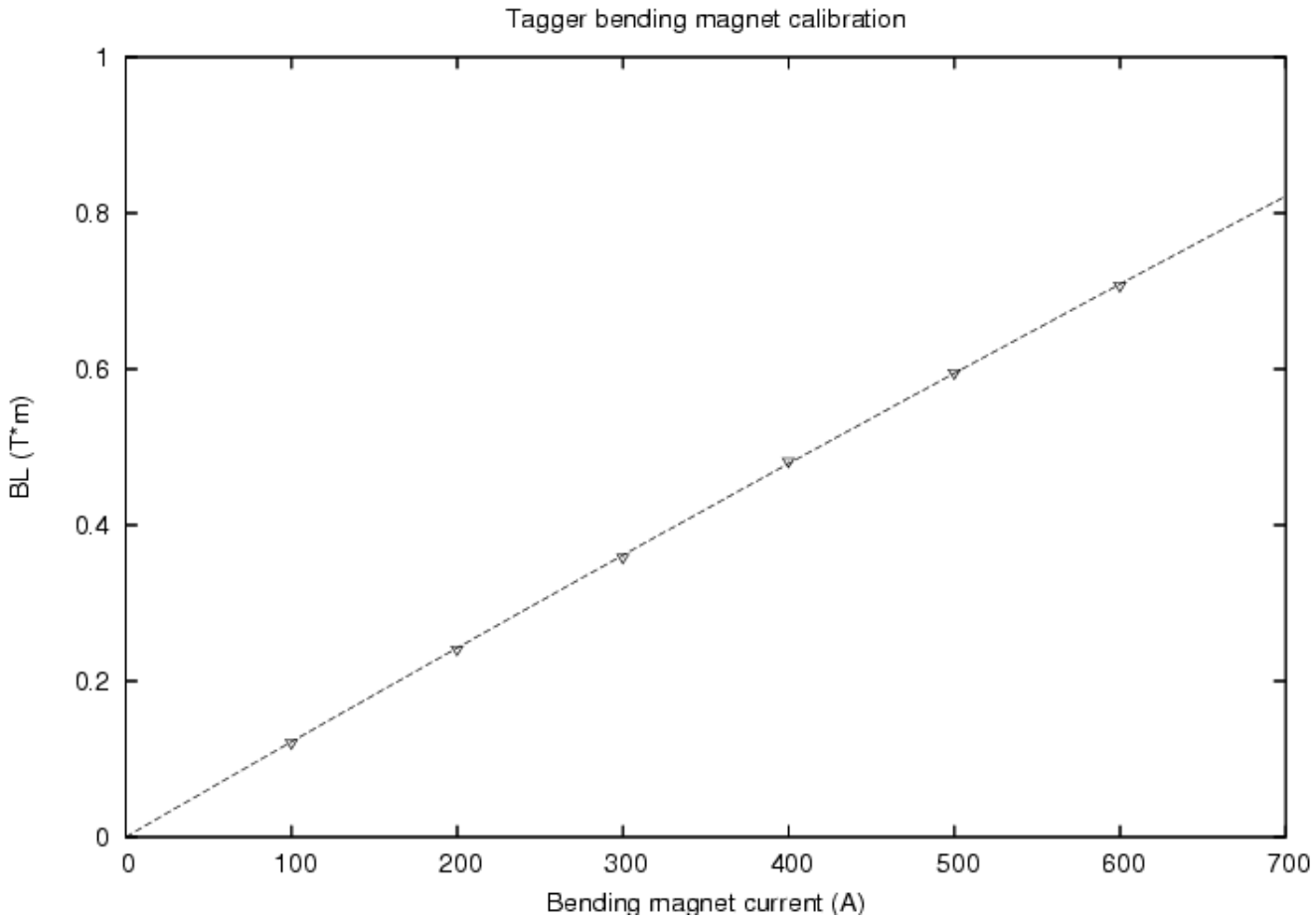
| Current (A) | dp/p (%) |
|---|---|
| 100 | 8.1092 |

| | |
|---|---|
| 120 | 6.7661 |
| 150 | 5.42303 |
| 180 | 4.52769 |
| 200 | 4.08003 |
| 220 | 3.71378 |
| 240 | 3.40858 |
| 250 | 3.27429 |
| 300 | 2.73719 |
| 350 | 2.35359 |
| 360 | 2.28966 |
| 400 | 2.06593 |
| 420 | 1.97006 |
| 450 | 1.84223 |
| 500 | 1.66331 |
| 550 | 1.51695 |
| 600 | 1.39501 |
| 650 | 1.29186 |
| 700 | 1.20346 |

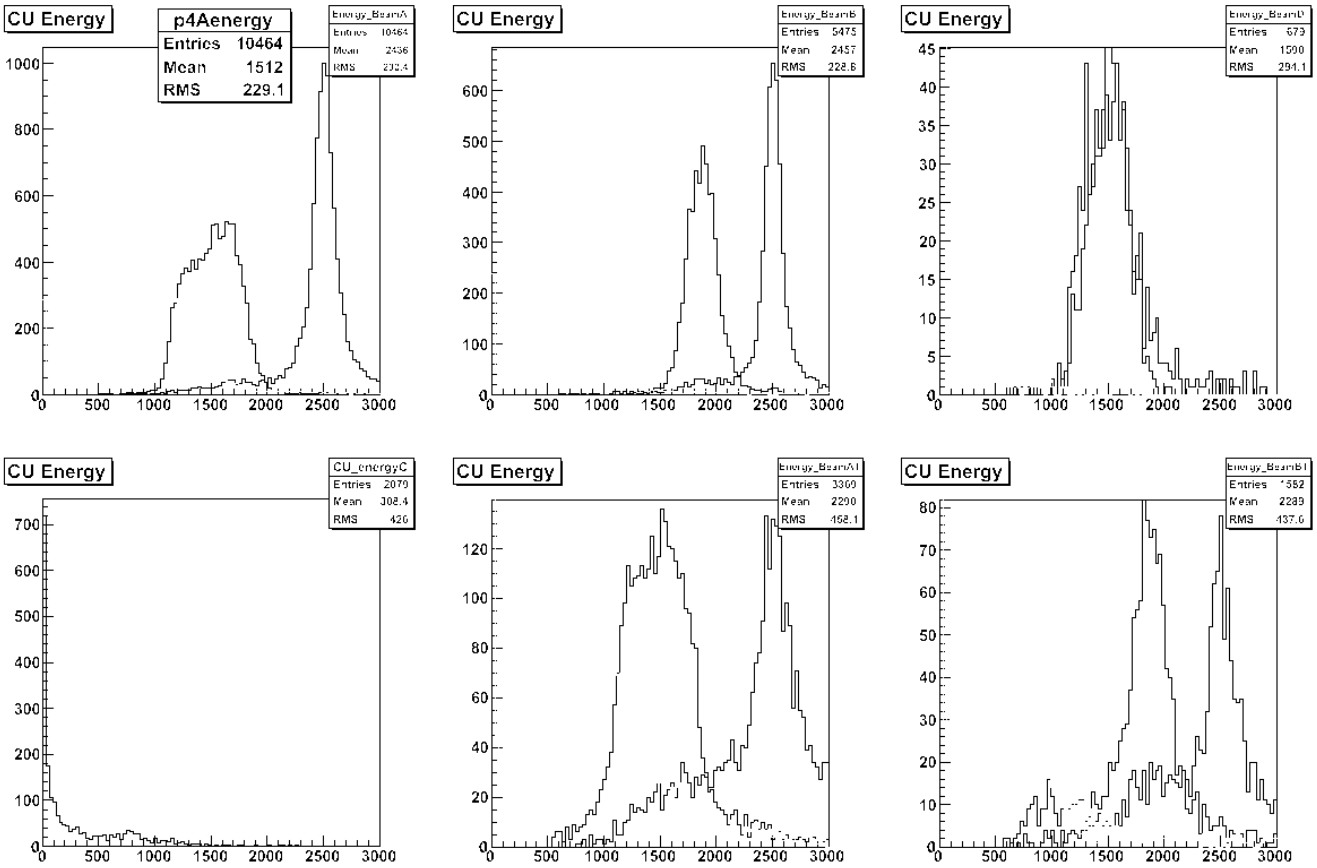
### Calibration of the bending magnet

The bending magnet data have been fitted with a quadratic polinomial:

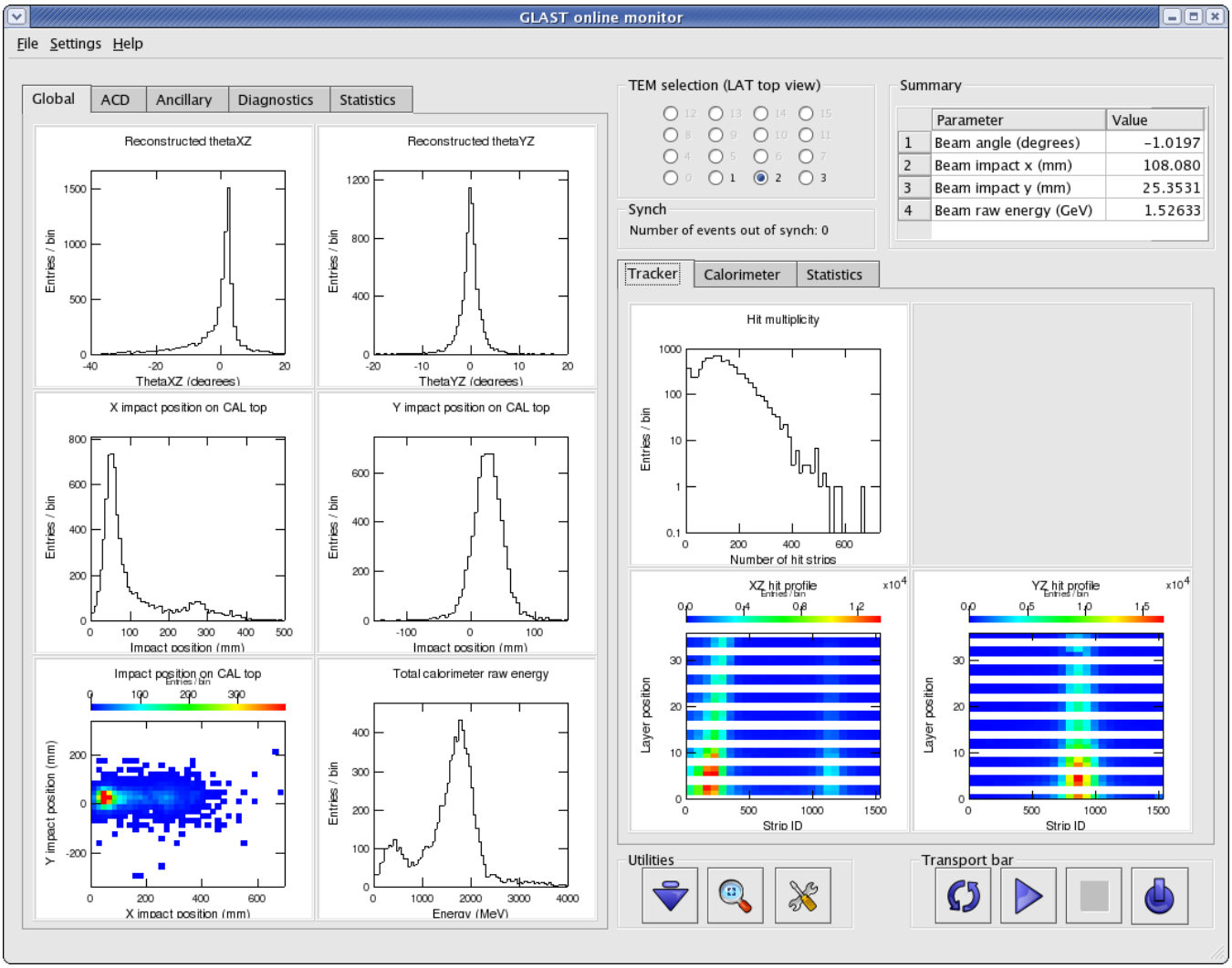
```
B*L (T*m) = 0.0012271*I(A) - 7.60132e-08*I^2(A^2)
```

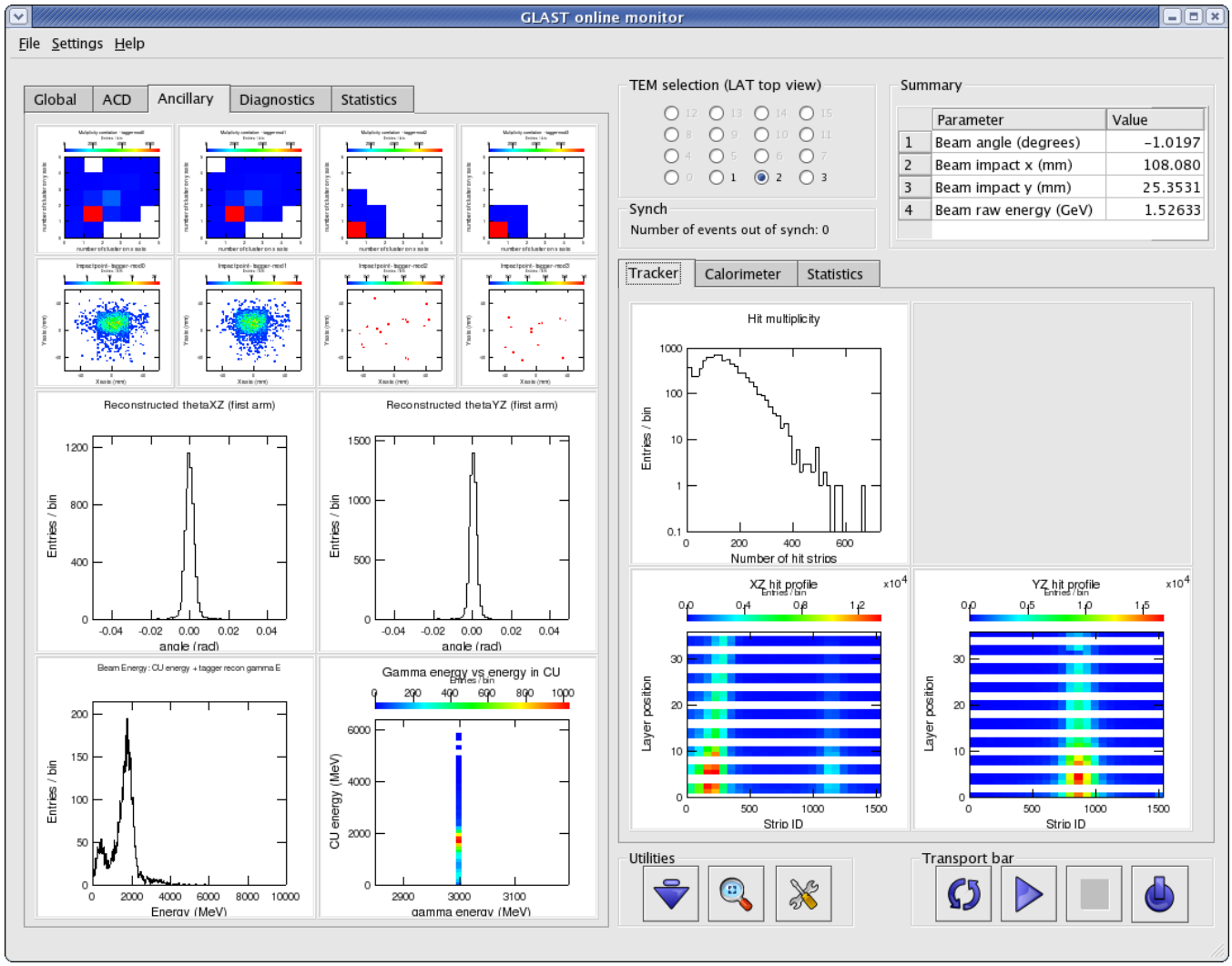


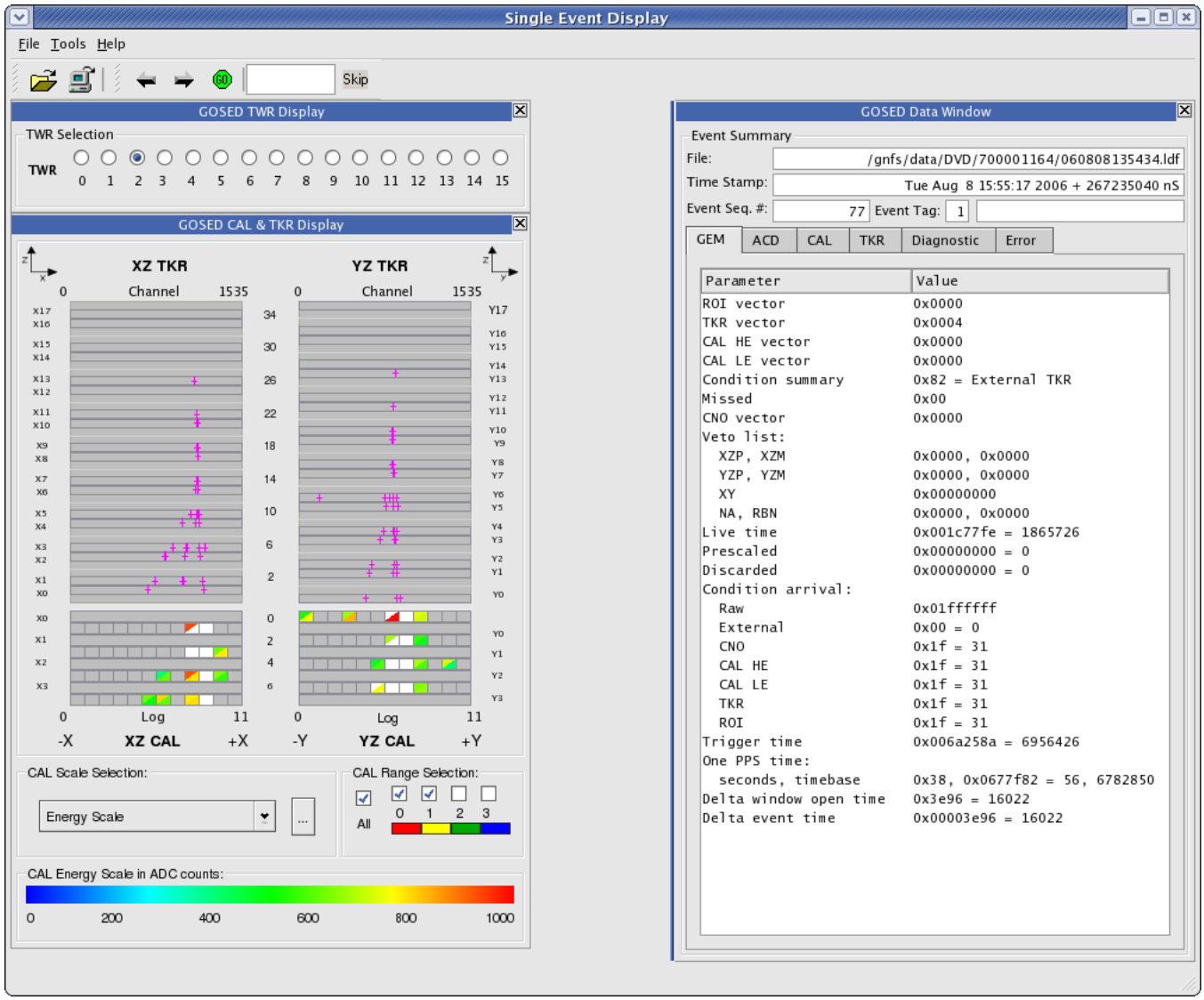

**Angular reconstruction**




**Few screenshots from the tagger calibration runs.**


GLAST online monitor
File Settings Help
Global ACD Ancillary Diagnostics Statistics
Reconstructed thetaXZ
Entries / bin
ThetaXZ (degrees)
Reconstructed thetaYZ
Entries / bin
ThetaYZ (degrees)
X impact position on CAL top
Entries / bin
Impact position (mm)
Y impact position on CAL top
Entries / bin
Impact position (mm)
Impact position on CAL top
entries / bin
Y impact position (mm)
X impact position (mm)
Total calorimeter raw energy
Entries / bin
Energy (MeV)
TEM selection (LAT top view)
Synch
Number of events out of synch: 0
Summary
Parameter
Value
1 Beam angle (degrees) -1.0197
2 Beam impact x (mm) 108.080
3 Beam impact y (mm) 25.3531
4 Beam raw energy (GeV) 1.52633
Tracker Calorimeter Statistics
Hit multiplicity
Entries / bin
Number of hit strips
XZ hit profile
entries / bin
Layer position
Strip ID
YZ hit profile
entries / bin
Layer position
Strip ID
Utilities
Transport bar


GLAST online monitor
File Settings Help
Global ACD Ancillary Diagnostics Statistics
Reconstructed thetaXZ (first arm)
Entries / bin
angle (rad)
Reconstructed thetaYZ (first arm)
Entries / bin
angle (rad)
Beam Energy : CU energy + tagger recon gamma E
Entries / bin
Energy (MeV)
Gamma energy vs energy in CU
Entries / bin
CU energy (MeV)
gamma energy (MeV)
TEM selection (LAT top view)
Synch
Number of events out of synch: 0
Summary
Parameter Value
1 Beam angle (degrees) -1.0197
2 Beam impact x (mm) 108.080
3 Beam impact y (mm) 25.3531
4 Beam raw energy (GeV) 1.52633
Tracker Calorimeter Statistics
Hit multiplicity
Entries / bin
Number of hit strips
XZ hit profile
Entries / bin
Layer position
Strip ID
YZ hit profile
Entries / bin
Layer position
Strip ID
Utilities
Transport bar


Single Event Display
File Tools Help
Skip
GOSED TWR Display
TWR Selection
TWR
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
GOSED CAL & TKR Display
XZ TKR
YZ TKR
0 Channel 1535
0 Log 11
-X XZ CAL +X
-Y YZ CAL +Y
CAL Scale Selection:
Energy Scale
CAL Range Selection:
All
0 1 2 3
CAL Energy Scale in ADC counts:
0 200 400 600 800 1000
GOSED Data Window
Event Summary
File: /gnfs/data/DVD/700001164/060808135434.ldf
Time Stamp: Tue Aug 8 15:55:17 2006 + 267235040 nS
Event Seq. #: 77 Event Tag: 1
GEM ACD CAL TKR Diagnostic Error
Parameter Value
ROI vector 0x0000
TKR vector 0x0004
CAL HE vector 0x0000
CAL LE vector 0x0000
Condition summary 0x82 = External TKR
Missed 0x00
CNO vector 0x0000
Veto list:
XZP, XZM 0x0000, 0x0000
YZP, YZM 0x0000, 0x0000
XY 0x00000000
NA, RBN 0x0000, 0x0000
Live time 0x001c77fe = 1865726
Prescaled 0x00000000 = 0
Discarded 0x00000000 = 0
Condition arrival:
Raw 0x01ffffff
External 0x00 = 0
CNO 0x1f = 31
CAL HE 0x1f = 31
CAL LE 0x1f = 31
TKR 0x1f = 31
ROI 0x1f = 31
Trigger time 0x006a258a = 6956426
One PPS time:
seconds, timebase 0x38, 0x0677f82 = 56, 6782850
Delta window open time 0x3e96 = 16022
Delta event time 0x00003e96 = 16022