

# GENEVA MEETING

23/11/2005

Sonia Natale

## 2004 Test beam Analysis:

- Efficiency
- Hit Resolution
- Momentum Resolution
- Photon Energy Resolution
- Photon Angular Resolution

# Data Sample

(still waiting for files with last code version)

Layer Efficiency  
and  
Hit Resolution

Run	Energy	Trigger	Magnet	Converter	S/N cut	# Events
1210	5 GeV	BC1C2	OFF	OFF	4	67500
1456	7 GeV	BC1C2	ON	OFF	4	29225
1461	7 GeV	BC1C2	ON	OFF	4	29524
1462	7 GeV	BC1C2	ON	OFF	4	8643
1394	5 GeV	BC1C2	ON	ON	4	29192 (+...)
1416	3 GeV	BC1C2	ON	ON	4	1 (+...)
1428	3 GeV	BC1C2	ON	ON	4	1229 (+...)
1470	7 GeV	BC1C2	ON	ON	4	196 (+...)
1471	7 GeV	BC1C2	ON	ON	4	111 (+...)

Momentum  
Resolution  
vs  
# Hits (track)

Photon Energy and Angular Resolution  
(Momentum Resolution vs Energy)

**Efficiency**

# Hit Efficiency

## Standard Reco

## My Reco

LAYER	EFFICIENCY
0	78.8
1	74.2
2	80.2
3	80.6
4	81.3
5	95.7
6	88.6
7	61.9
8	96.3
9	95.4
10	94.1
11	76.1
12	64.9

LAYER	EFFICIENCY
0	80.9
1	75.2
2	80.6
3	83.4
4	90.9
5	97.6
6	91.4
7	75.7
8	98.1
9	96.1
10	96.5
11	88.2
12	65.8

# Track Efficiency

## Standard Reco

## My Reco

LAYER	EFFICIENCY(%)	LAYER	EFFICIENCY(%)
0	75.9	0	86.6
1	92.9	1	96.1
2	84.9	2	89.2
3	71.2	3	79.1
4	91.6	4	94.2
5	81.8	5	88.2
6	77.5	6	86.2
7	55.5	7	66.9

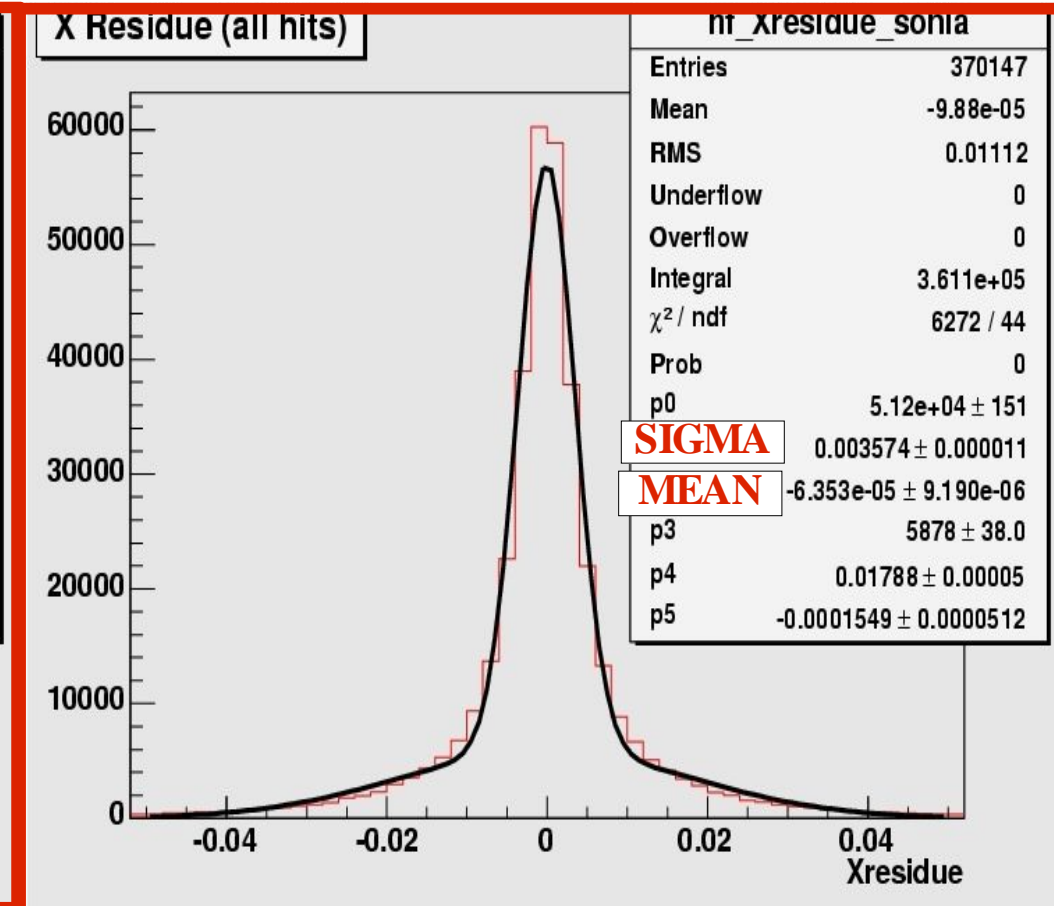
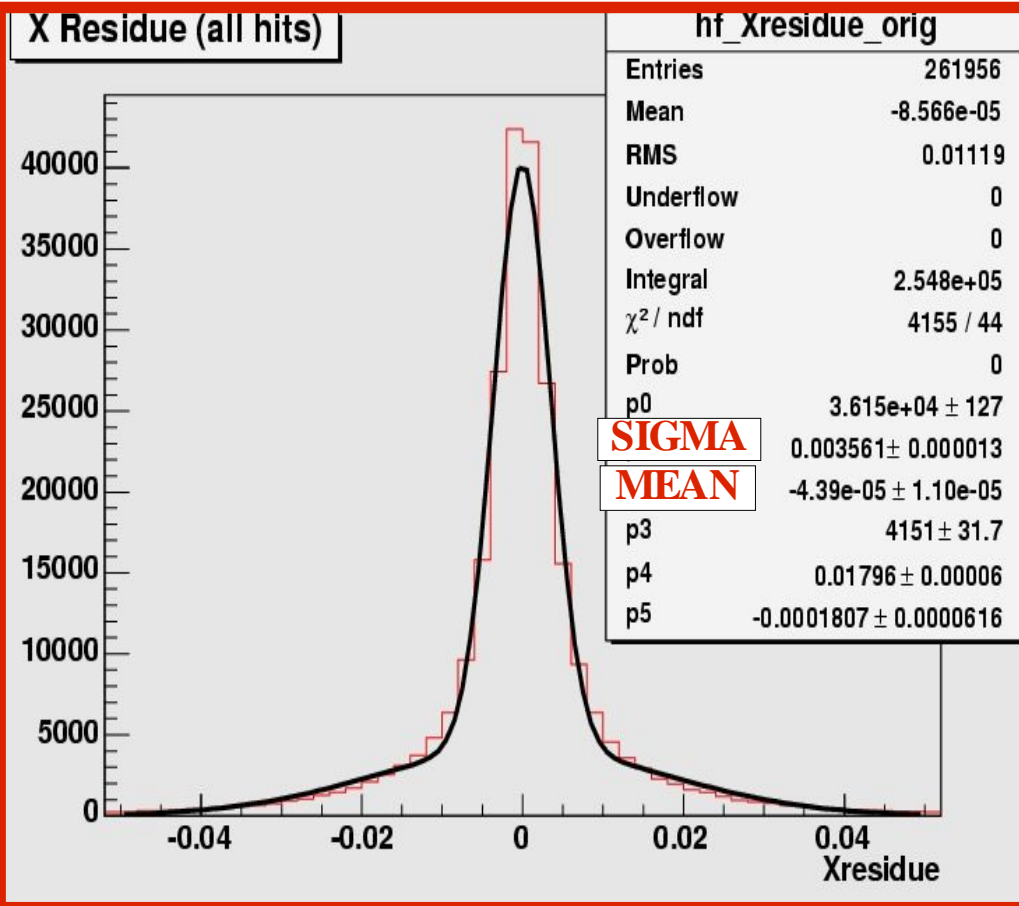
# Hit Resolution

# Hit resolution (X)

Runs: 1210  
Tot events: 67133  
Energy: 5 GeV  
B: OFF  
Conv: OFF

Standard

My

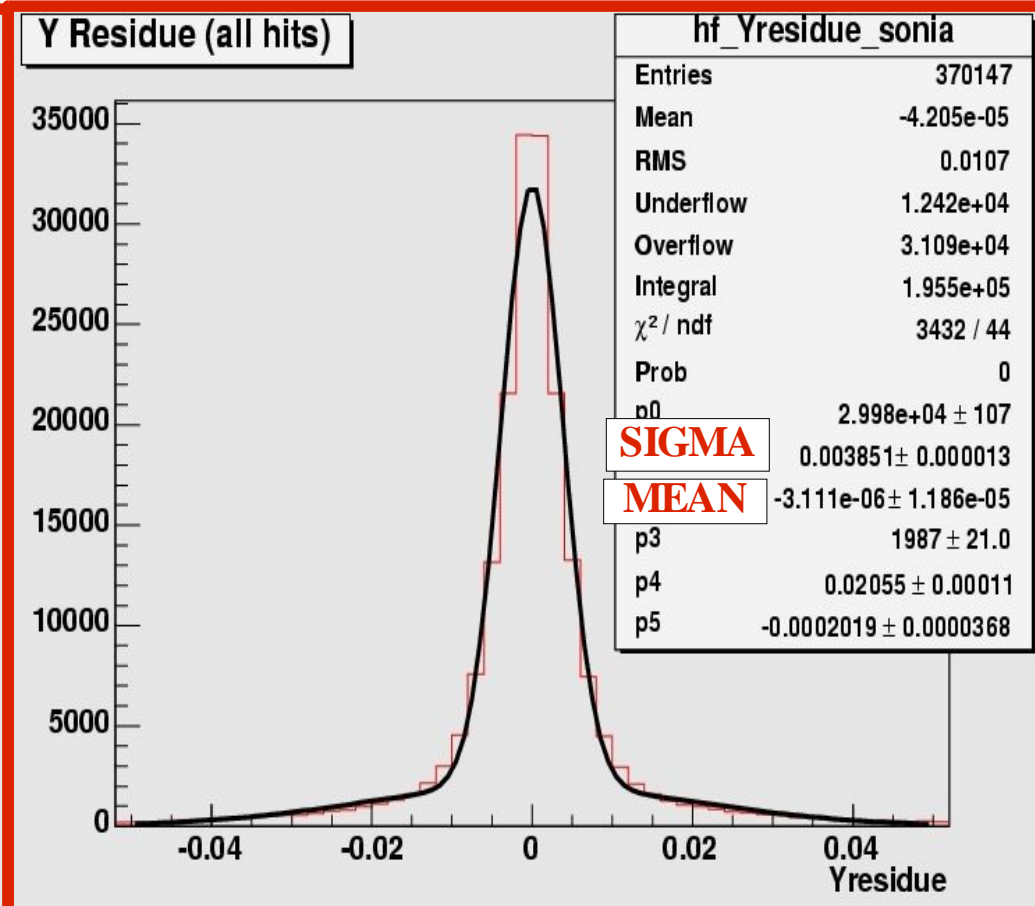
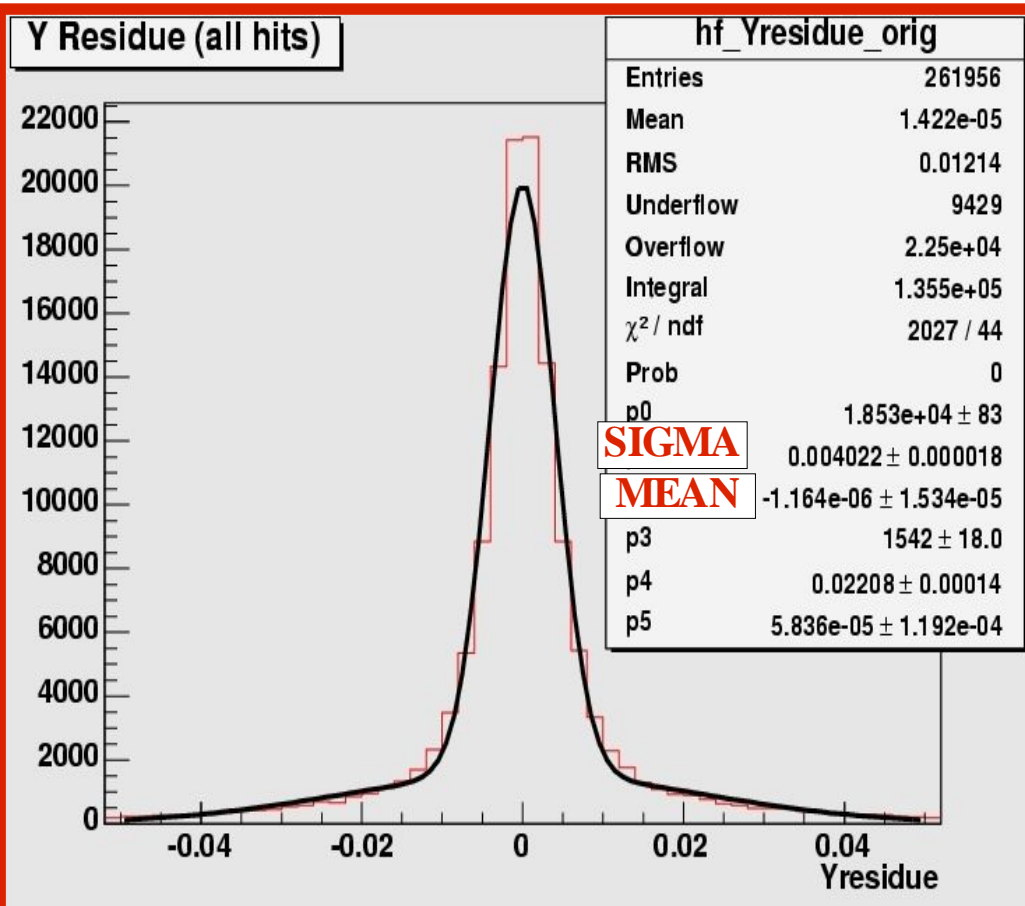


# Hit resolution (Y)

Runs: 1210  
Tot events: 67133  
Energy: 5 GeV  
B: OFF  
Conv: OFF

Standard

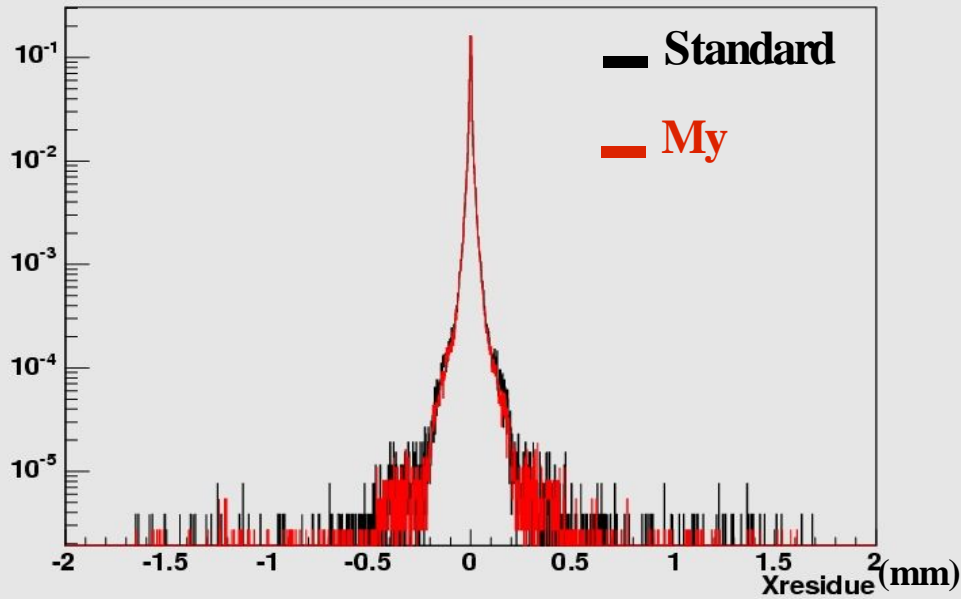
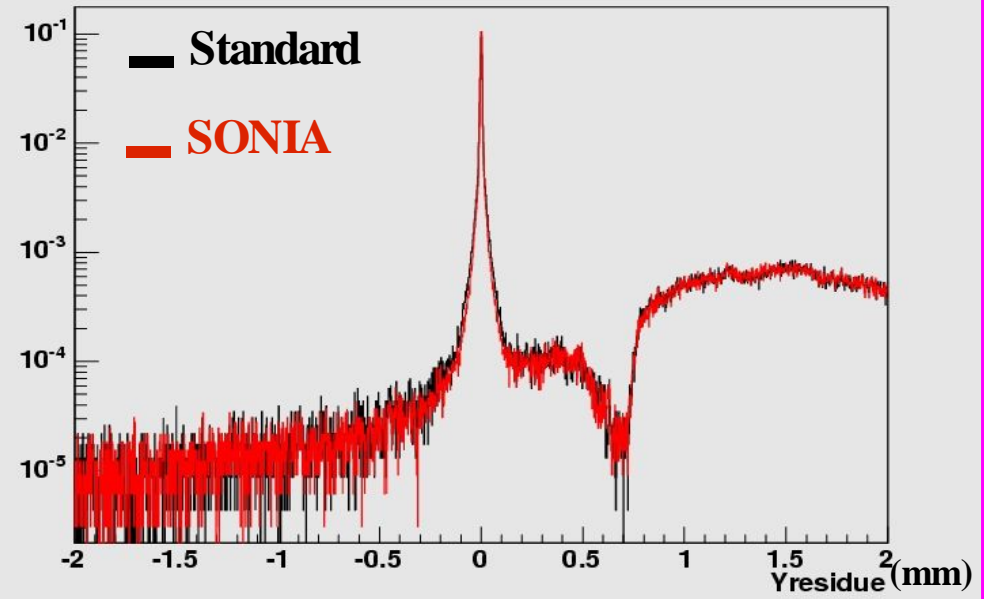
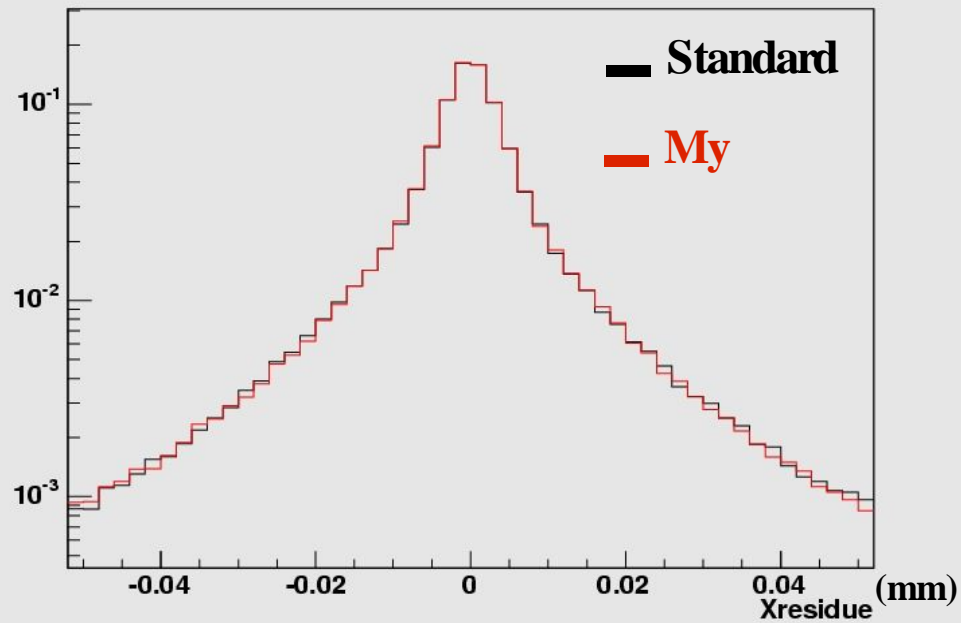
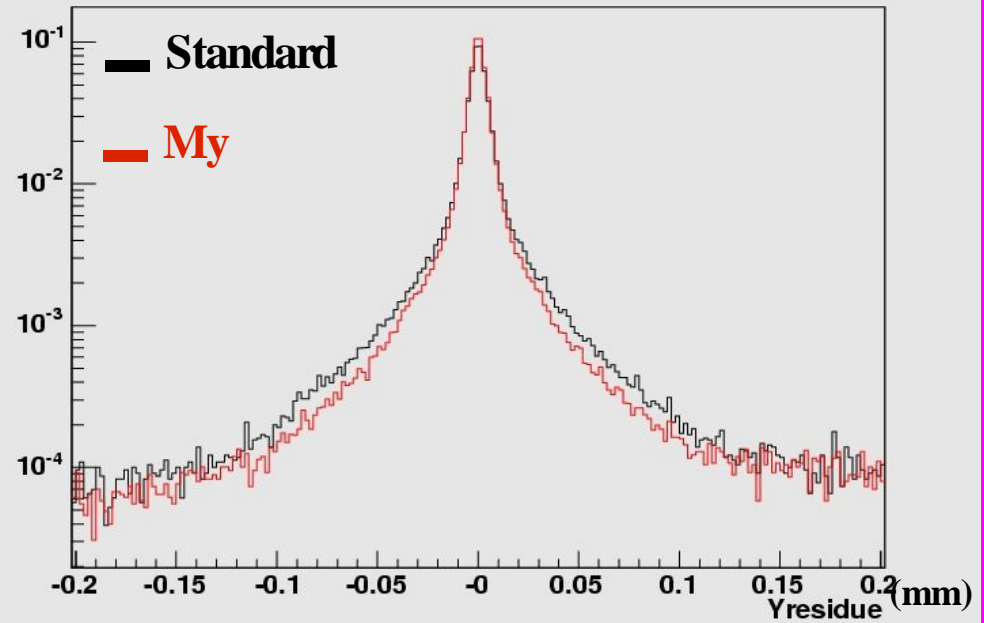
My





**X**

# Hit resolution (X,Y)

**Y****X Residue (all hits)****Y Residue (all hits)****X Residue (all hits)****Y Residue (all hits)**

# Momentum Resolution

# Momentum resolution

**Runs: 1456,1461,1462**

**Tot events: 67392**

**Energy: 7 GeV**

**B: ON**

**Conv: OFF**

**CUTS**

1 track with more than 5 hits

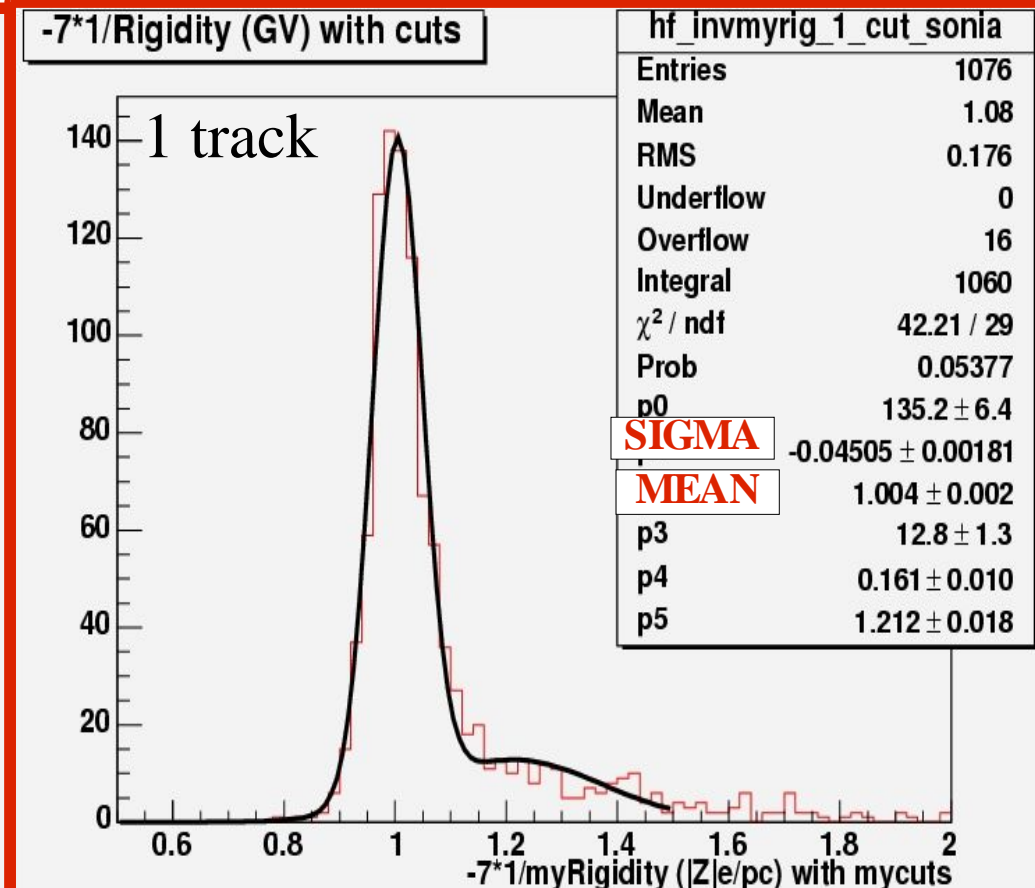
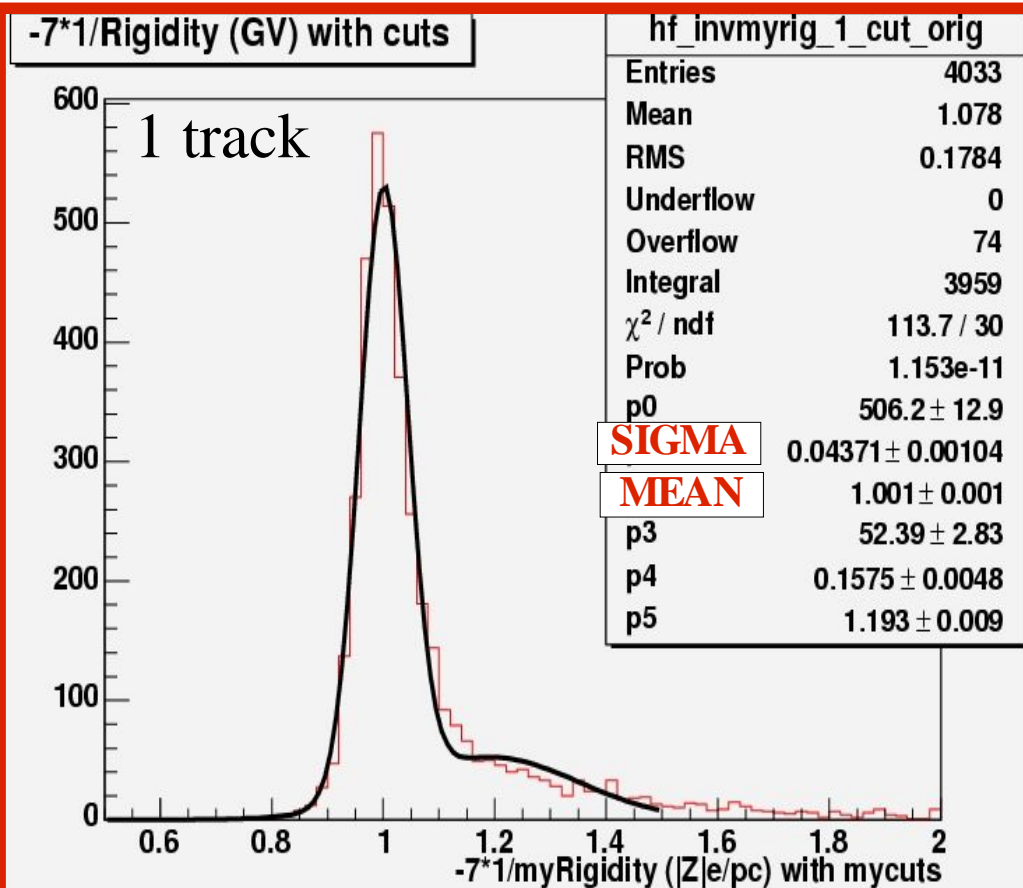
tr->Chi2<20 && tr->Chi2StrLine<20

xypos<3 (1<sup>st</sup> point of the track)

tr->Theta<0.005 && abs(tr->Phi)>1

**Standard reco & sele (produced by me)**

**My reco using Nacho sele**

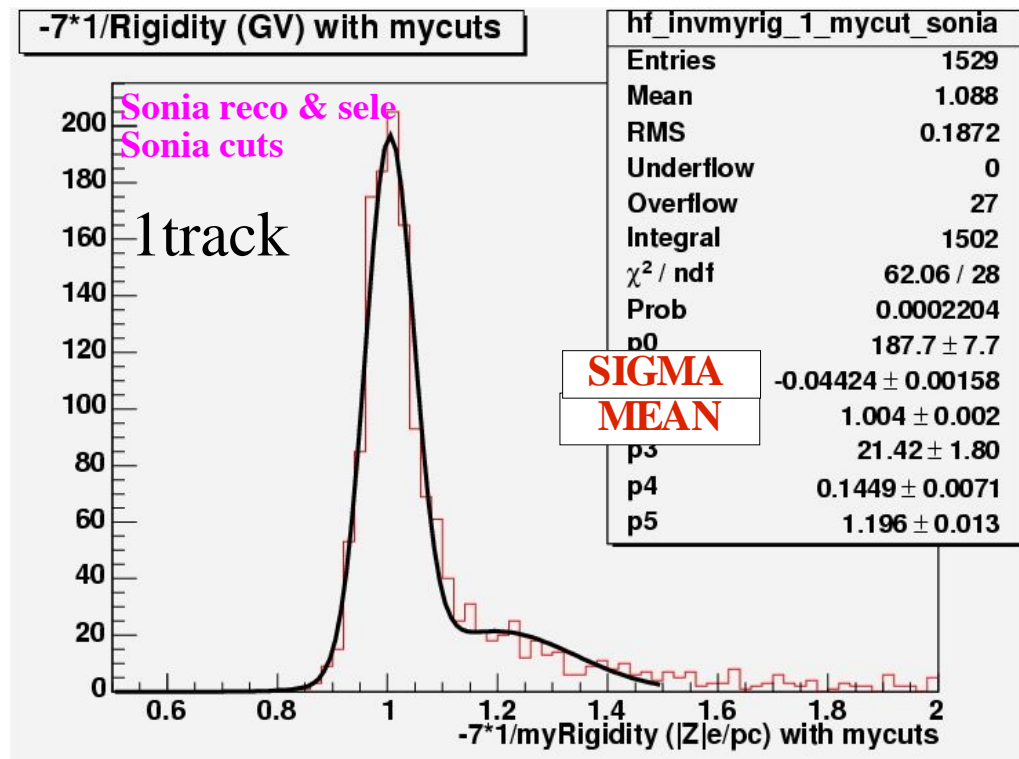


# Momentum resolution with my sele

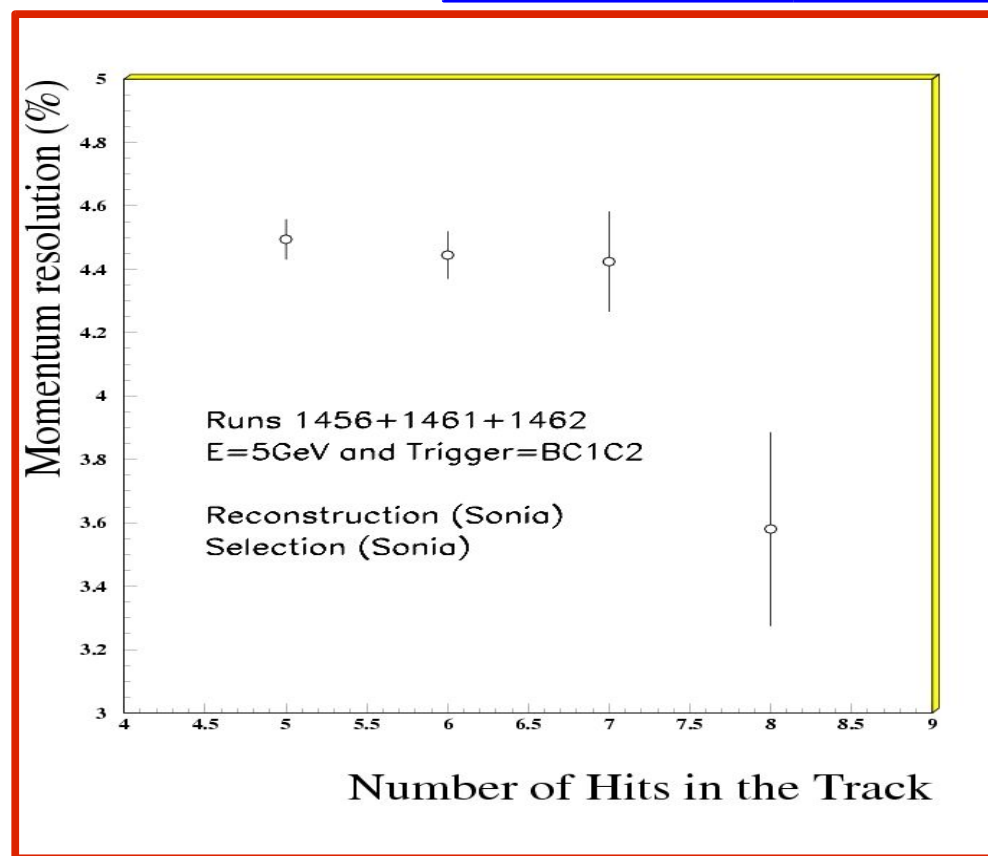
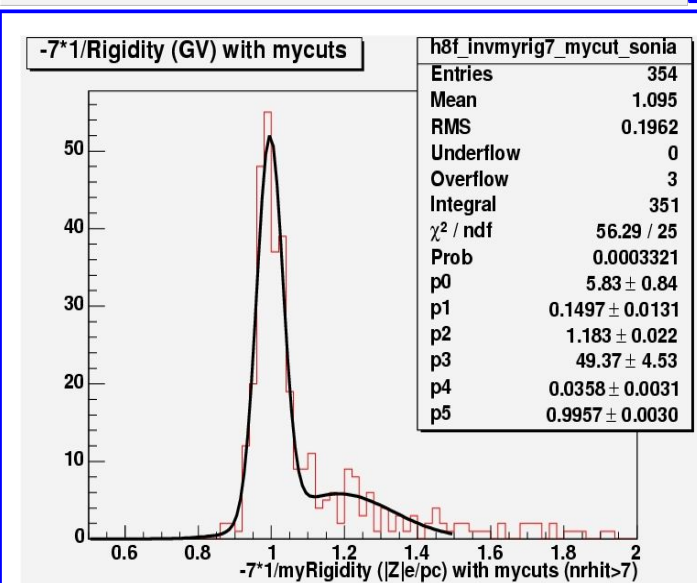
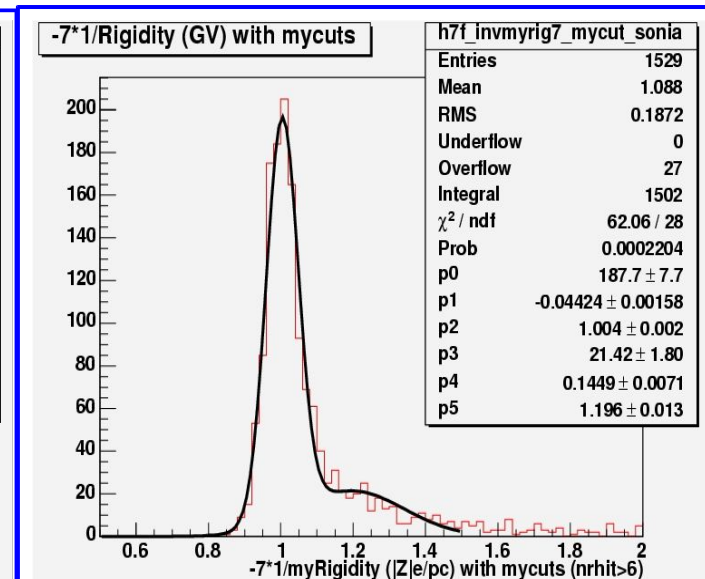
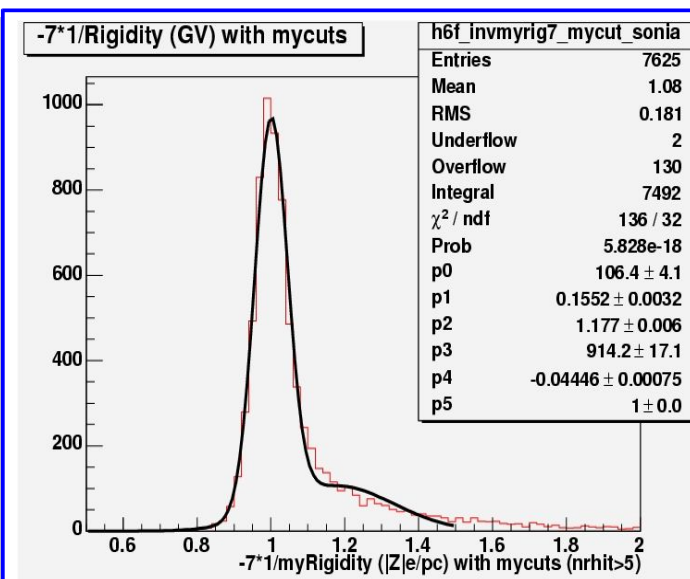
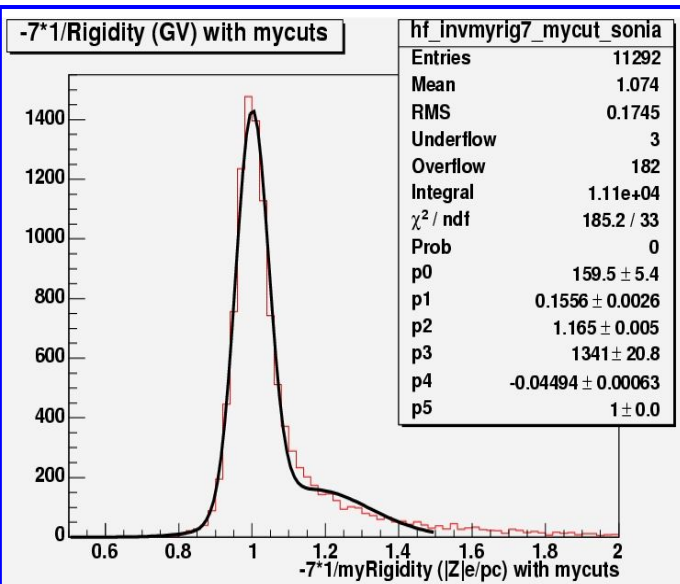
CUTS

Runs: 1456-1461-1462  
Tot events: 67392  
Energy: 7 GeV  
B: ON  
Conv: OFF

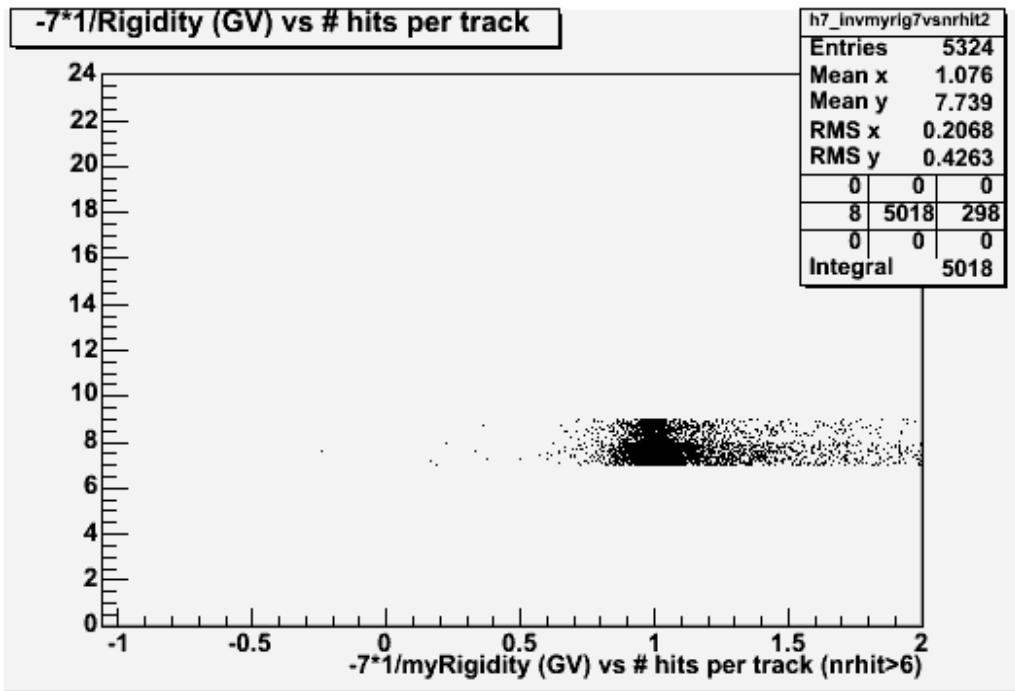
1 track with more than 5 hits  
tr->Chi2<20 && tr->Chi2StrLine<20  
xypos<2 (1<sup>st</sup> point of the track)  
tr->Theta<0.005 && abs(tr->Phi)>1



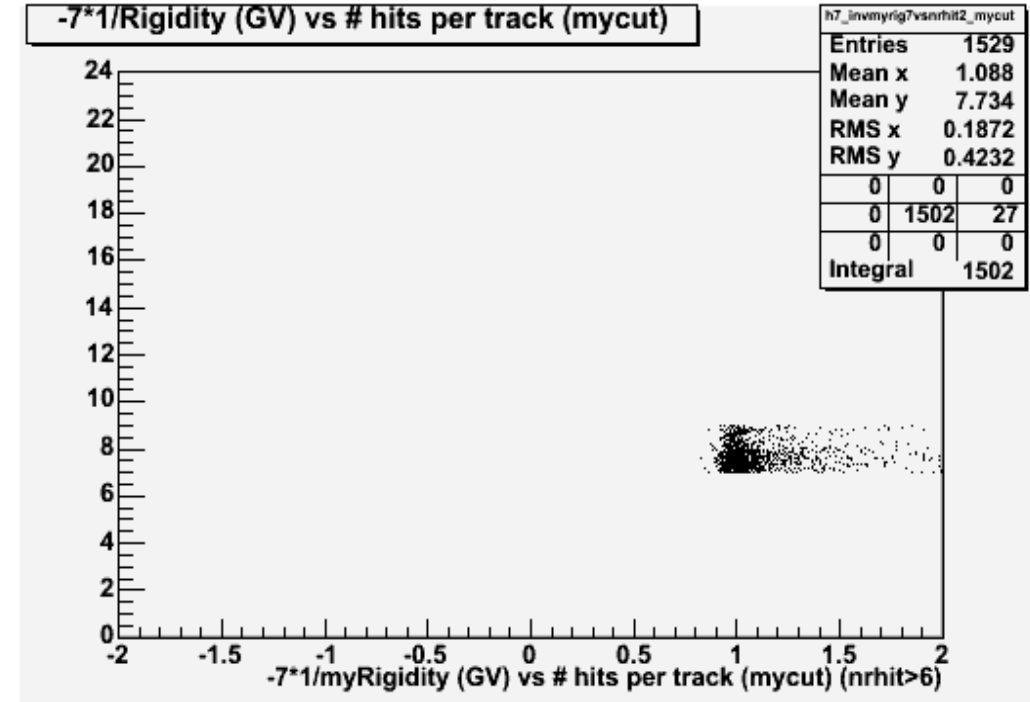
# Momentum resolution vs # hits in the track



# Momentum vs track # of hits

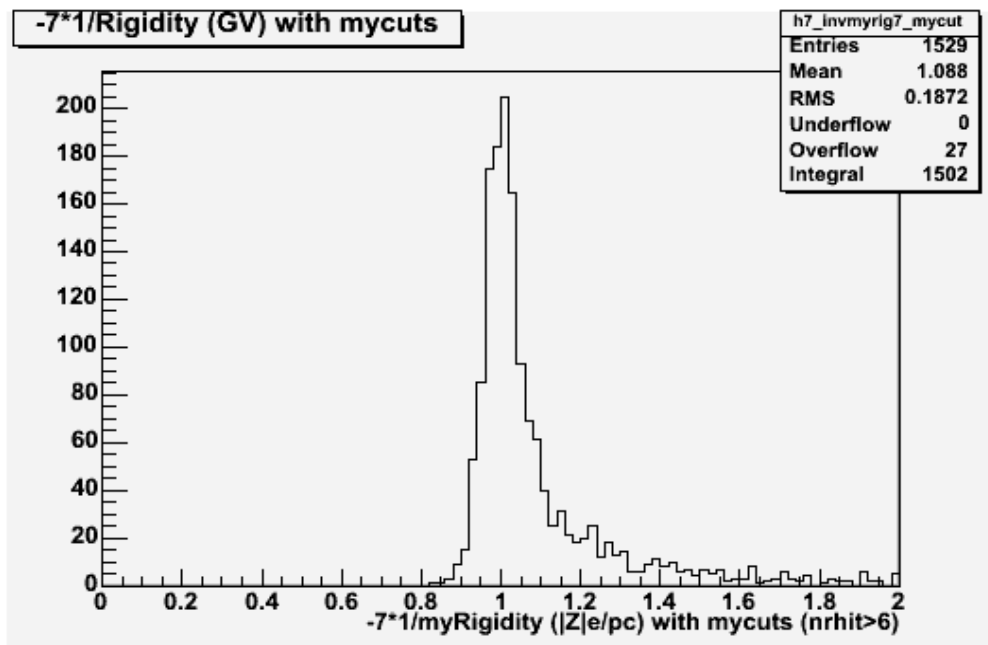


Before cuts

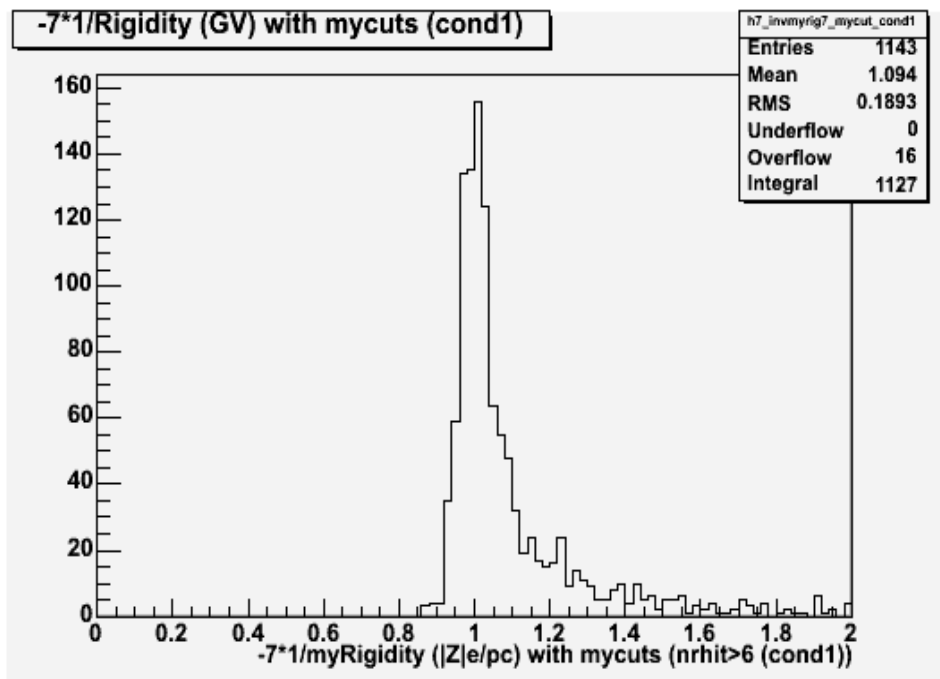


After cuts

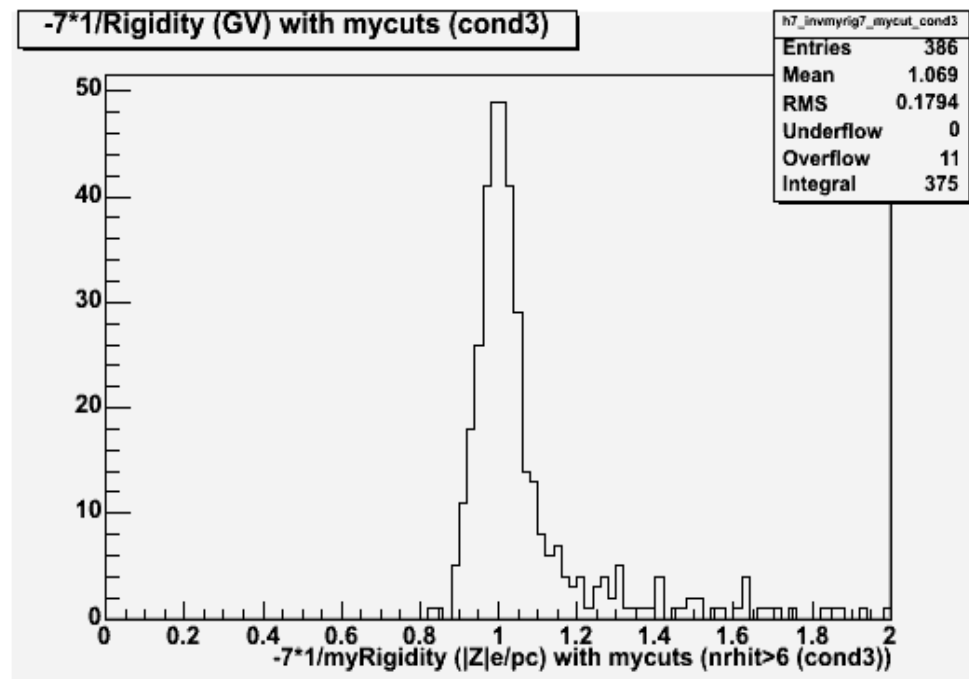
# Momentum vs Used Layers for Hits belonging the Track



All



First, Middle, Last



All but First or Last (\*)

# Momentum resolution

**Runs: 1461,1462**  
**Tot events: ~ 40000**  
**Energy: 7 GeV**  
**B: ON**  
**Conv: OFF**

1 track with more than 6 hits **CUTS**  
 xypos<3 (1<sup>st</sup> point of the track)  
 tr->Theta<0.005  
 Ecal energy > 4 GeV

Data (Nacho)  
 $3.8 \pm 0.2$   
 Sim (Nacho)  
 $3.7 \pm 0.2$

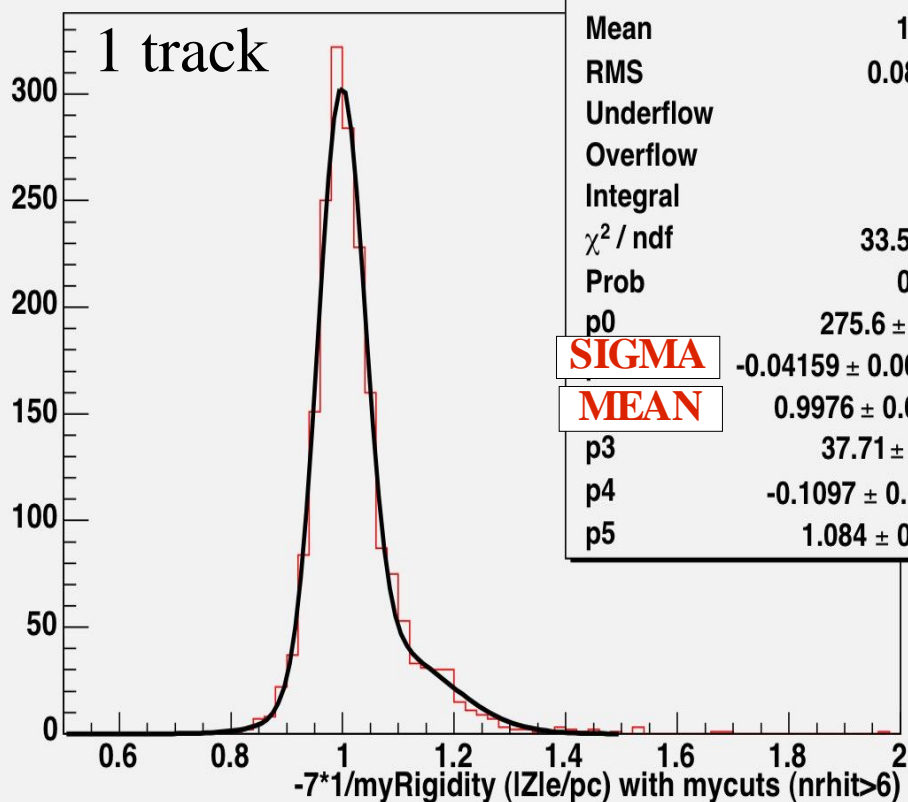
Nacho reco & Nacho sele (produced by me)

Sonia reco using Nacho sele

-7\*1/Rigidity (GV) with mycuts

h7f\_invmyrig7\_mycut\_orig

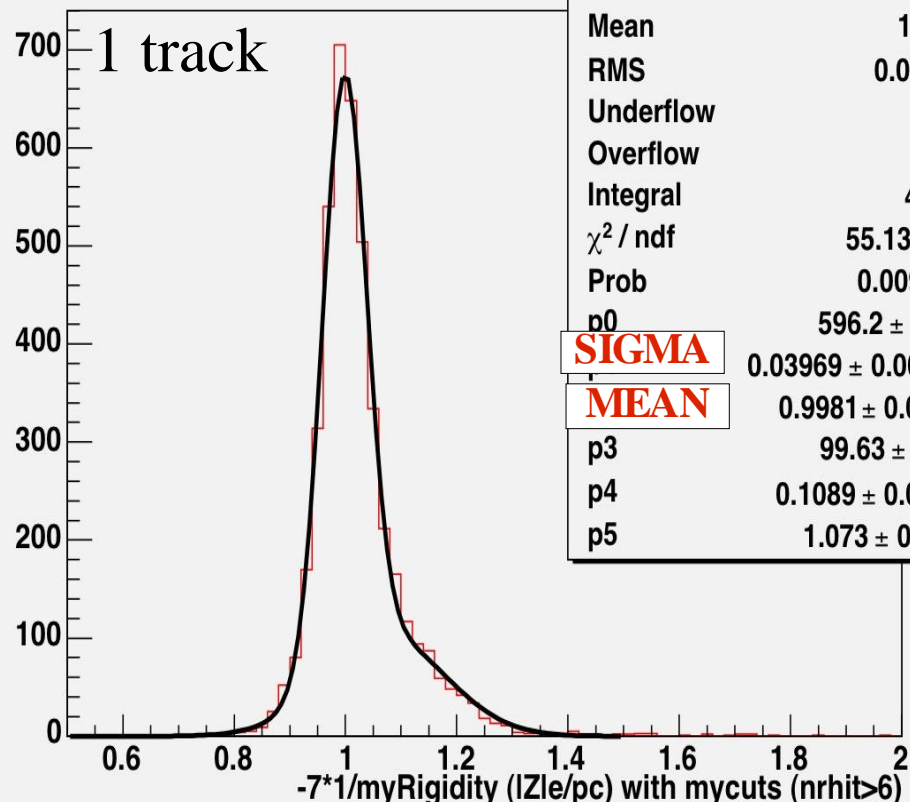
1 track



-7\*1/Rigidity (GV) with mycuts

h7f\_invmyrig7\_mycut\_sonia

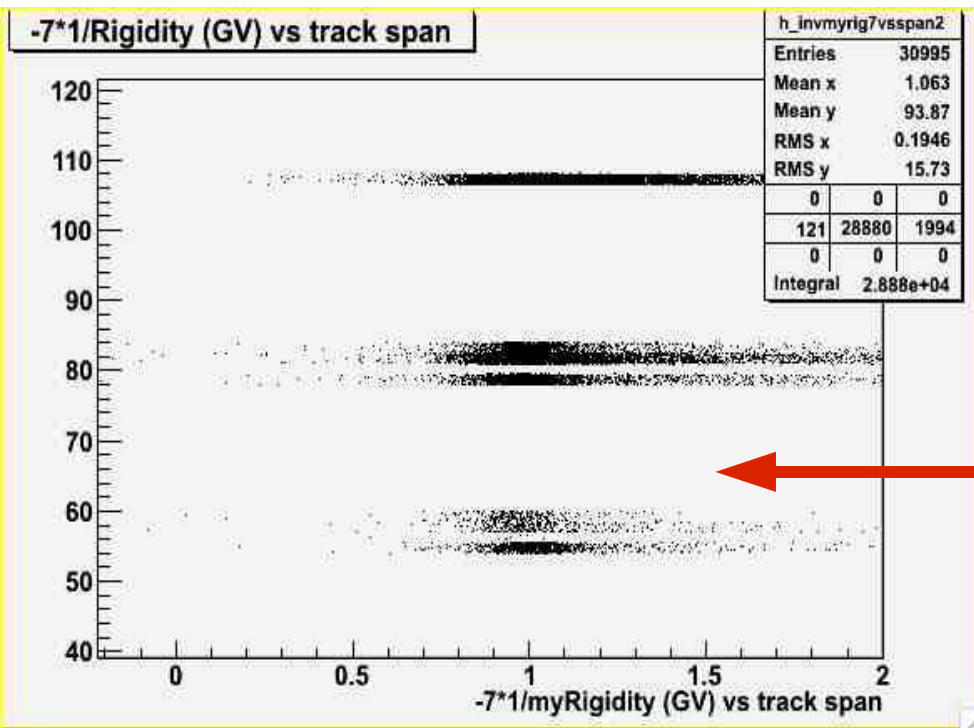
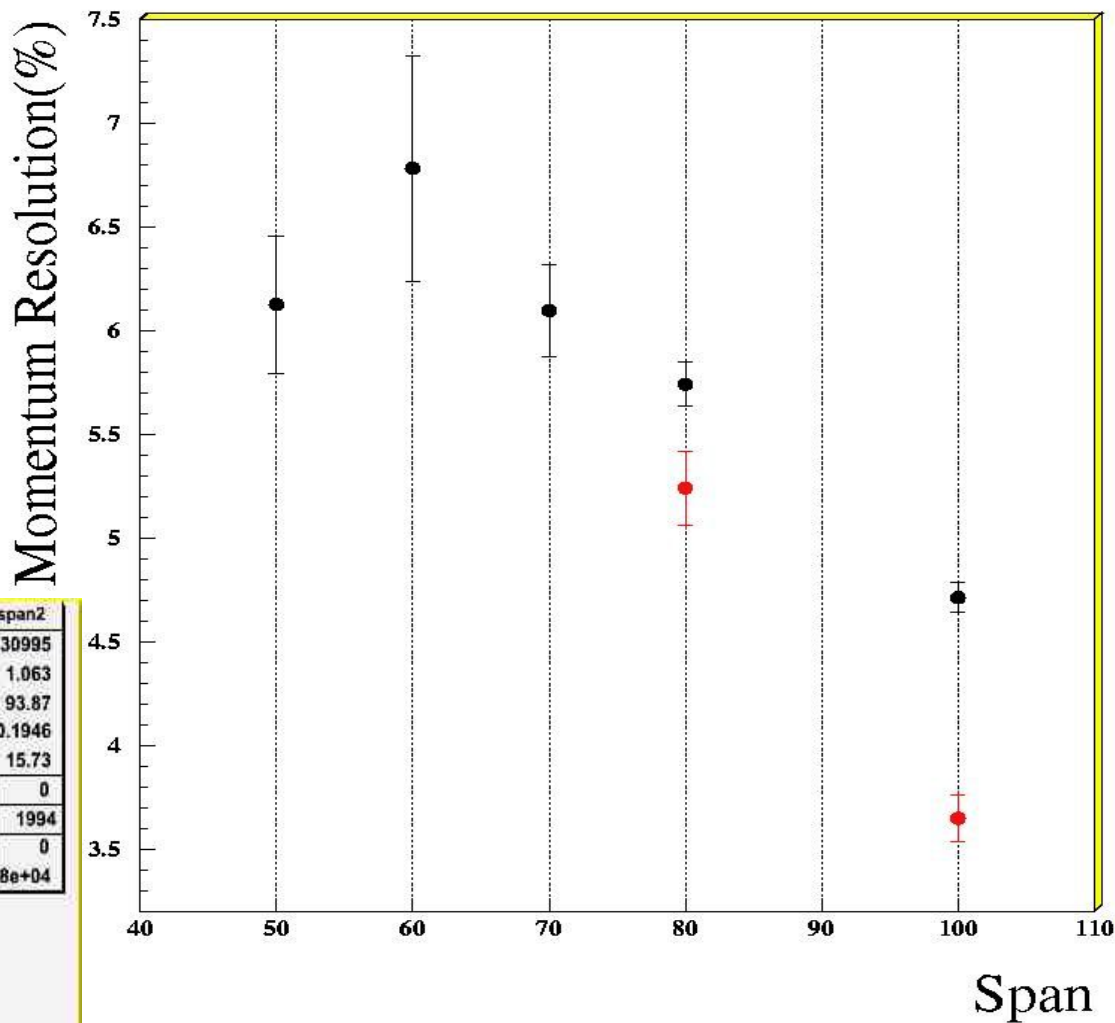
1 track



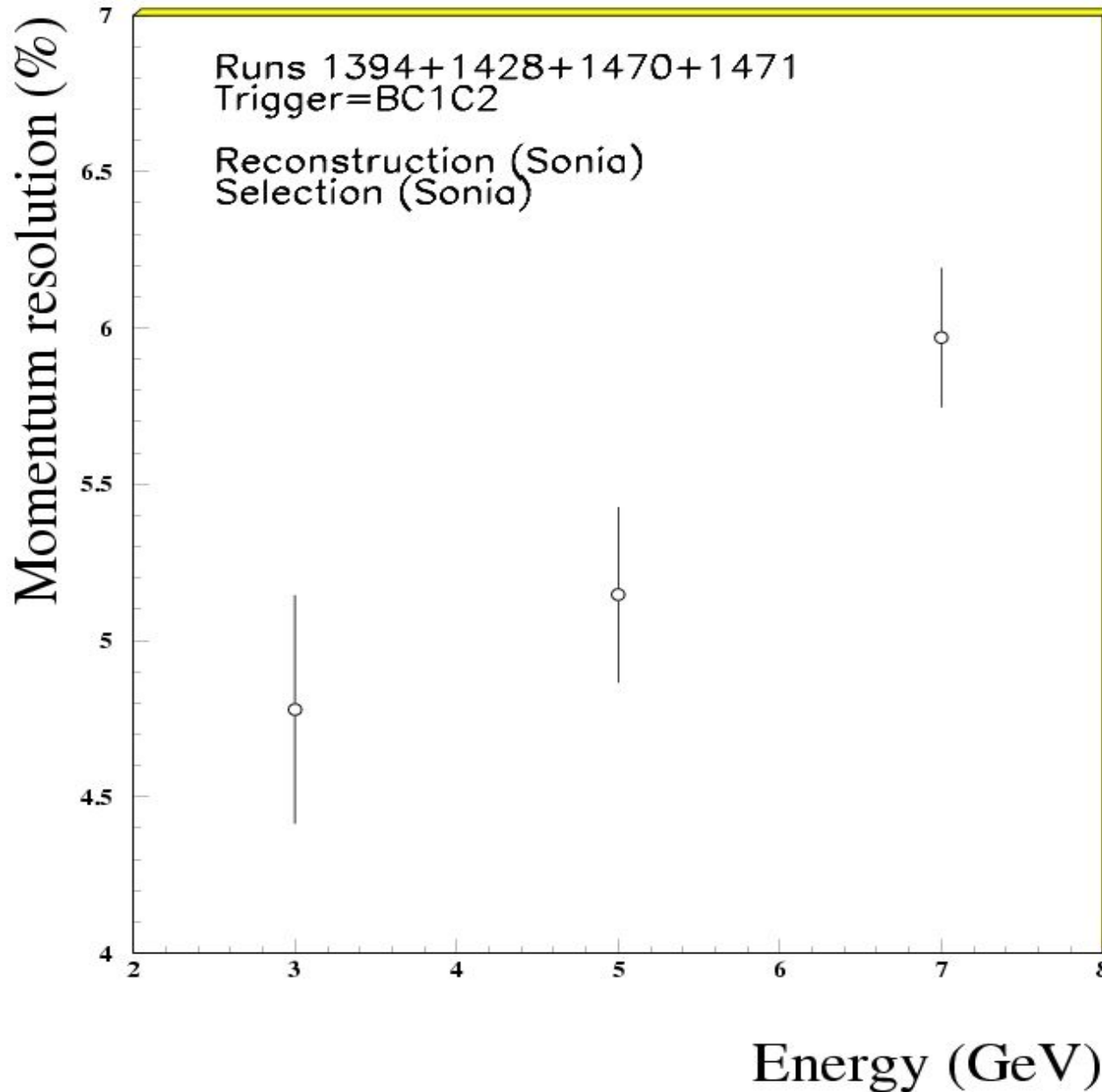


# Momentum vs track length (span)

No cuts  
 With cuts



# Momentum Resolution vs Energy



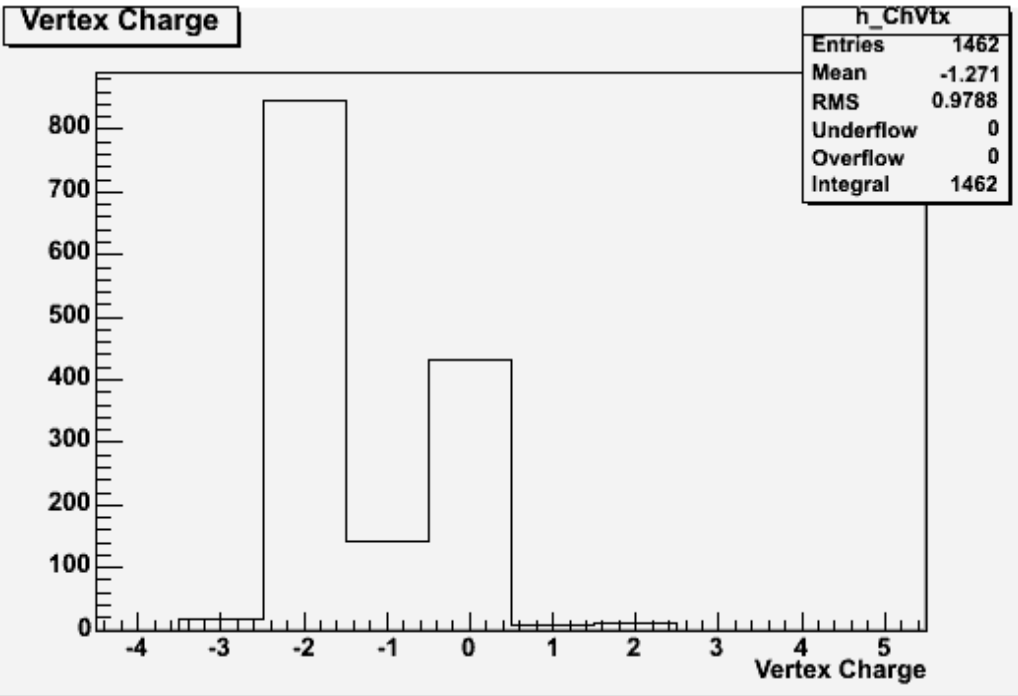
Data Sample:

~ 40000 Events  
@ each energy

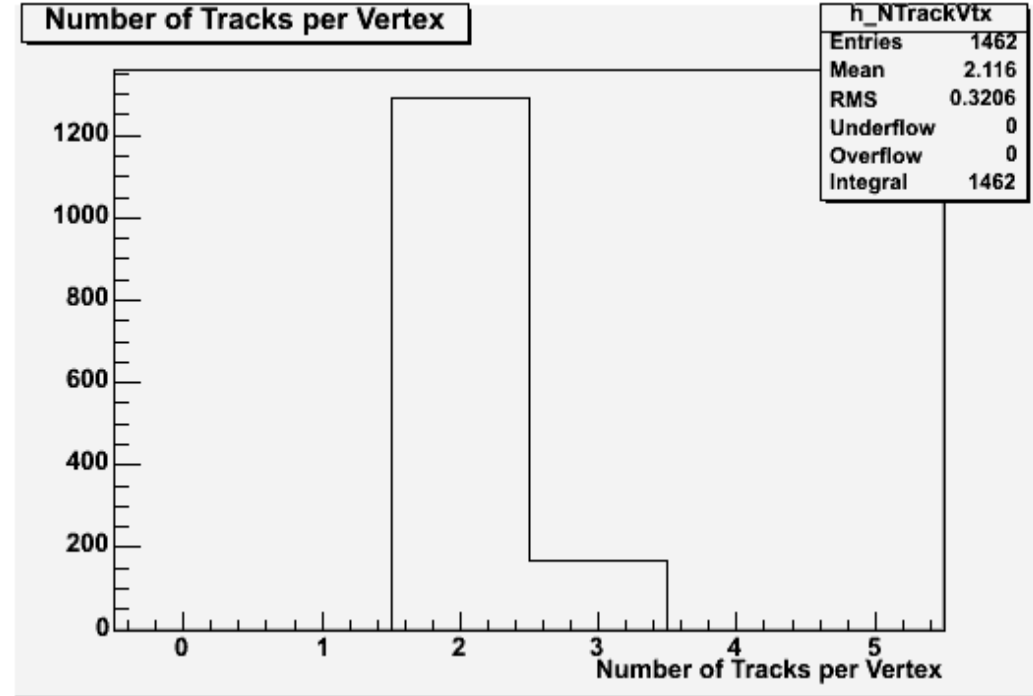
# Vertex distributions

# Global distributions

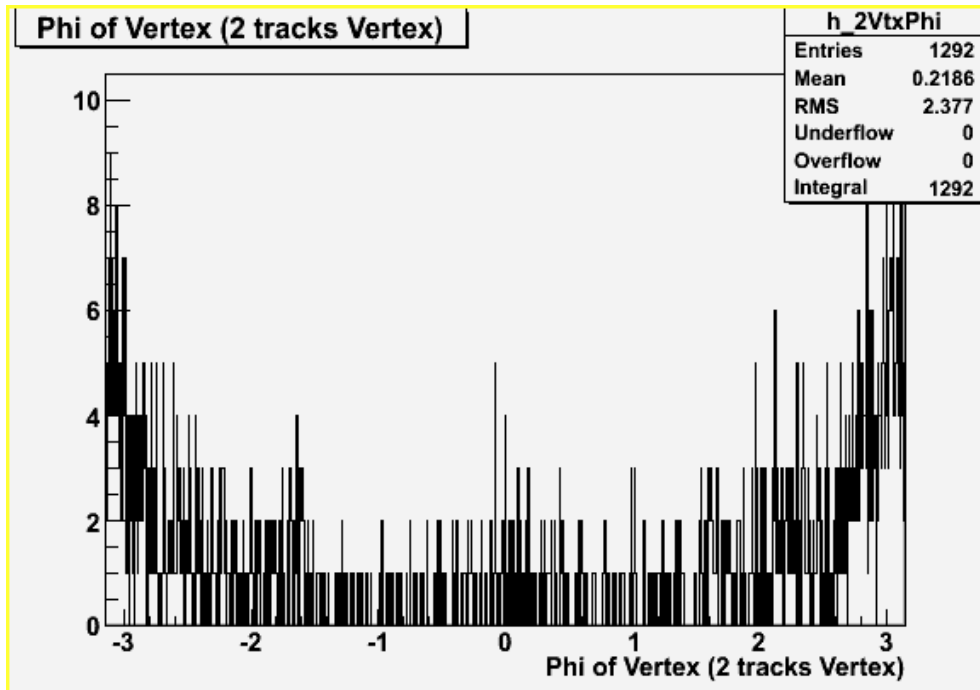
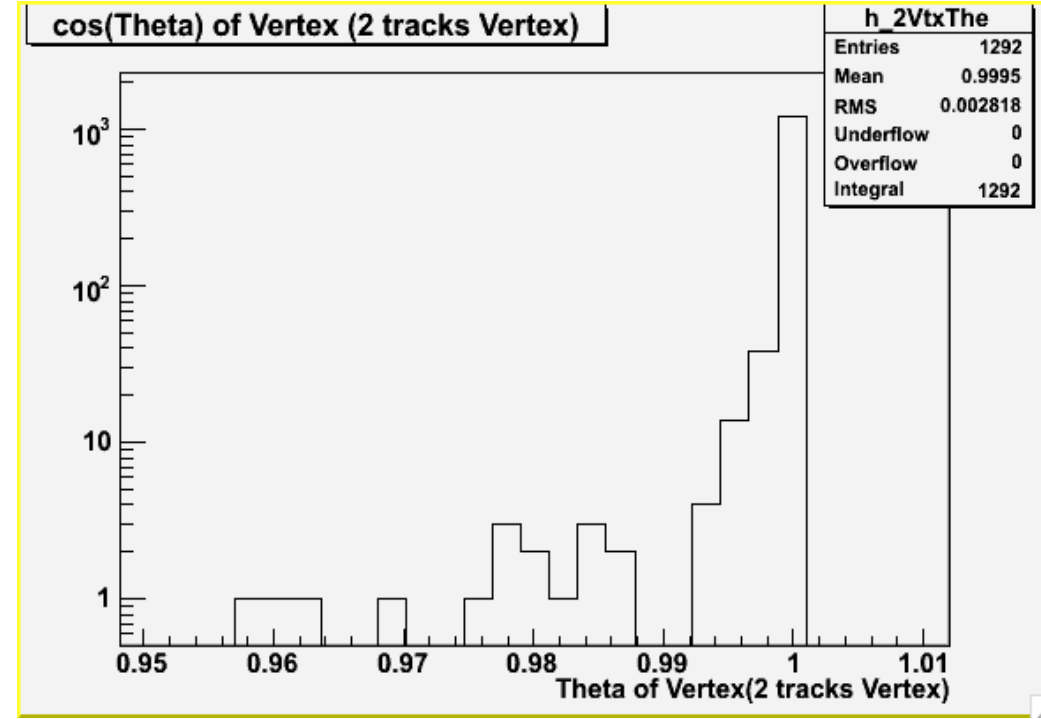
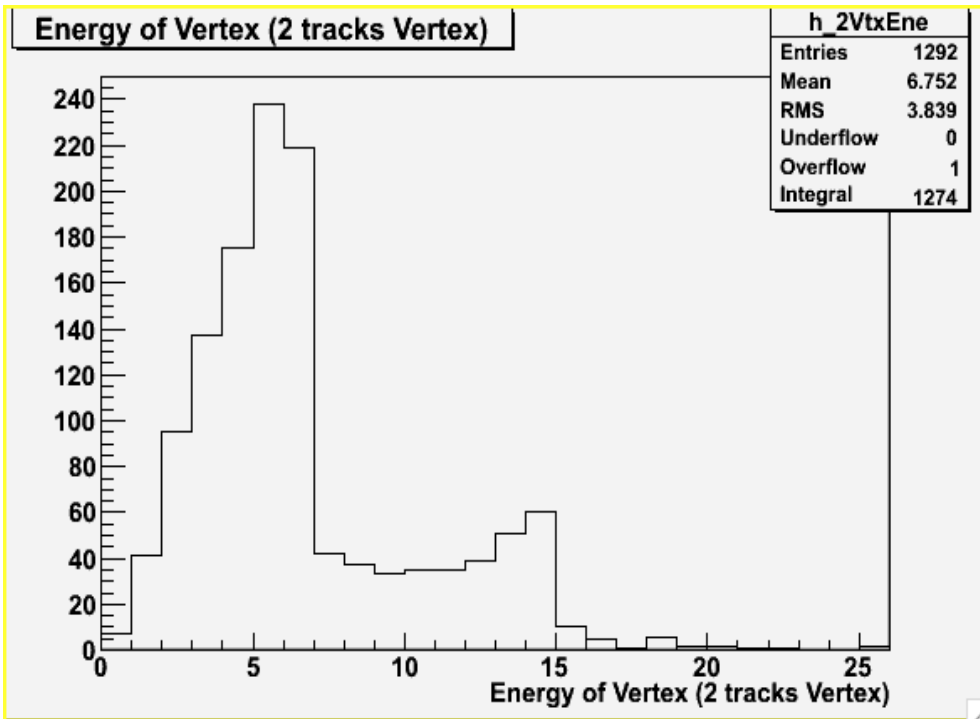
## Global Charge



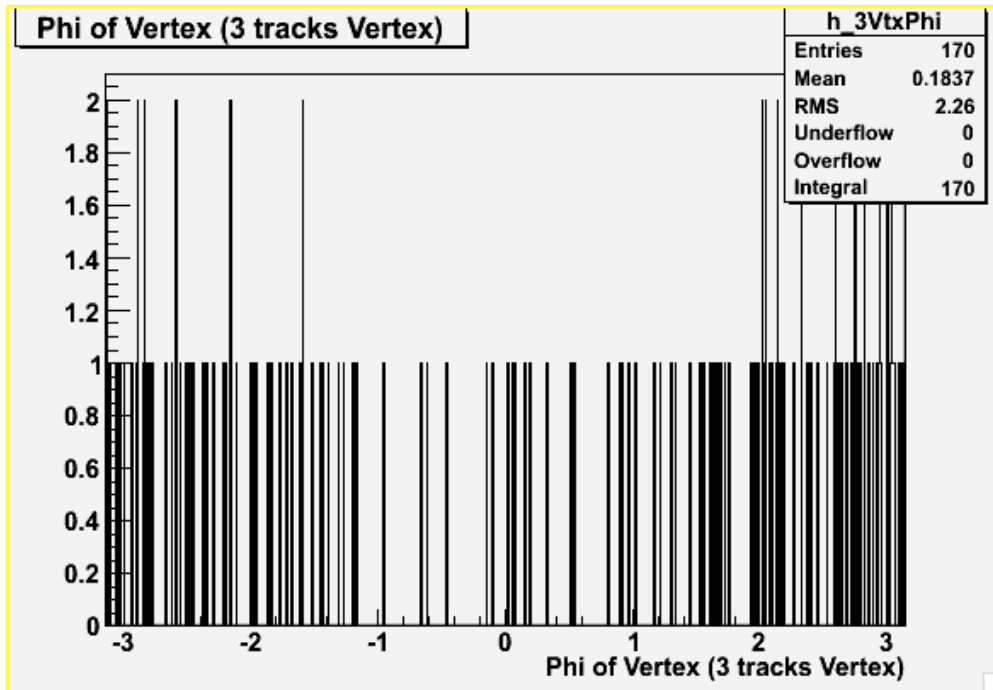
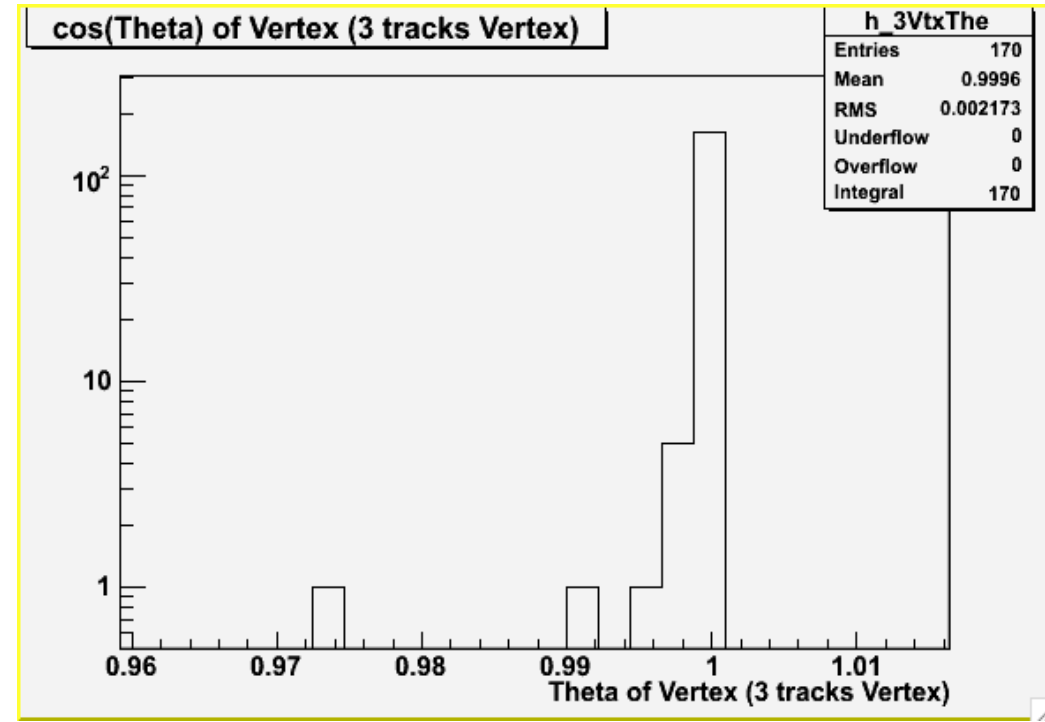
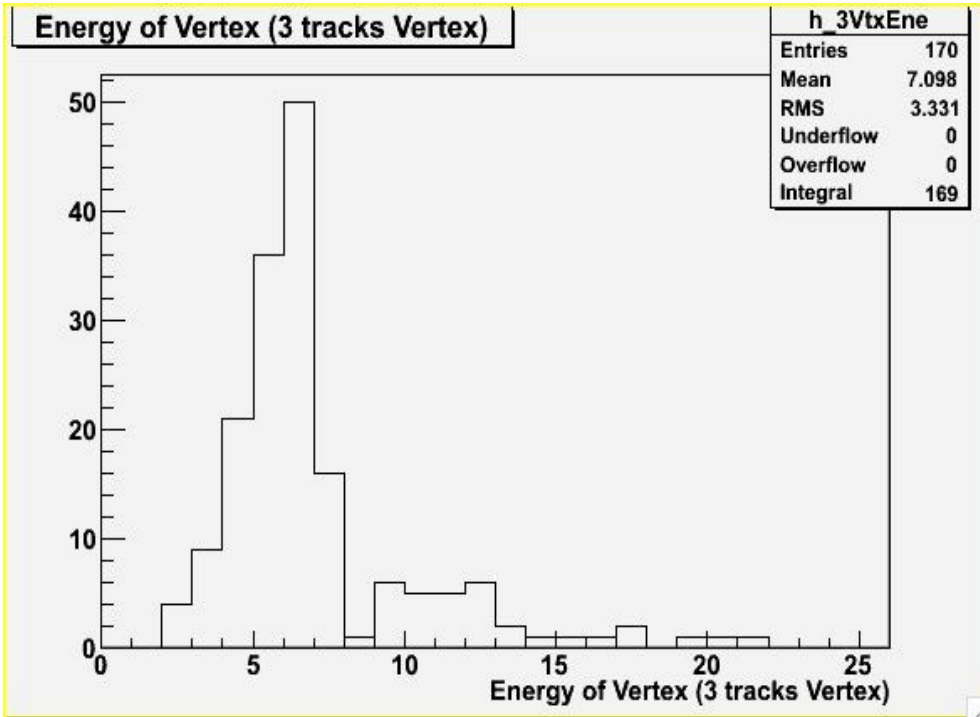
## Number of Tracks



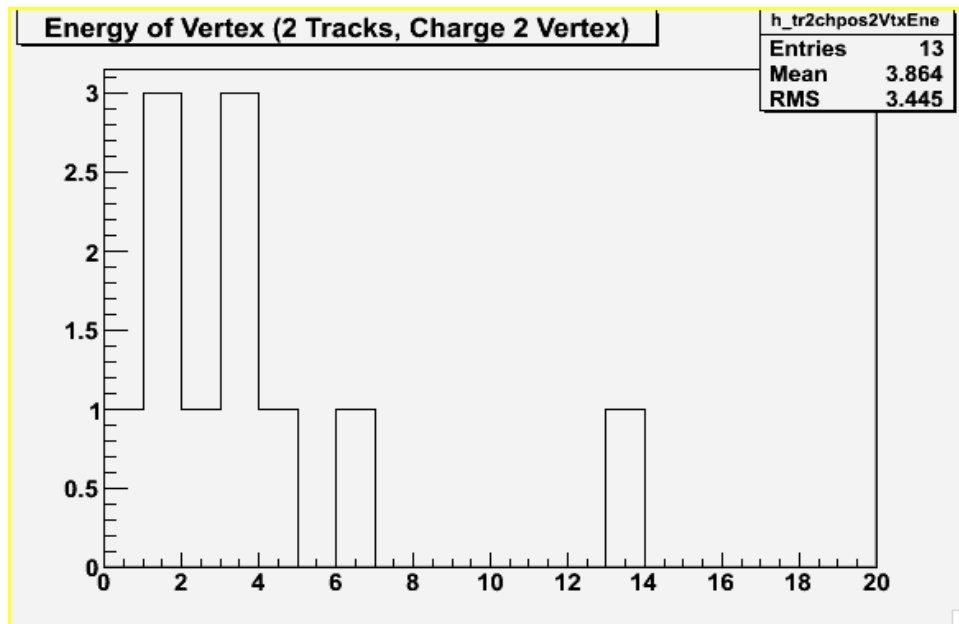
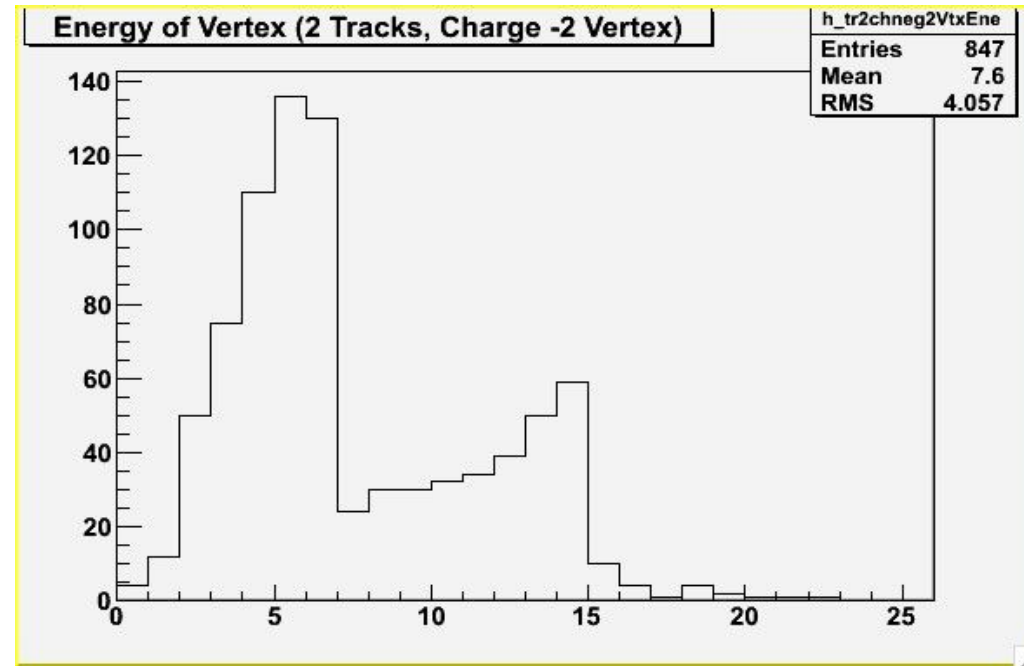
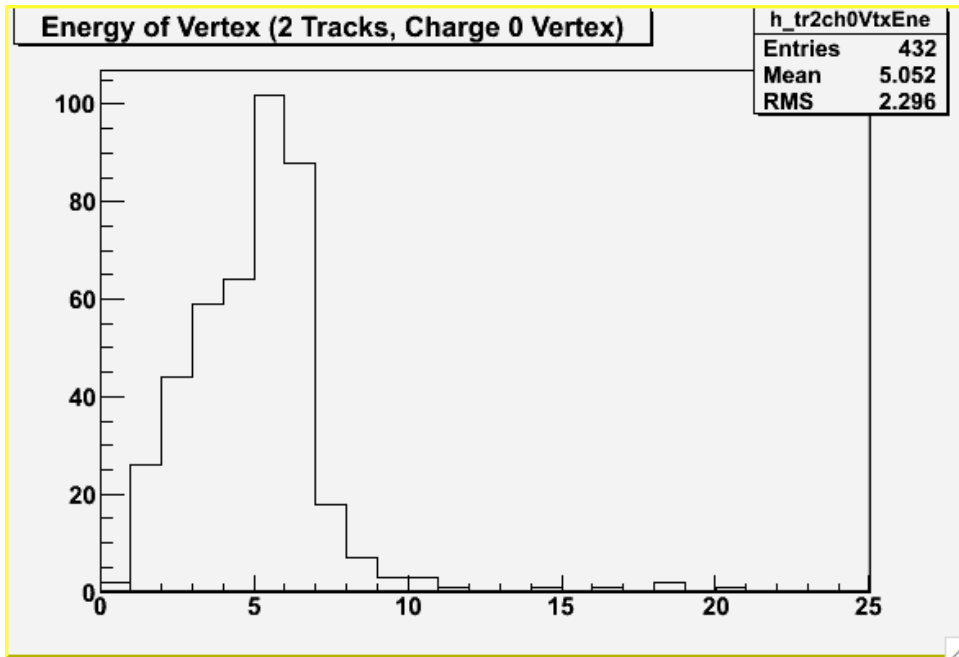
## 2 tracks vertex global distributions



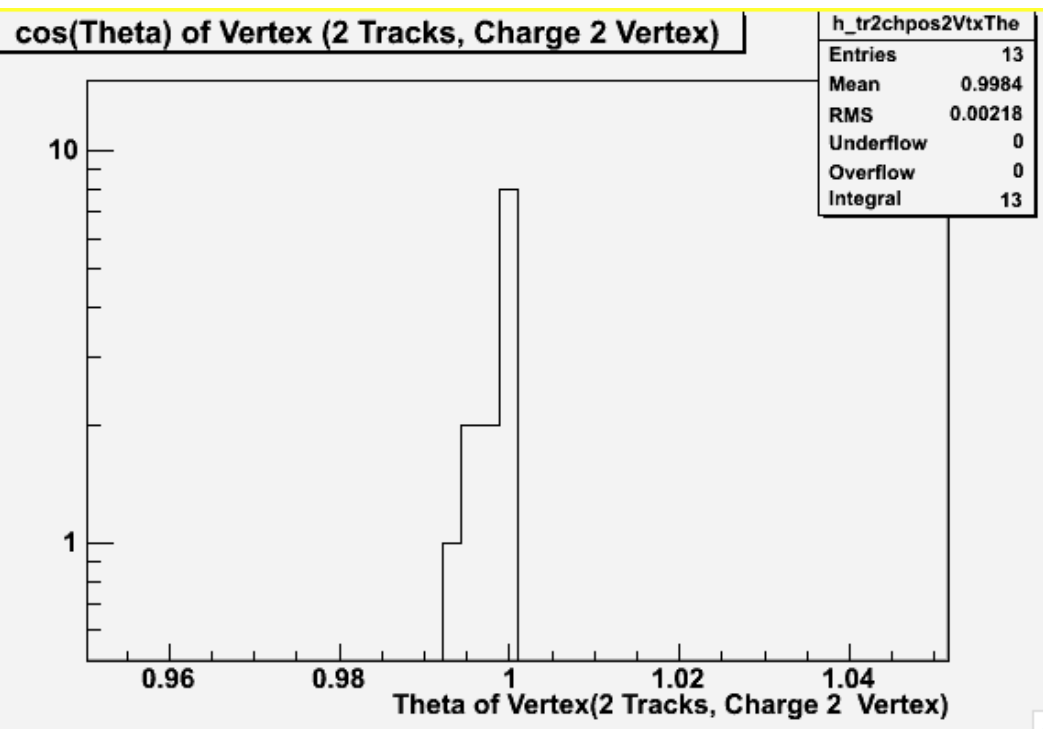
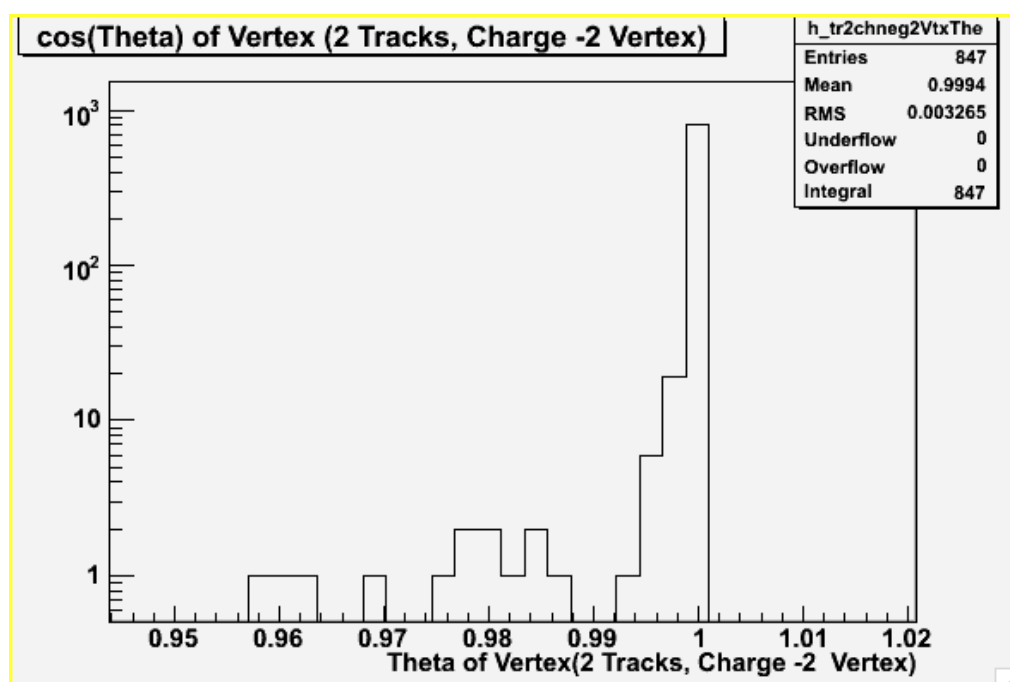
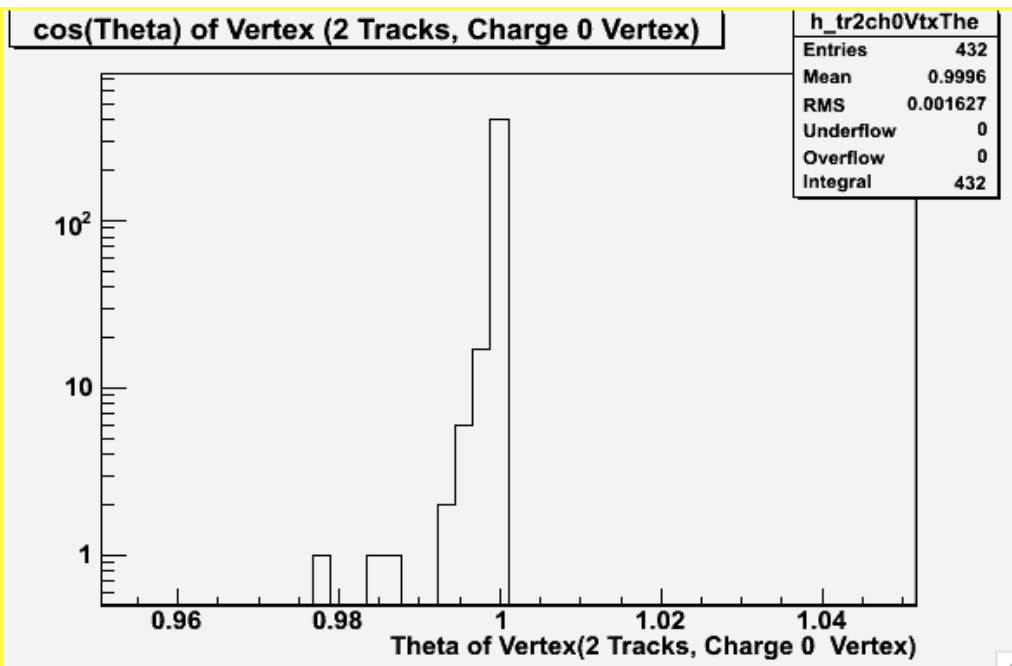
# 3 tracks vertex global distributions



## 2 tracks and different charge: vertex energy

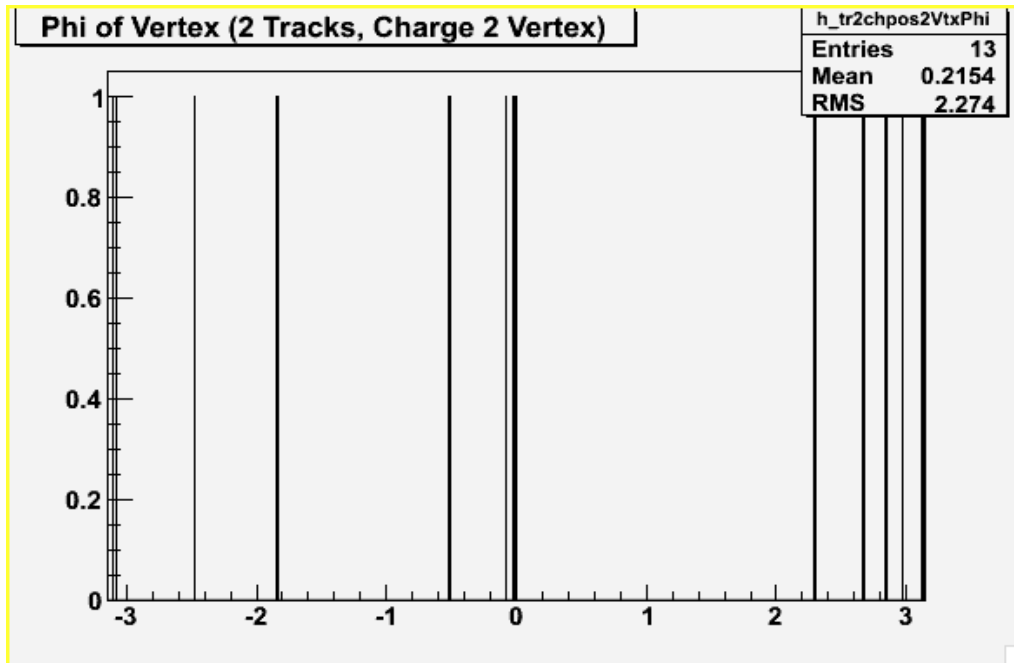
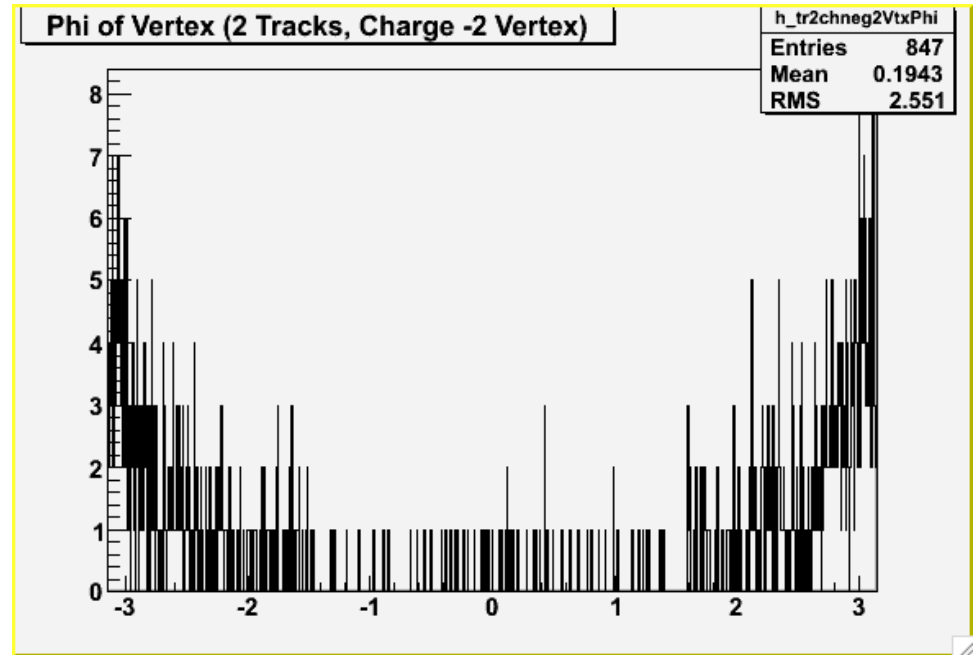
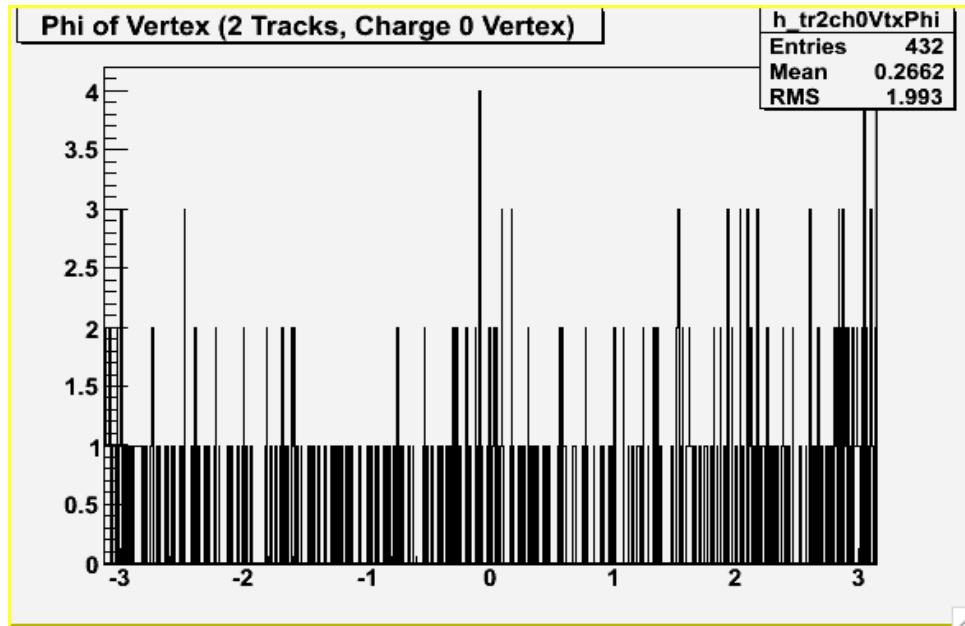


## 2 tracks and different charge: cos(theta) vertex momentum





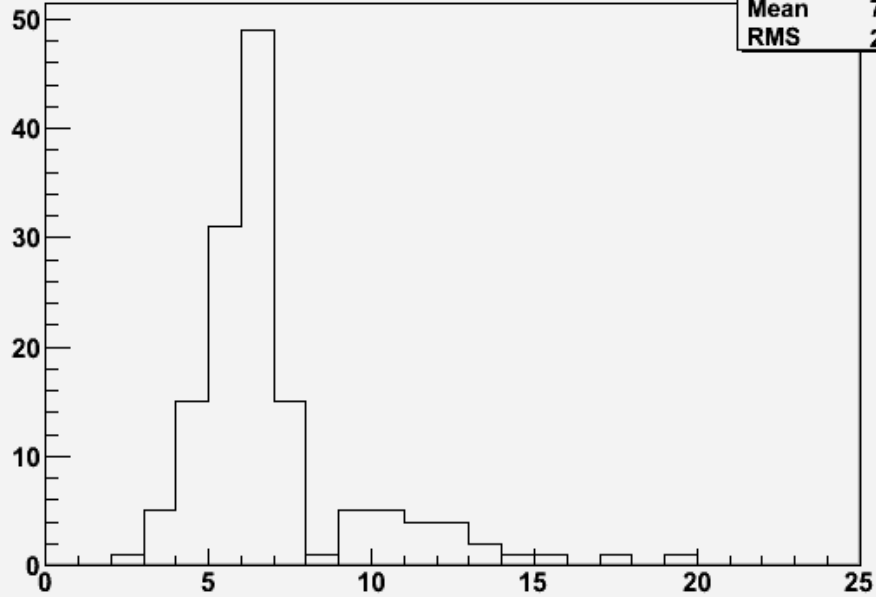
# 2 tracks and different charge: phi vertex momentum



# 3 tracks and different charge: vertex energy

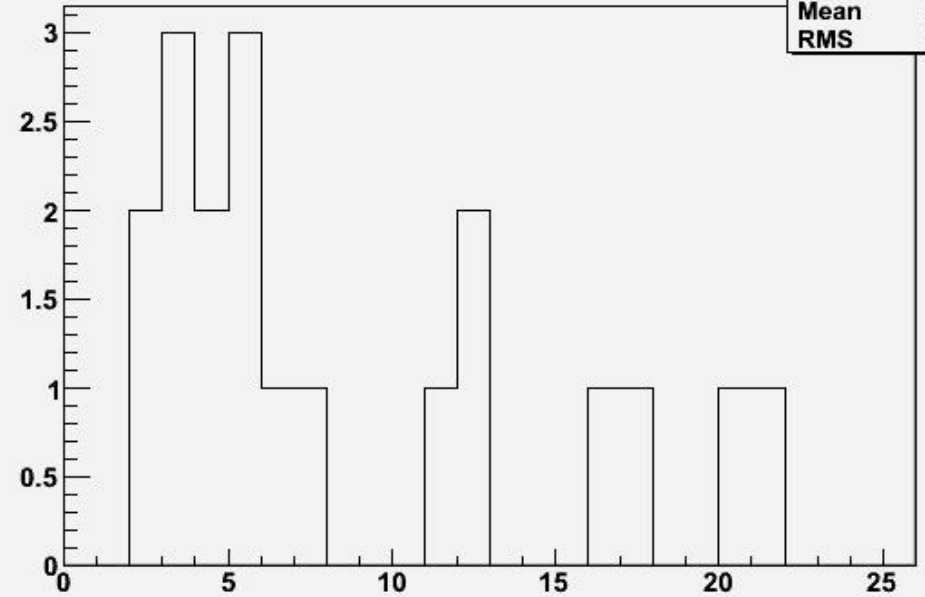
Energy of Vertex (3 Tracks, Charge -1 Vertex)

h_tr3chneg1VtxEne	
Entries	142
Mean	7.004
RMS	2.712



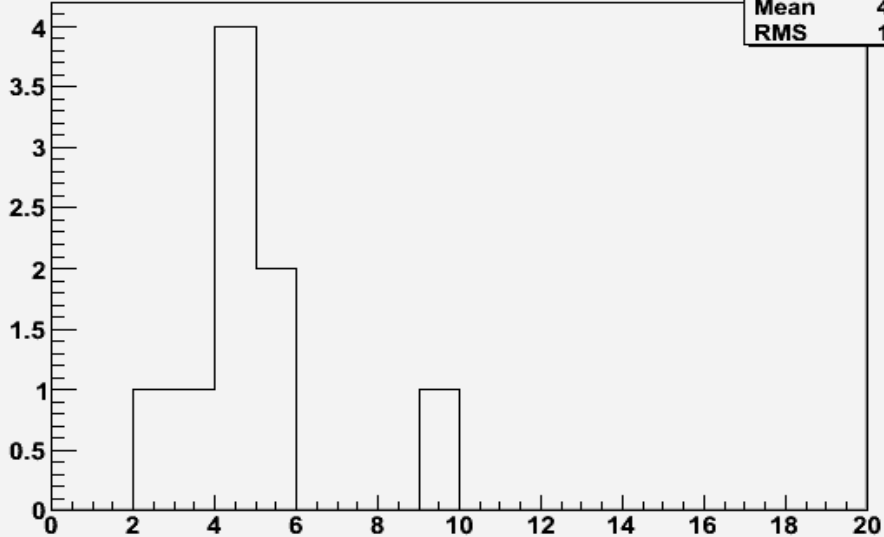
Energy of Vertex (3 Tracks, Charge -3 Vertex)

h_tr3chneg3VtxEne	
Entries	19
Mean	8.816
RMS	6.105



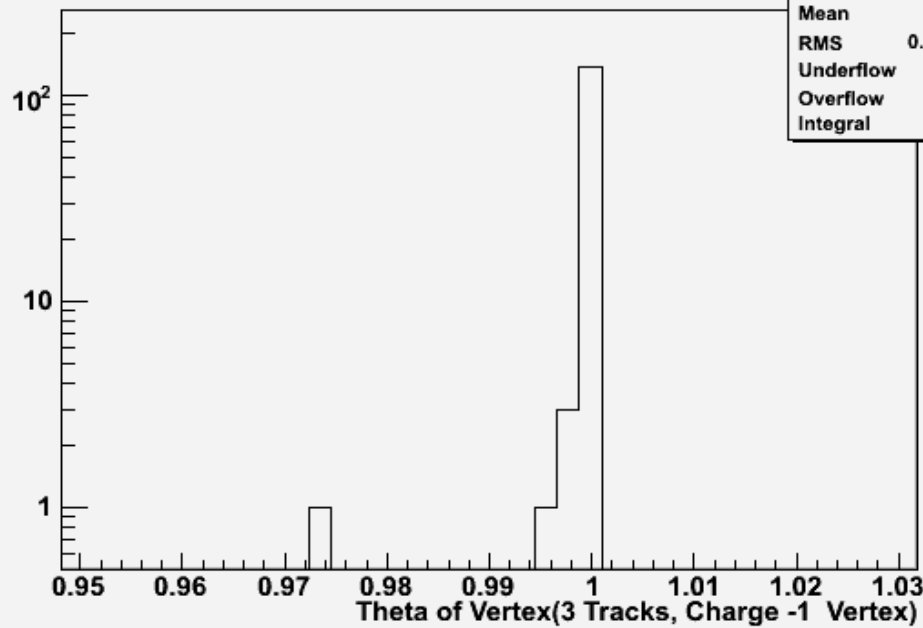
Energy of Vertex (3 Tracks, Charge 1 Vertex)

h_tr3chpos1VtxEne	
Entries	9
Mean	4.944
RMS	1.832

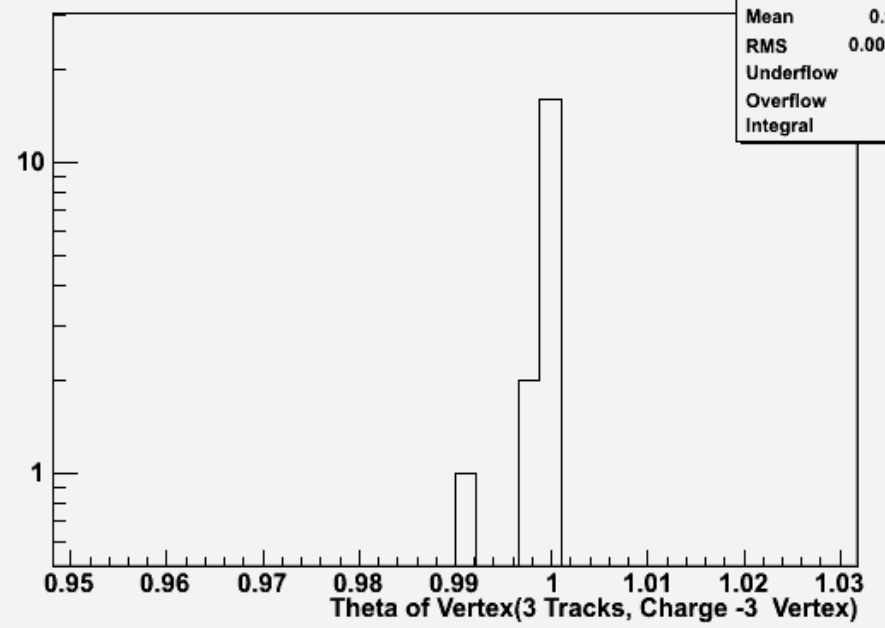


# 3 tracks and different charge: cos(theta) vertex momentum

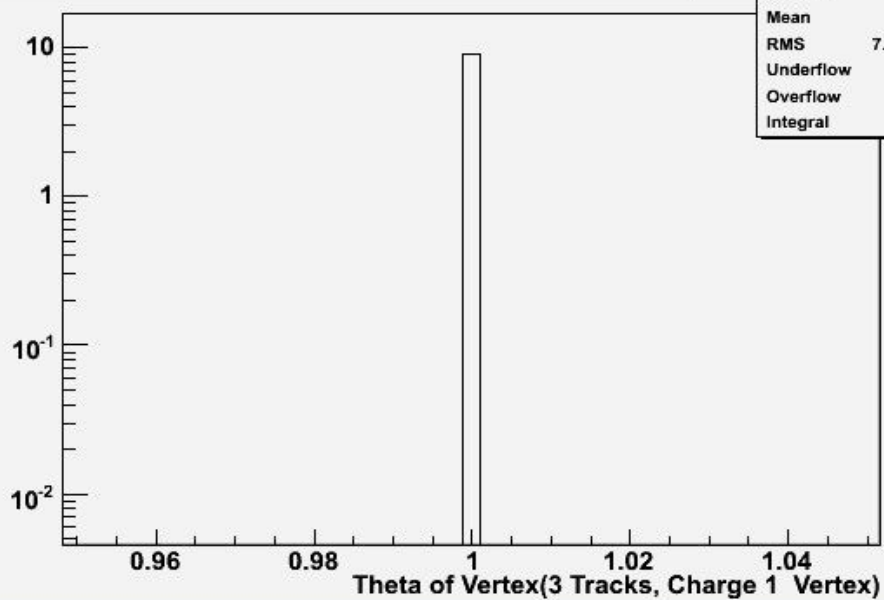
cos(Theta) of Vertex (3 Tracks, Charge -1 Vertex)



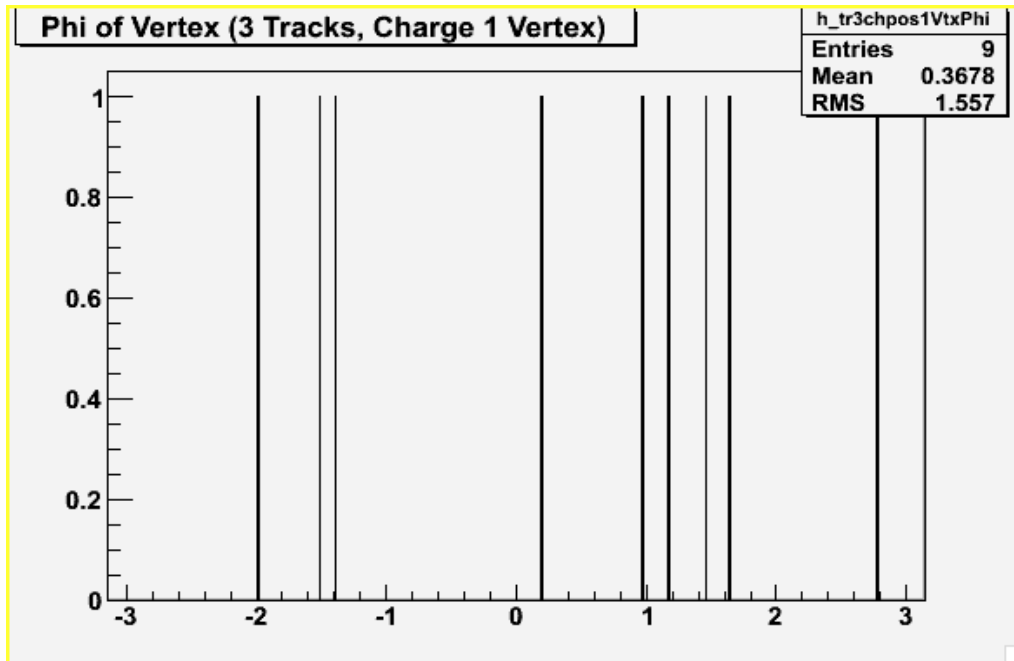
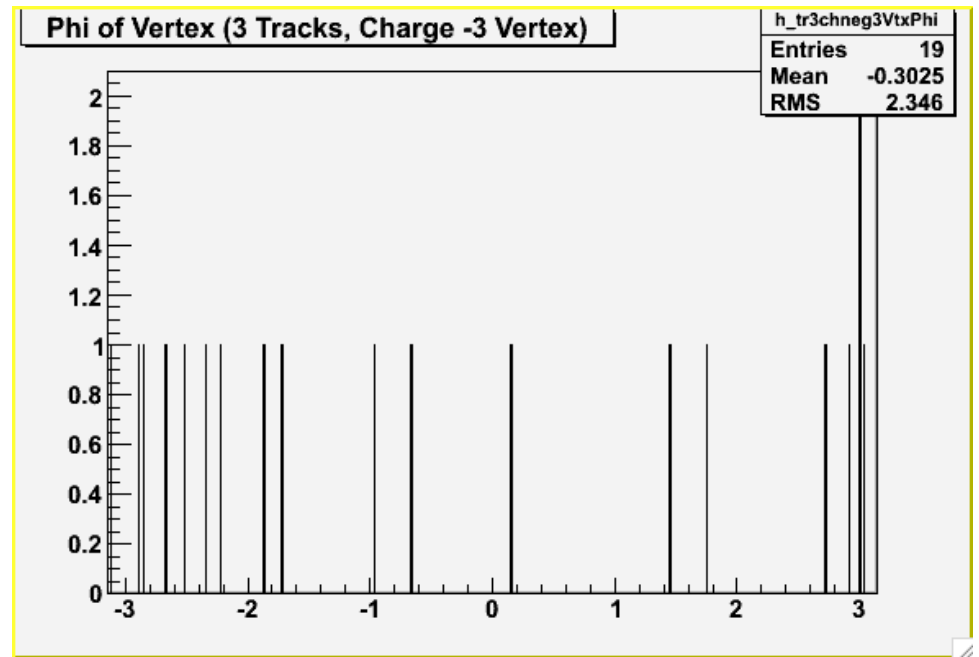
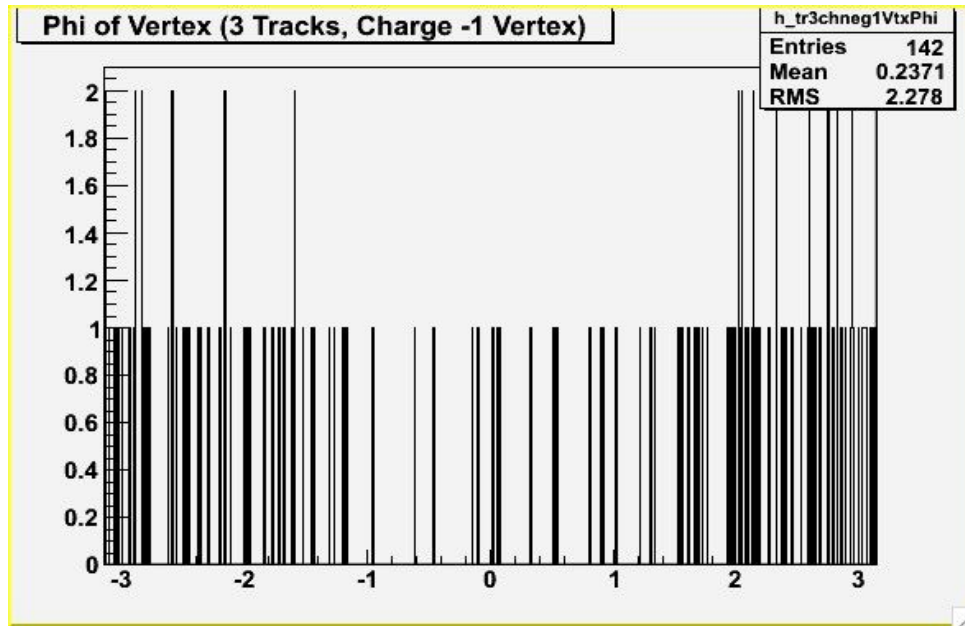
cos(Theta) of Vertex (3 Tracks, Charge -3 Vertex)



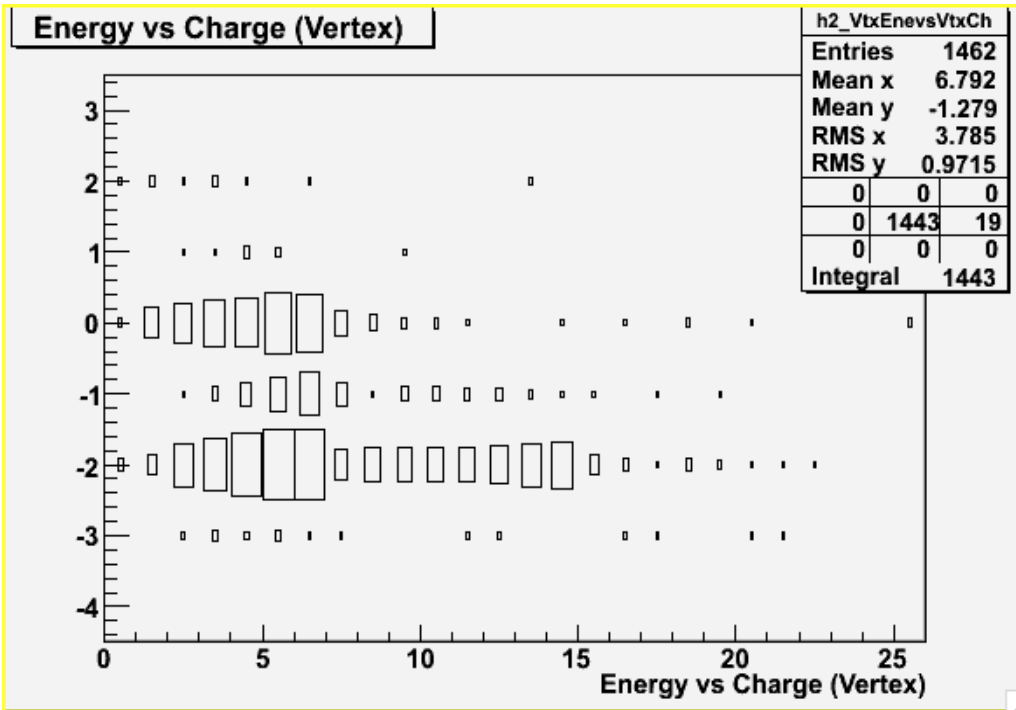
cos(Theta) of Vertex (3 Tracks, Charge 1 Vertex)



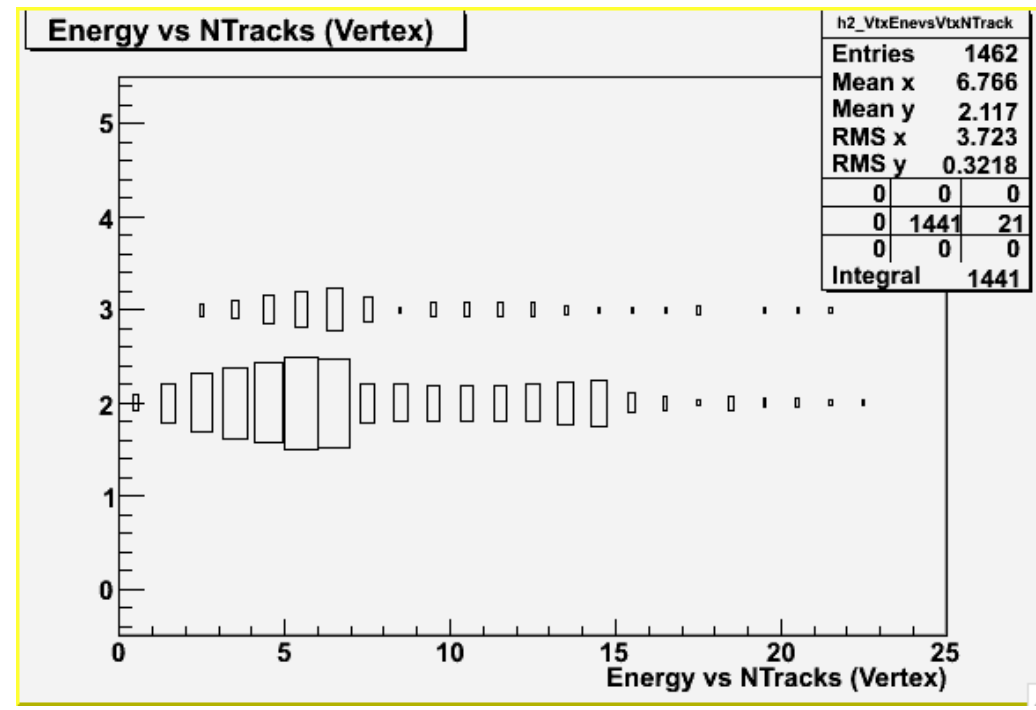
# 3 tracks and different charge: phi vertex momentum



# Vertex Energy vs .....

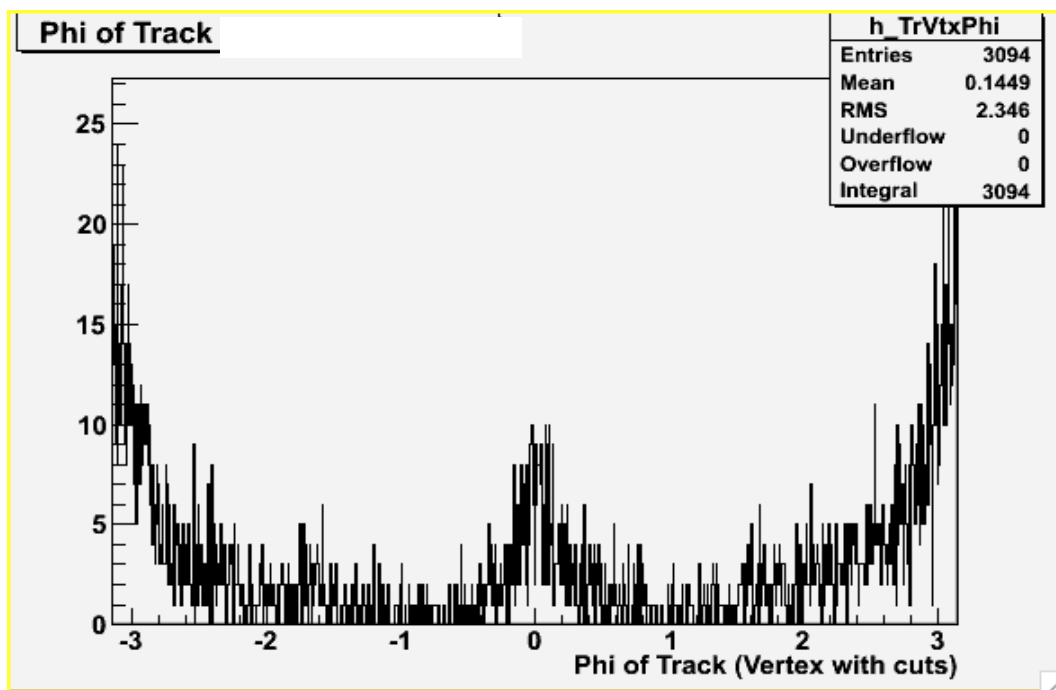
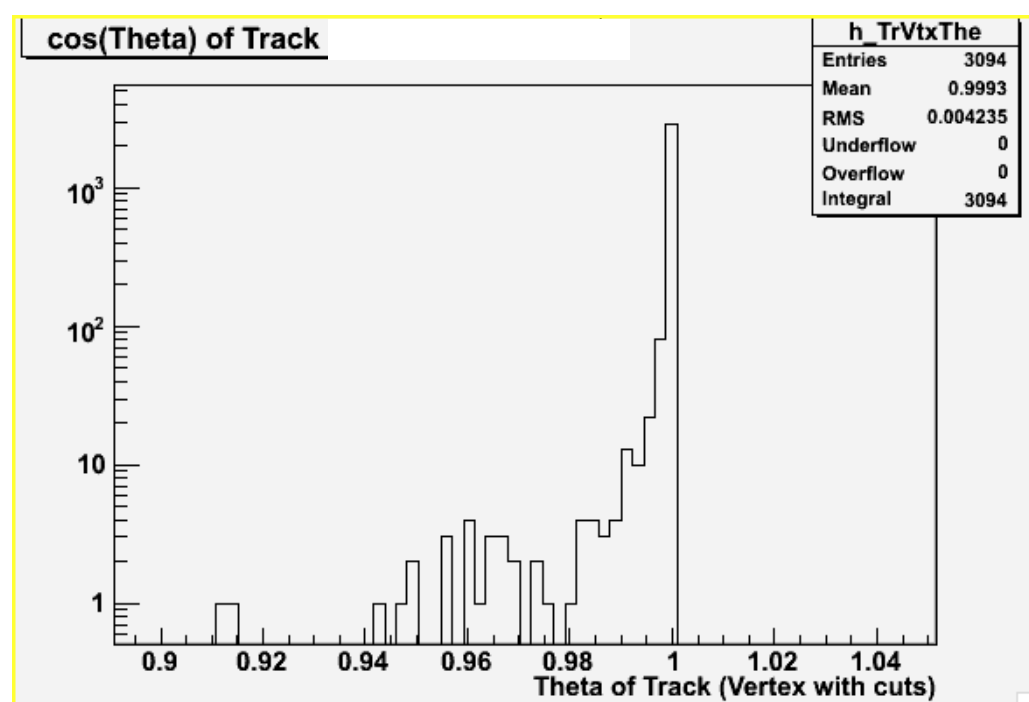
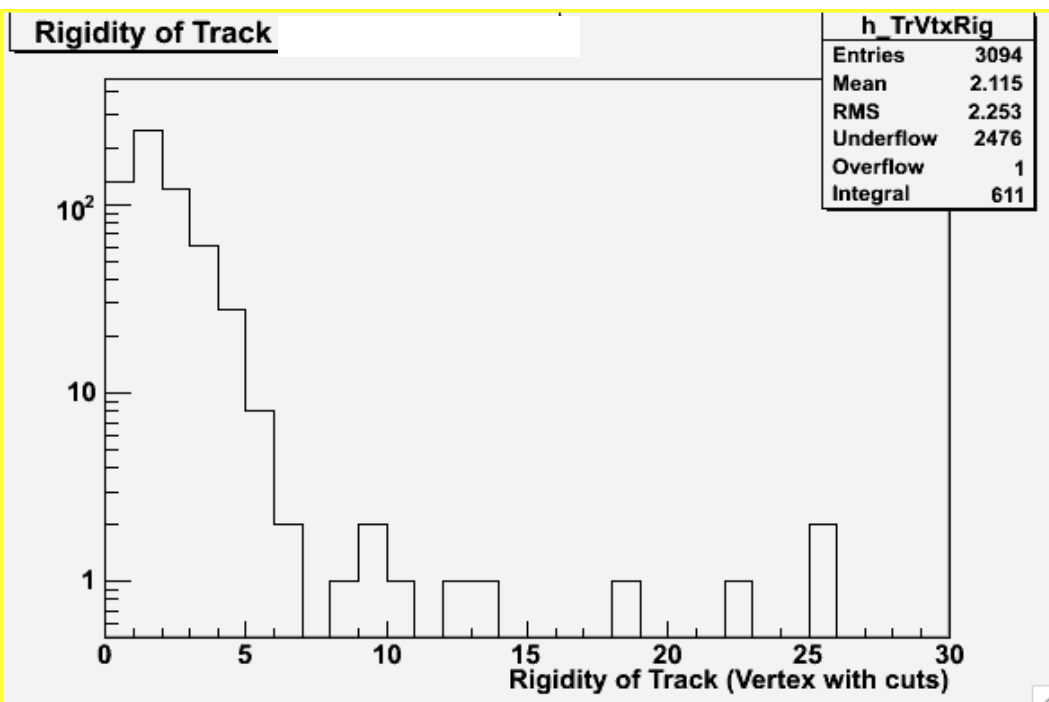


Vertex Charge

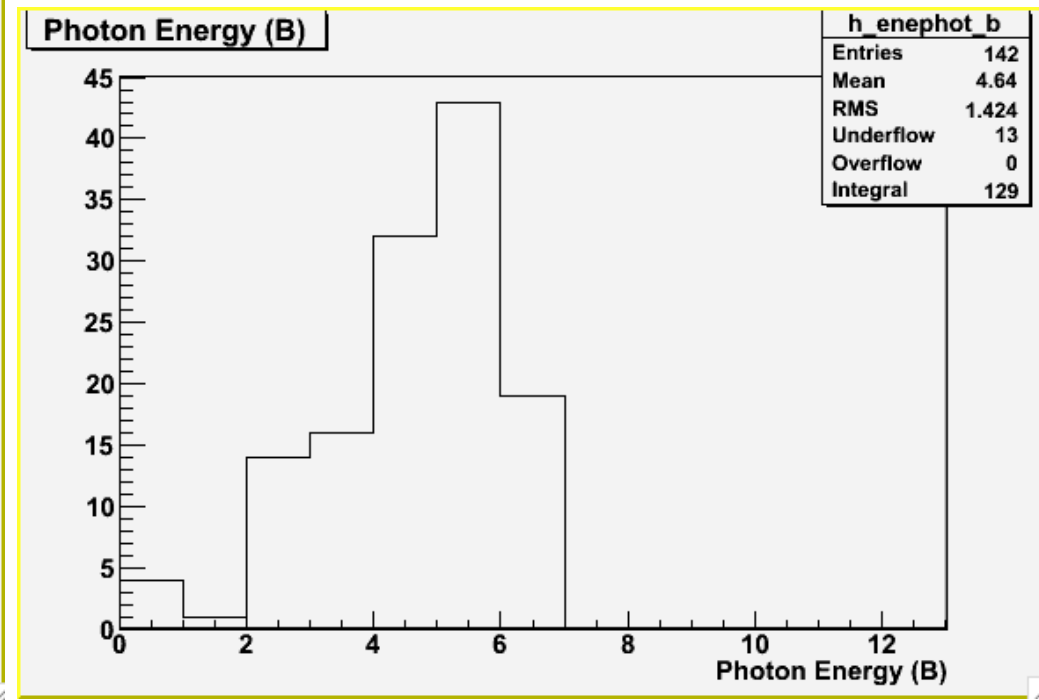
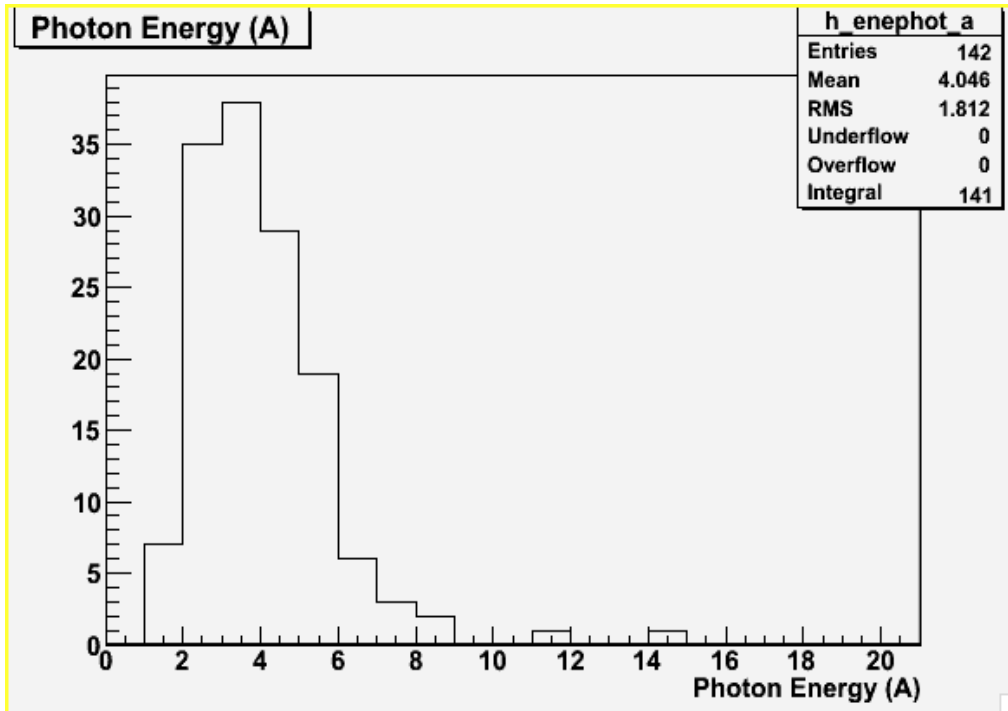
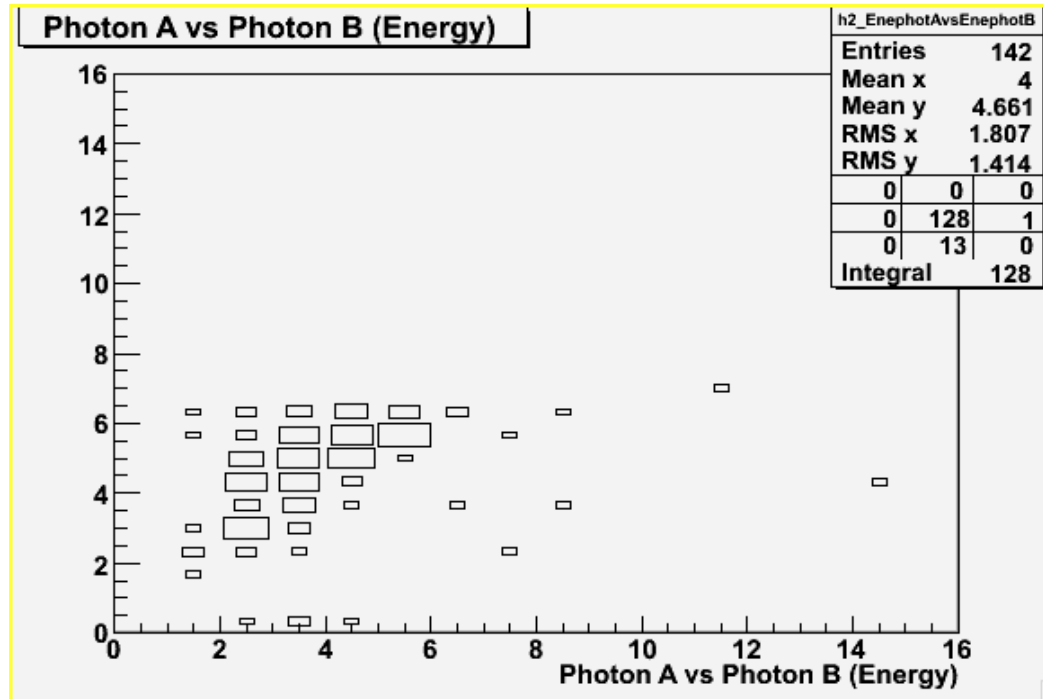


Vertex NTracks

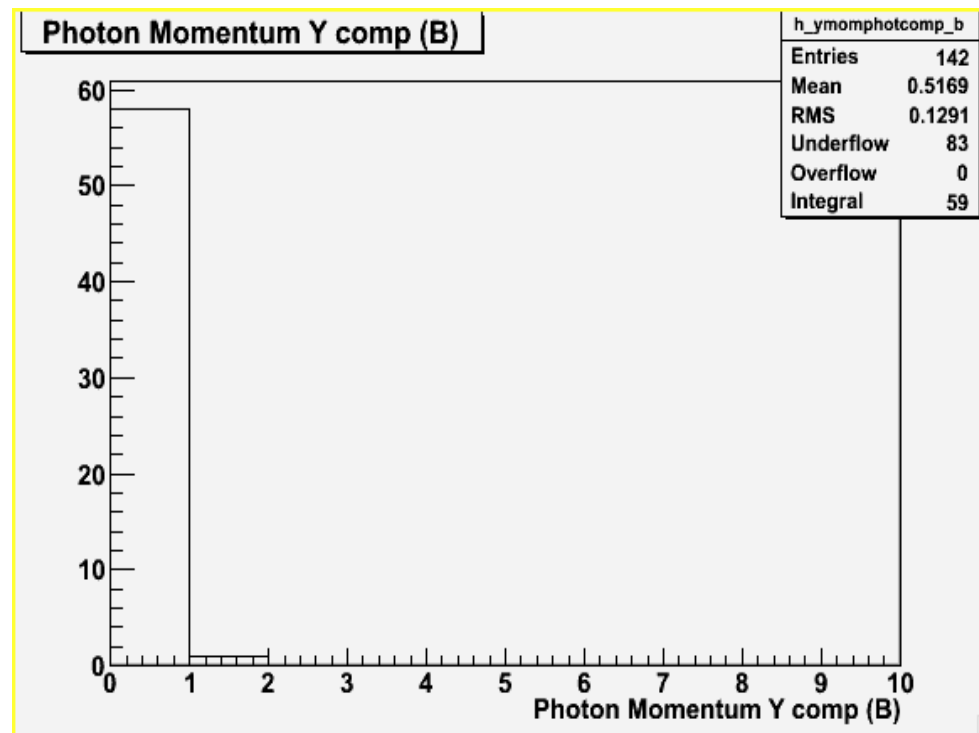
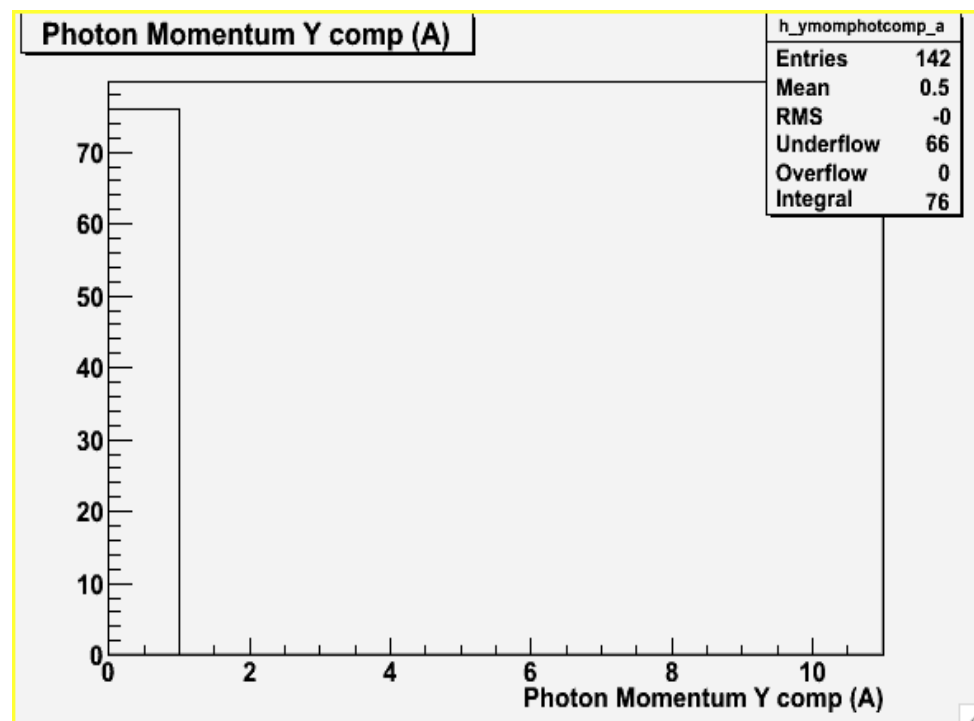
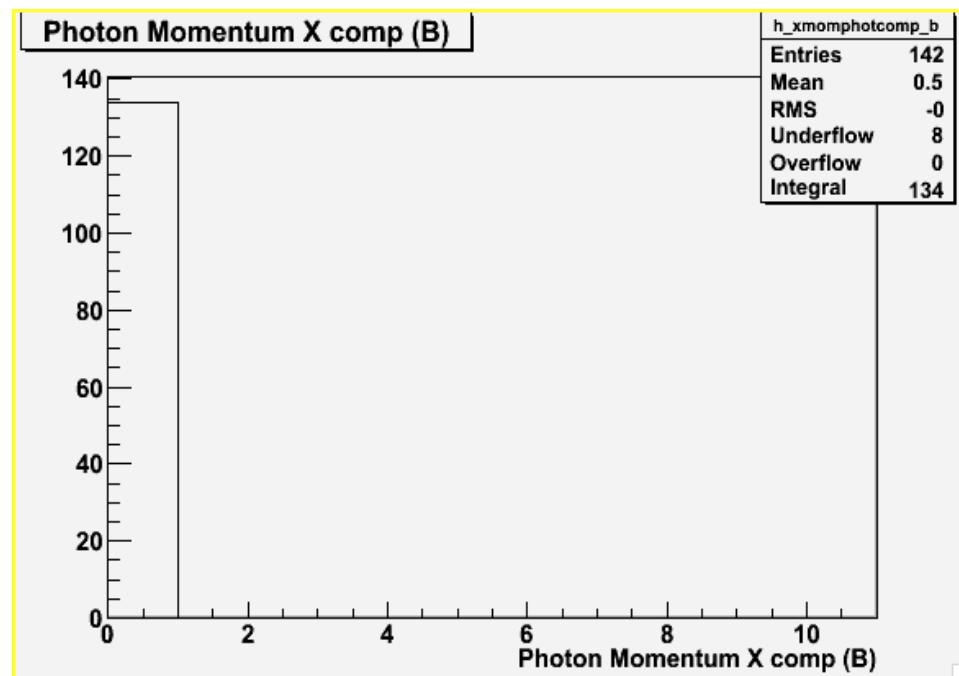
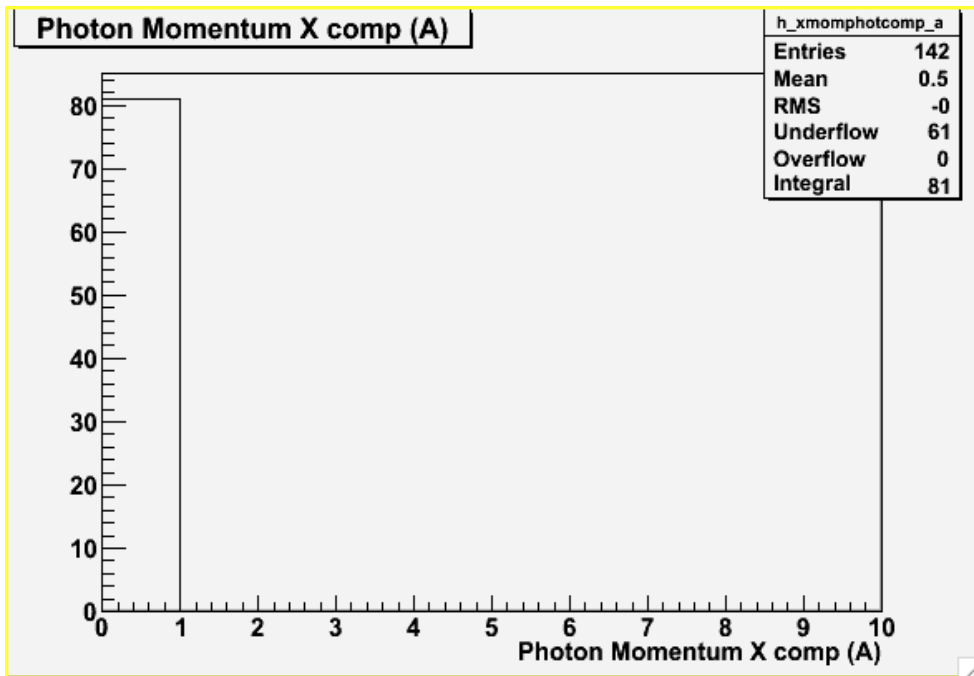
# Vertex Track distributions



# Photon Energy (A) vs Photon Energy (B)

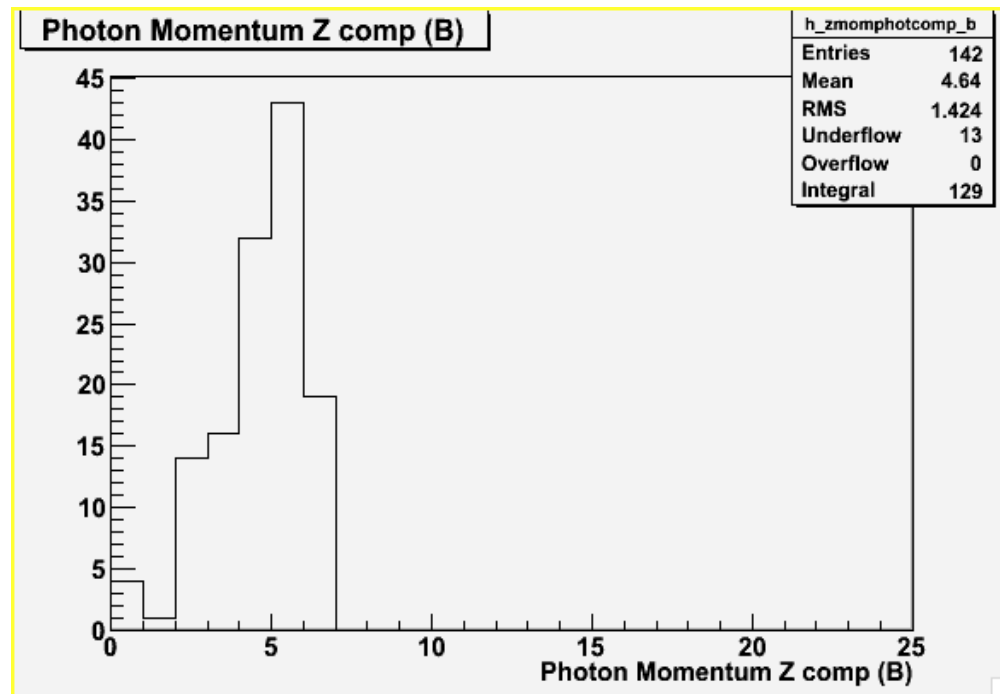
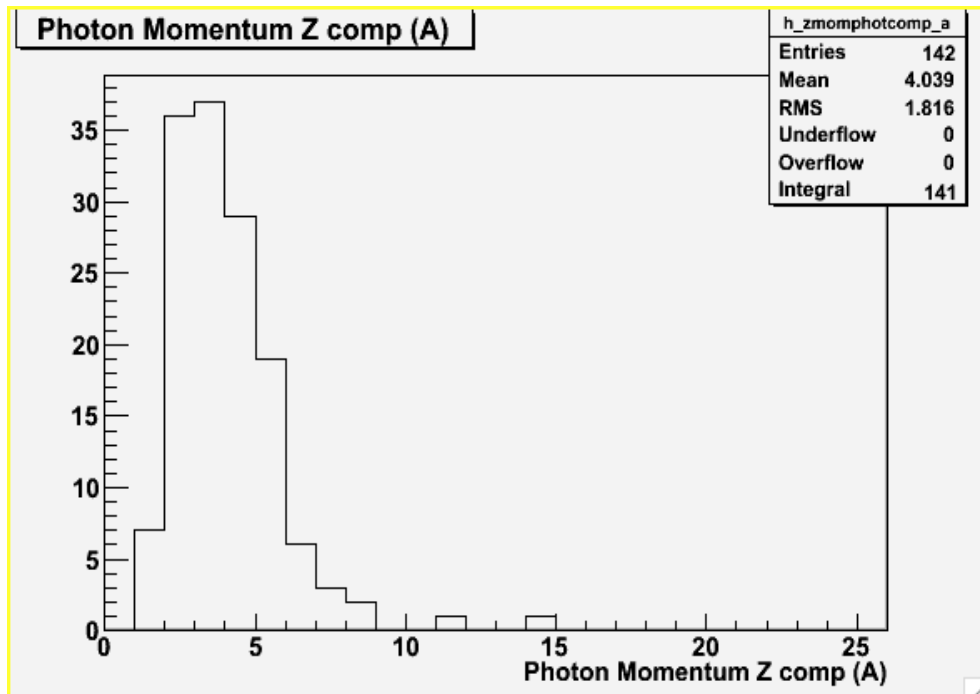


# Photon A and Photon B Momentum components (x,y)

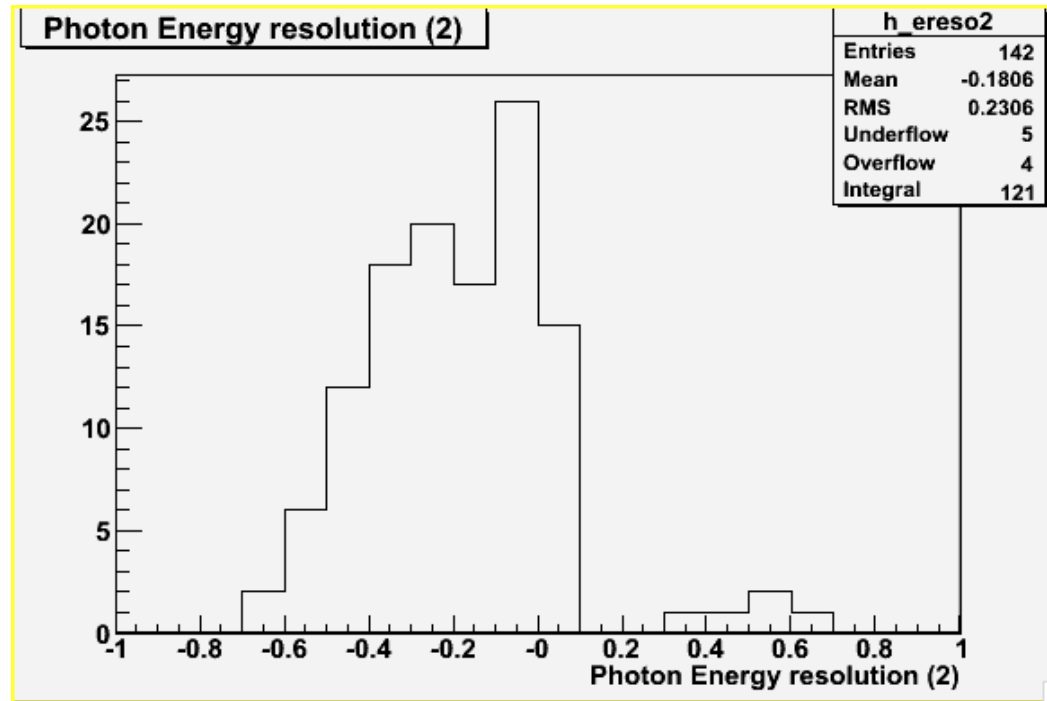




# Photon A and Photon B Momentum components (z)



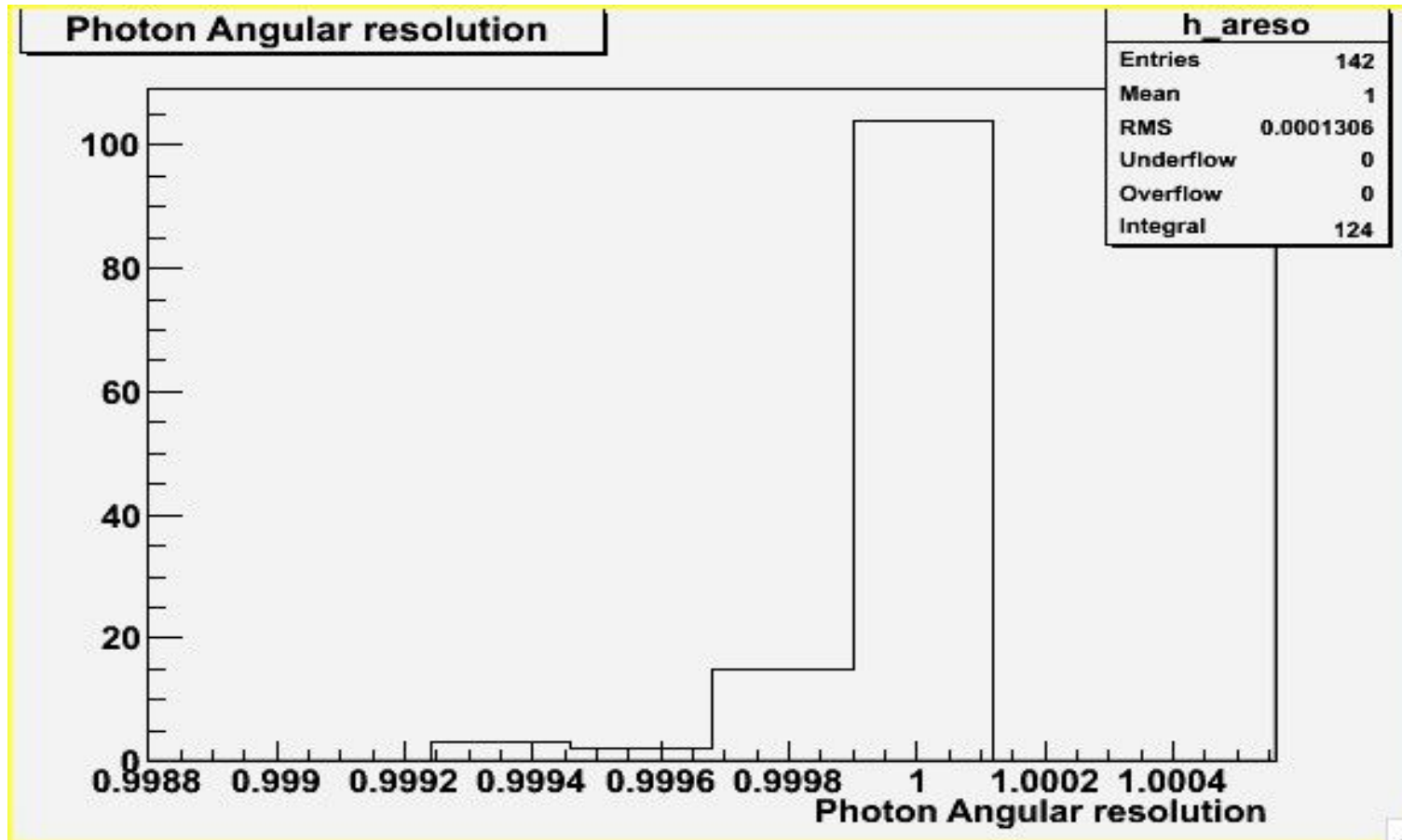
# Photon Energy Resolution



Photon Energy (A)-Photon Energy (B)

Photon Energy (B)

# Photon Angular Resolution



$$\cos(\Delta \theta) = \frac{\mathbf{p}_A \cdot \mathbf{p}_B}{|\mathbf{p}_A| |\mathbf{p}_B|}$$

# Summary @ 16/11/05

	<b>Standard Reco</b>	<b>My Reco</b>
<b>Track Efficiency</b>	Worse	Better
<b>Hit resolution</b>	Equal(X), Worse(Y)	Equal(X), Better(Y)
<b>Momentum resolution</b>	Equal? (Under Study)	Equal? (Under Study)
<b>Energy resolution</b>	Under study	Under Study
<b>Angular resolution</b>	Under study	Under Study