

ePIC Progress Report

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September 7, 2023



Angular resolution studies on LAGD

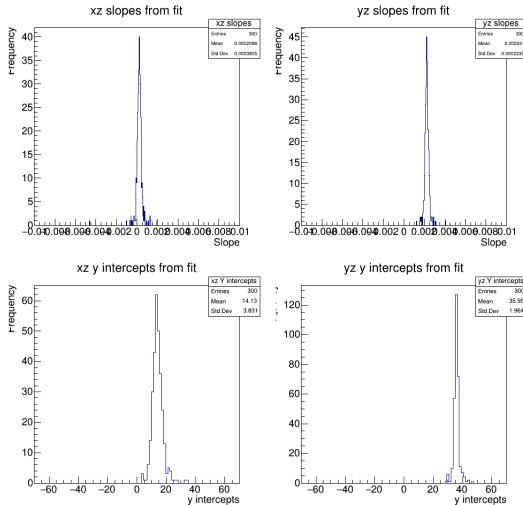
- ▶ Generated rootfiles/pedestal of raw data using Amore's Rootoutput option
- ▶ Made program to organize this data by APV, use pedestal data to locate hits, now doing tracking analysis
- ▶ Seeing weird residuals in trackers 1 and 2 y
 - Seems to be due to tracker 2 peak shifting
 - Looking back at notes, this detector was a TU-GEM



Strange Y-residual Investigation

- ▶ Varied multiple variables in the code to see effect
 - Varied bin sizing in the histograms - no effect
 - Restricted strip multiplicity, [2,4]
- ▶ Plotted a number of statistics for correctly and poorly reconstructed events

Track slopes and Y-Intercepts

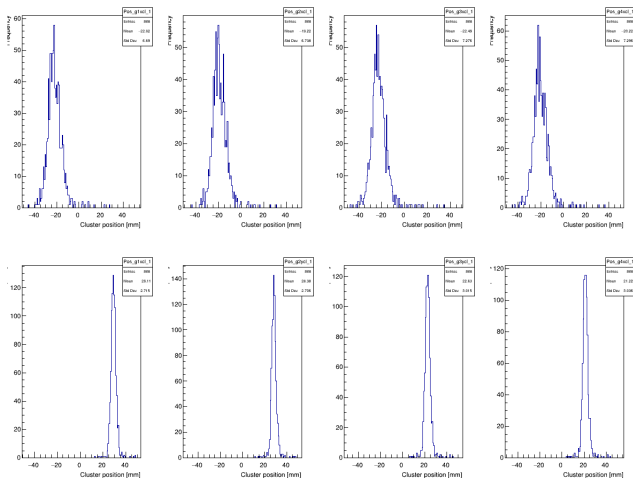


Strange Y-residual Investigation

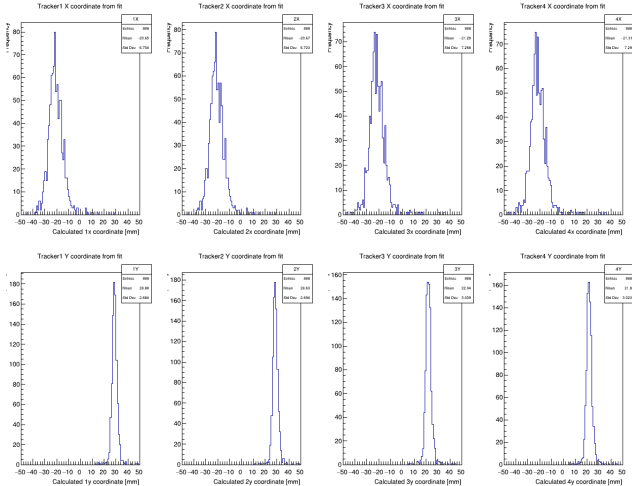
- ▶ $Y_{Res} = Y_{Fit} - Y_{Exp}$
- ▶ Histogrammed Y_{Fit} and Y_{Exp}
 - Found both to be gaussian
- ▶ Plotted Y_{Res} , Y_{Fit} , and Y_{Exp} per iteration
 - Found X_{Res} to be relatively constant each time
 - Y_{Res} had much more variation
- ▶ Investigated the XZ and YZ projections of the tracks again



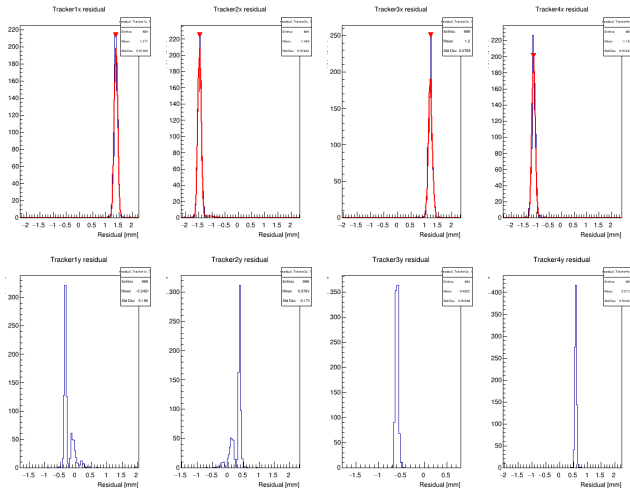
Tracker Experimental Coordinates



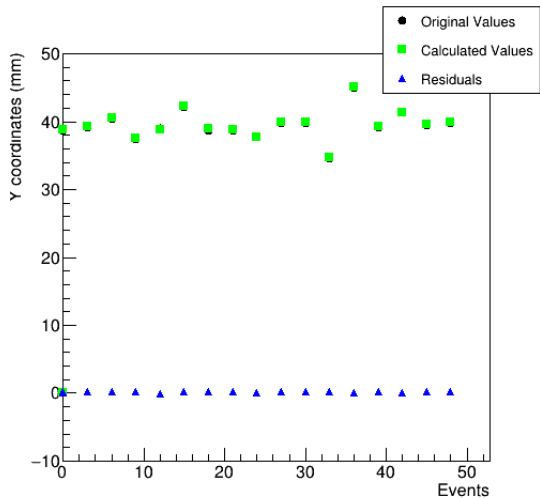
Tracker Theoretical Coordinates



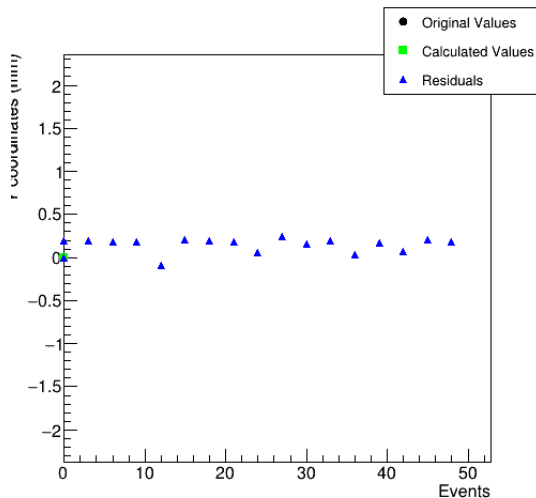
Tracker Residuals



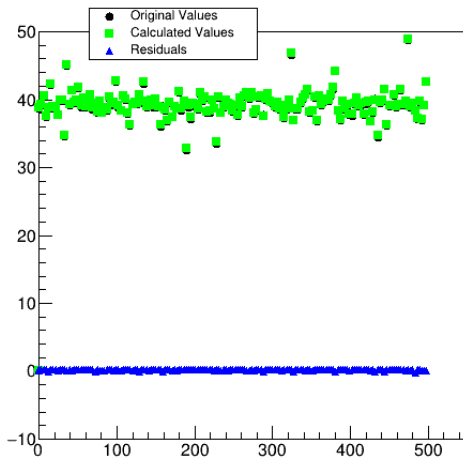
Y variables per Event



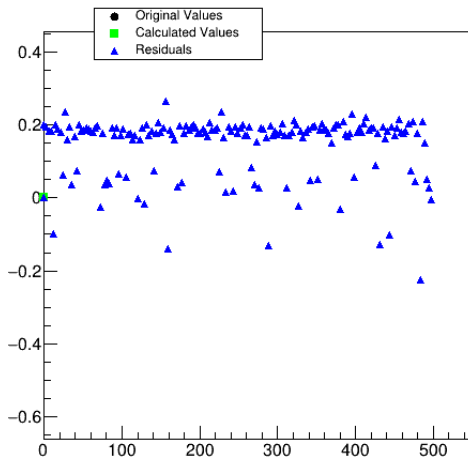
Y variables per Event close up on residual



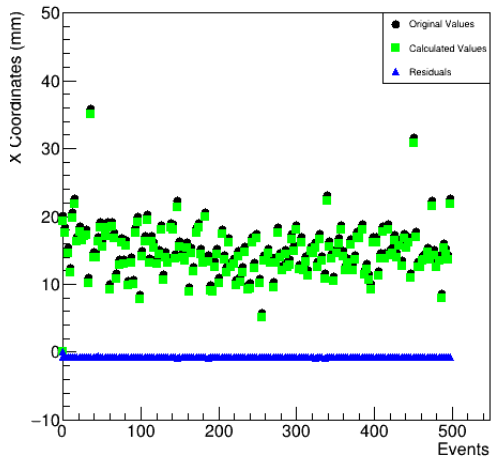
More Y variables per Event



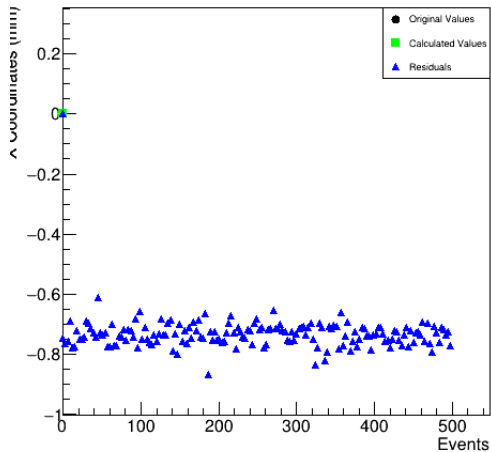
More Y variables per Event close up on 0



For comparison: Heres the X coordinate



For comparison: Heres the X coordinate at 0

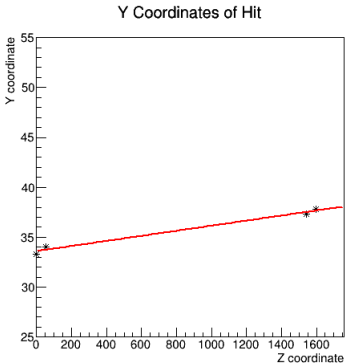
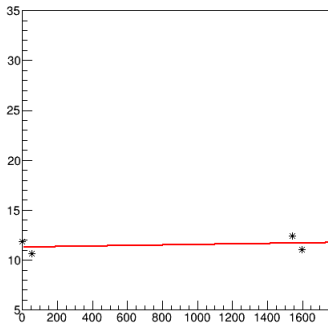


Strange Y-residual Investigation

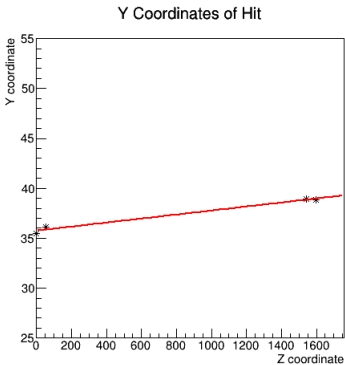
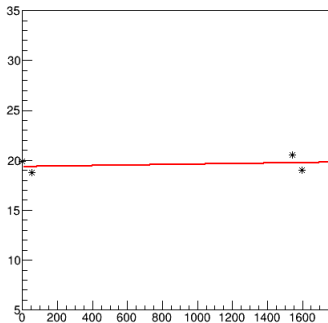
- ▶ Noticed Hits in YZ projection behaving strangely
 - Trackers 1 and 2 move wrt each other although they should be attached to each other
- ▶ Histogrammed distance between Trackers 1,2 and 3,4
 - Found 3 and 4 to stay the same distance
 - 1 and 2 move around and produces the same behavior as seen in residual plot
- ▶ Also tested removing Tracker 1/2 from the fitting



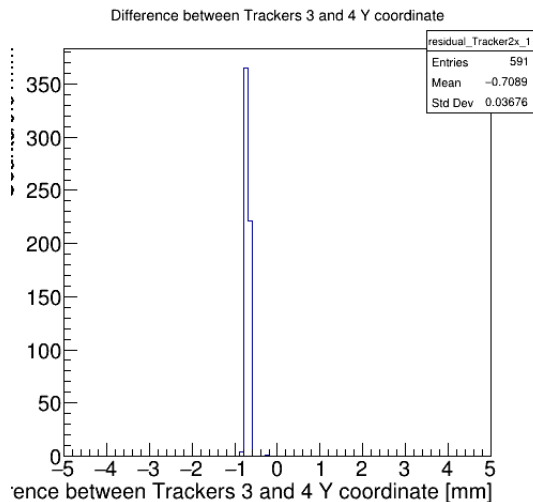
XZ and YZ projections of Events



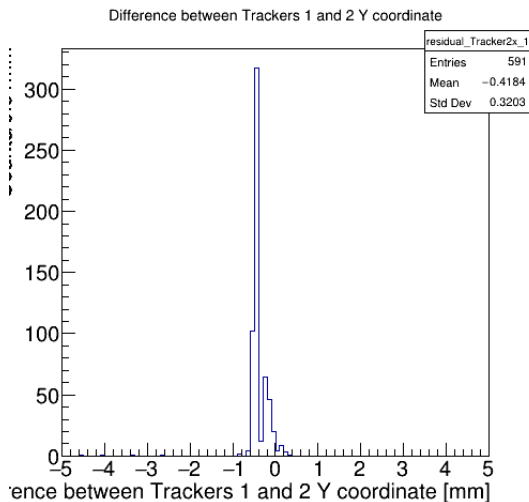
Histogram for trackers 1 and 2



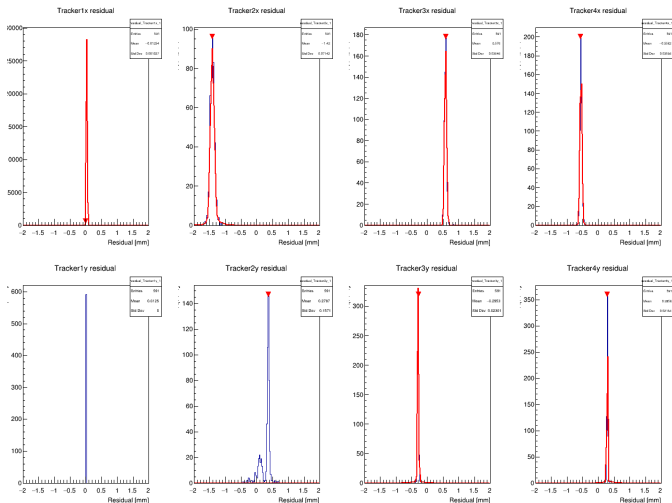
Histogram for trackers 3 and 4



Histogram for trackers 1 and 2

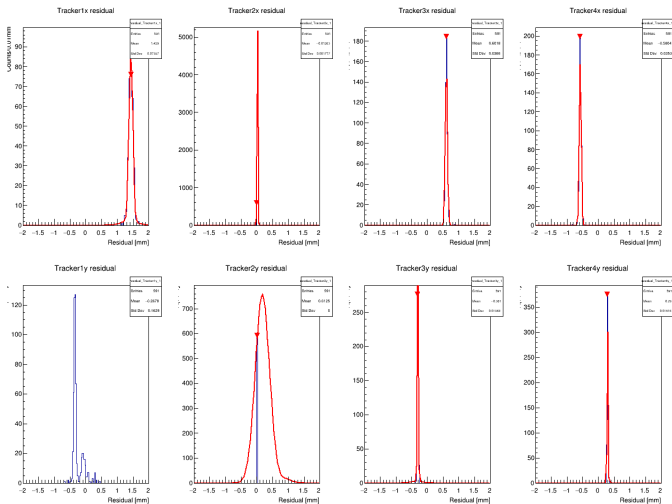


Residuals without Tracker 2

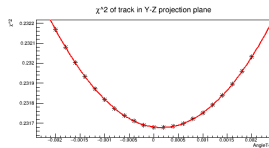
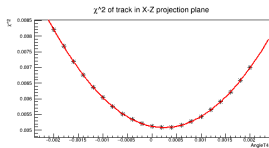
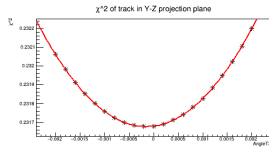
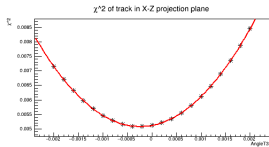
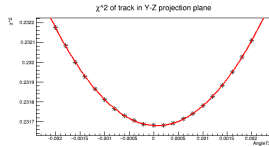
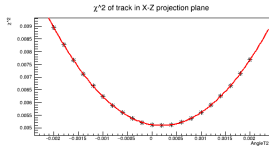


IDA TECH

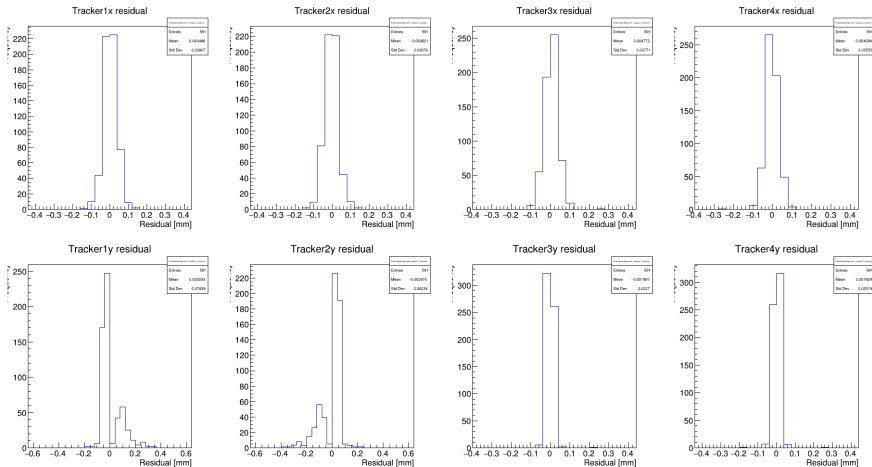
Residuals without Tracker 1



Final χ^2 and residuals



Final χ^2 and residuals



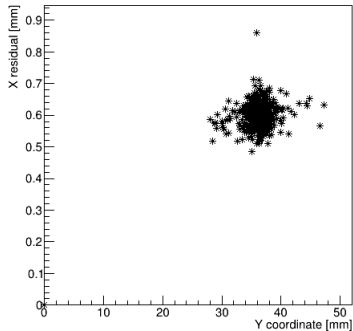
Strange Y-residual Investigation

- ▶ A few possibilities for what these could be from
 - Saturated hits
 - beam width effects
 - bad strips
- ▶ plots did not show promising evidence for a clear indicator

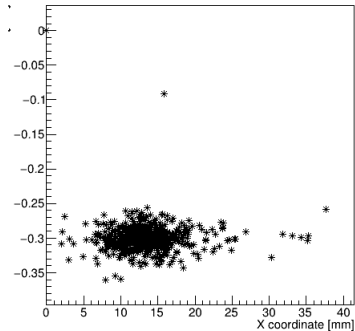


X and Y residual versus opposite coordinate

X Residual vs Y coordinate

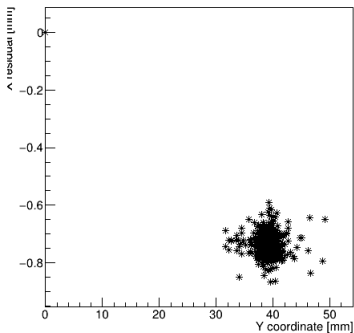


Y Residual vs X coordinate

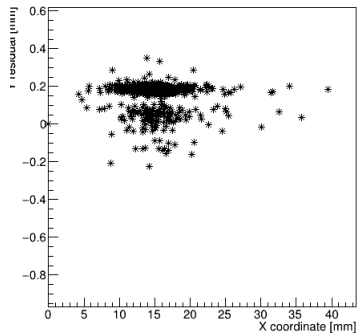


X and Y residual versus opposite coordinate

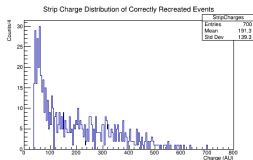
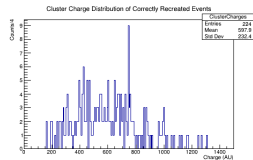
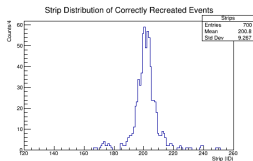
X Residual vs Y coordinate



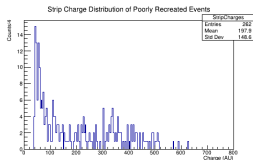
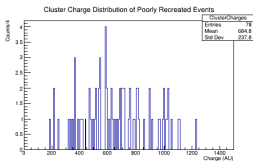
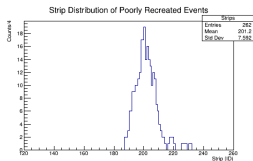
Y Residual vs X coordinate



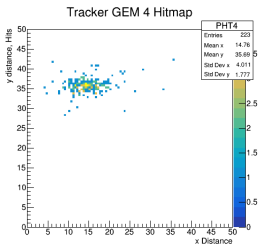
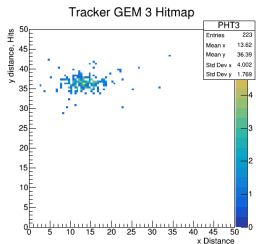
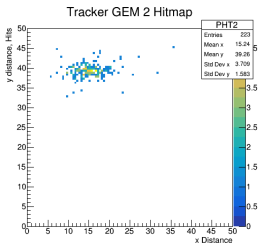
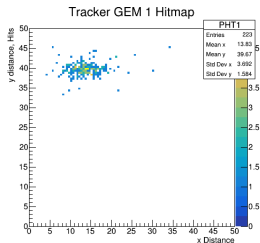
Correctly reconstructed Hits statistics



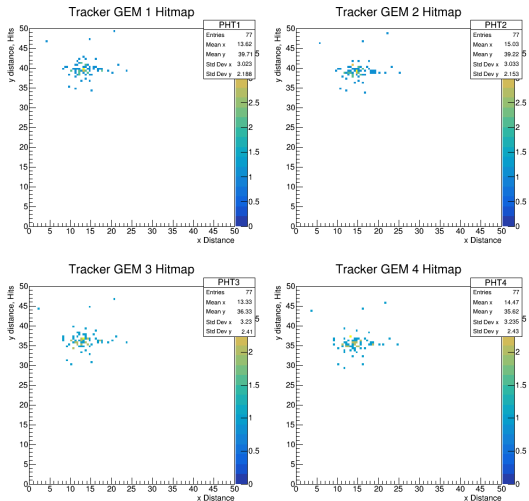
Poorly reconstructed Hits statistics



HitMaps

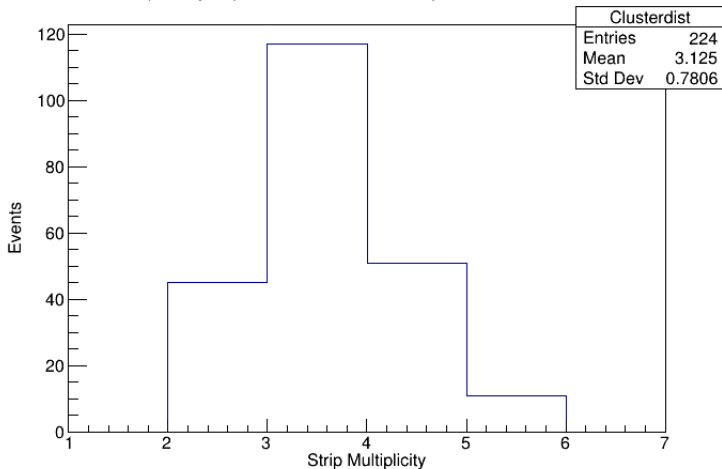


HitMaps



Strip Multiplicity Distribution

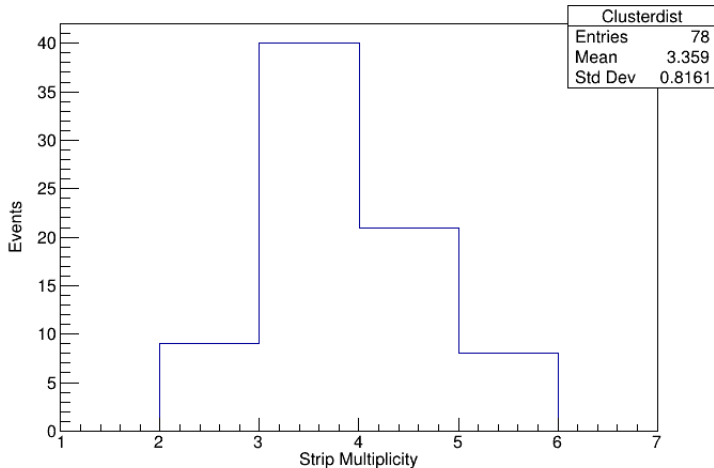
Strip Multiplicity in Tracker 2Y of Correctly Reconstructed Events



A TECH

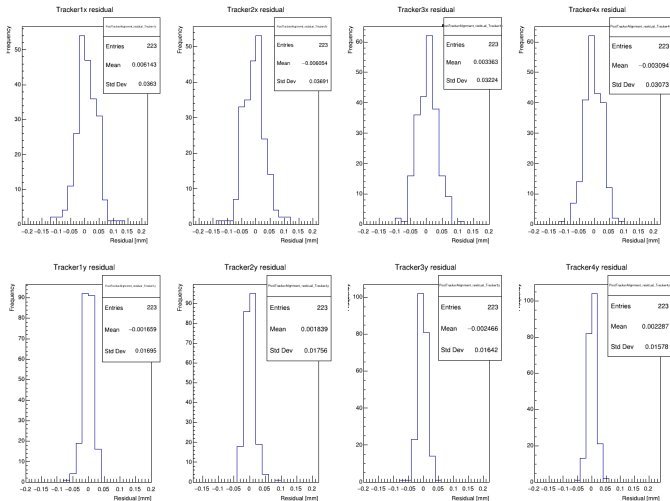
Strip Multiplicity Distribution

Strip Multiplicity in Tracker 2Y of Correctly Reconstructed Events

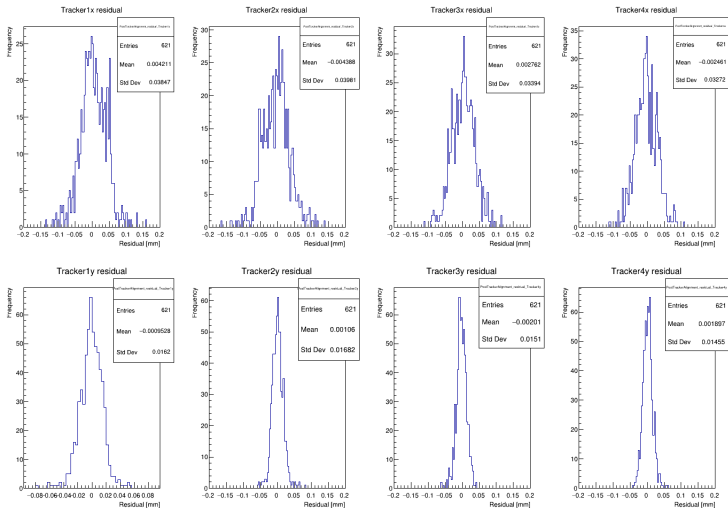


A TECH

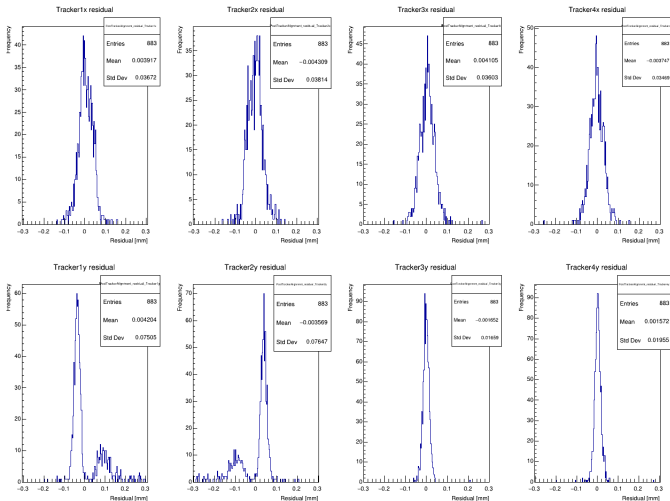
Final residuals with Bad reco events removed



Bad Events removed



All tracking events considered



Log from FTBF

Tuesday, June 8

First started the installation. Made sure table can drive and all cables and boxes have clearance. Two large chambers are aligned by hand to about 1cm.
Passed ORC inspection (per verbal statement)

Final full installation:

Front tracker looking downstream
FIT rigging uRWELL
HV deth UVa uRWELL 1.2 deth 2B-127.3
uRWELL1, uRWELL1.2 amp 2B-128.4
Readout cable 50
UVa uRWELL beam deth gap
HV deth UVa uRWELL 1 deth 2B129
uRWELL1, UVa uRWELL1.1 amp 2B130
Readout 40
Tracker 1
HV Trk2 2B-112
Readout Slave of Tracker2 both x,y
Tracker 2
HV Trk1 2B-111
Readout 40 side horizontal strips
44 top vertical strips

Table:
FIT large GEM
HV deth FIT deth 2B-121.5
window FIT window 2B-122.6
frame FIT frame 2B-123.7
Readout???
UVa large GEM
HV EC GEM 2B-130
Readout....

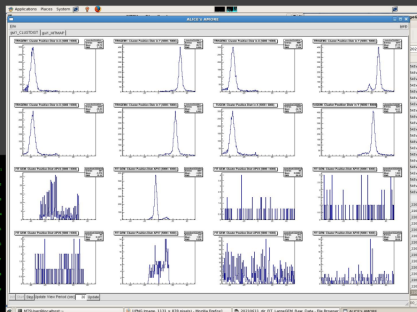
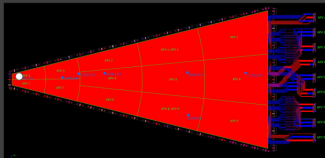
Back Tracker
UVa GEM 0.8mm pitch
HV RESH beam 2B-115
Readout 60
Tracker 3
HV Trk #4 2B-113
Readout 50
Tracker 4
HV GEM TU 2B-114
Readout slaved to 50



Beam spot location in LAGD

FITZZ Analysis

Hits at (900,217) \Rightarrow APV3 & APV7 (Straight strips)



Close up on Tracker histograms

