ToT and Spatial resolution studies

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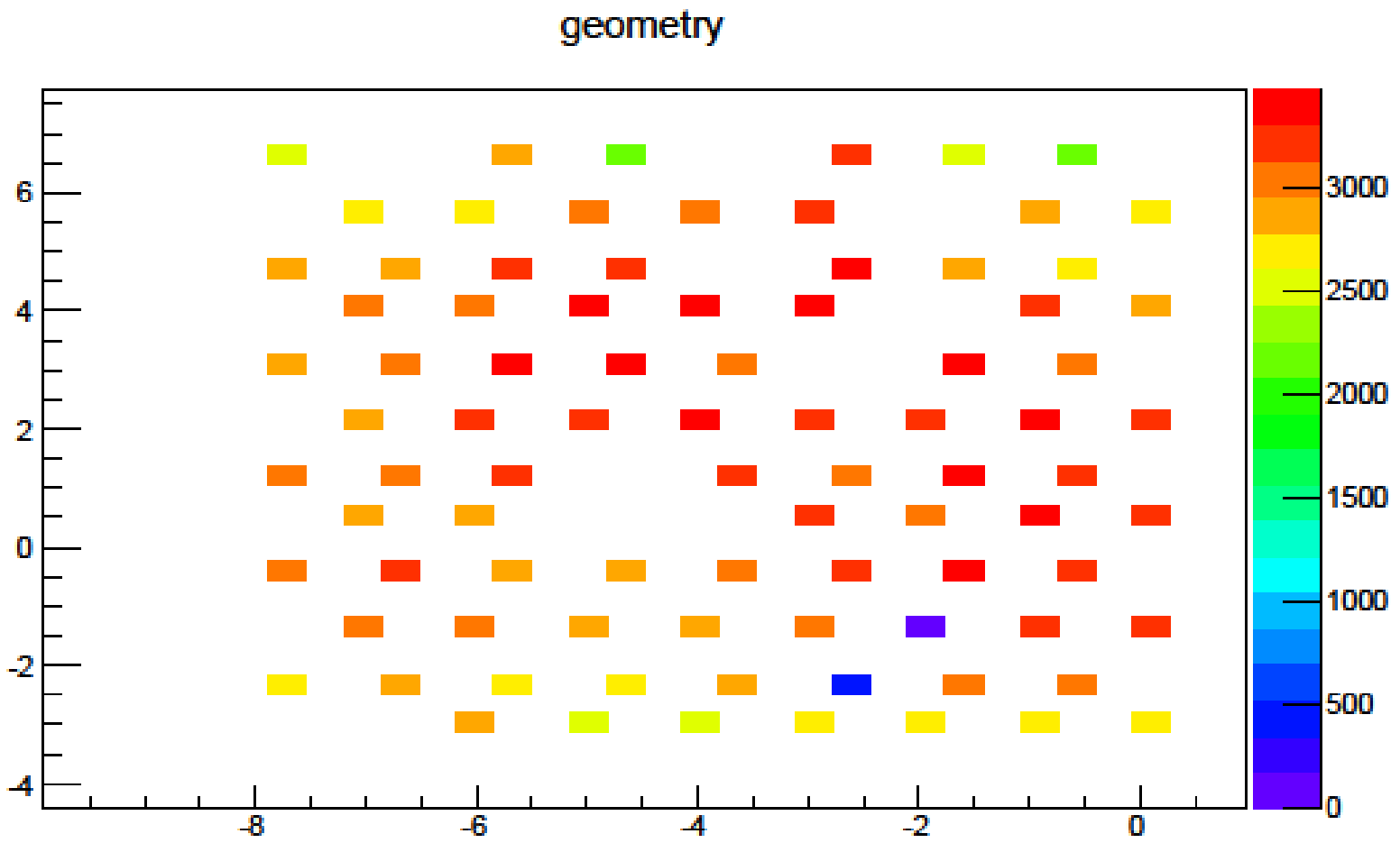
Menu:

- The Setup
- Basic Spectra
- Pulser Test
- Cosmic analysis
- Spatial resolution and ToT study

The Setup

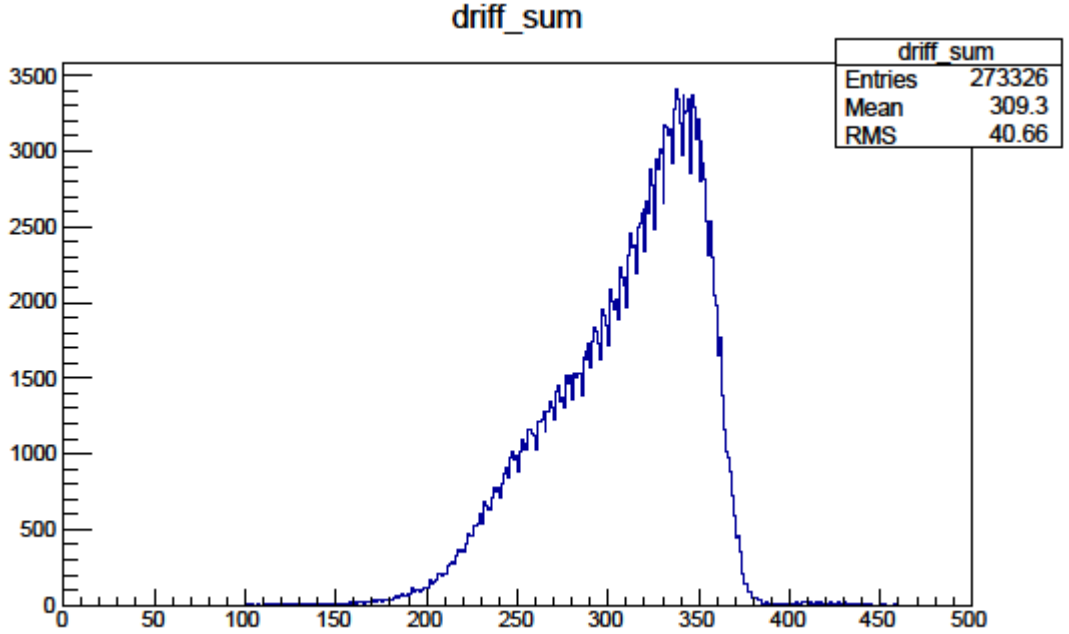
- 96 channels (8 layers consisting of 12 straws)
- A gas mixture of Ar/CO_2 (90%/10%)
- HV set 1900V
- Two scintillator triggers
- 3 x ASIC and one TRB v3 FRONT-END

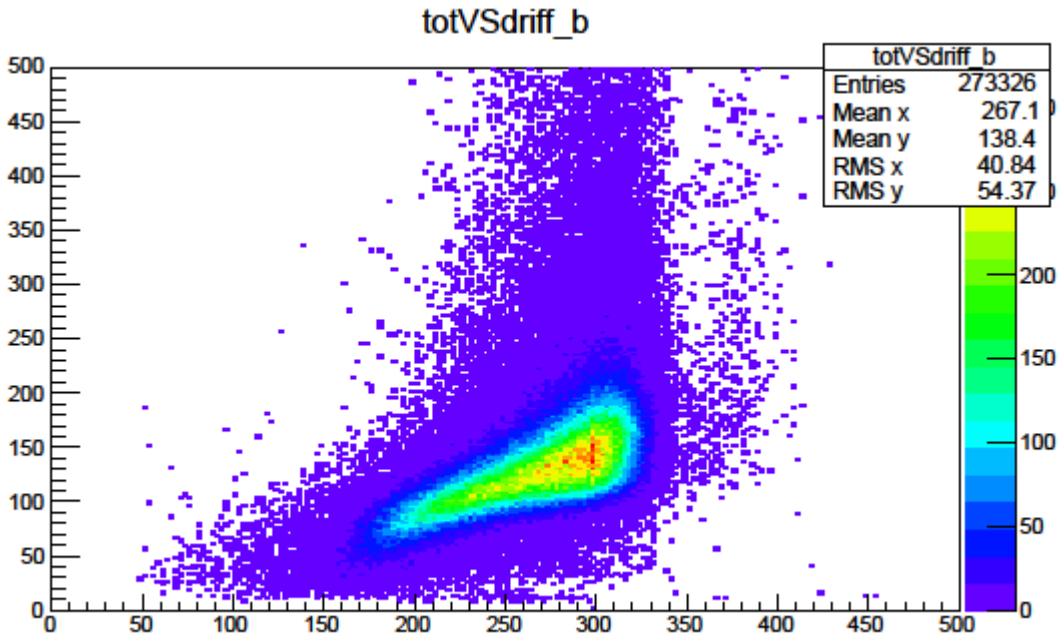
The Geometry

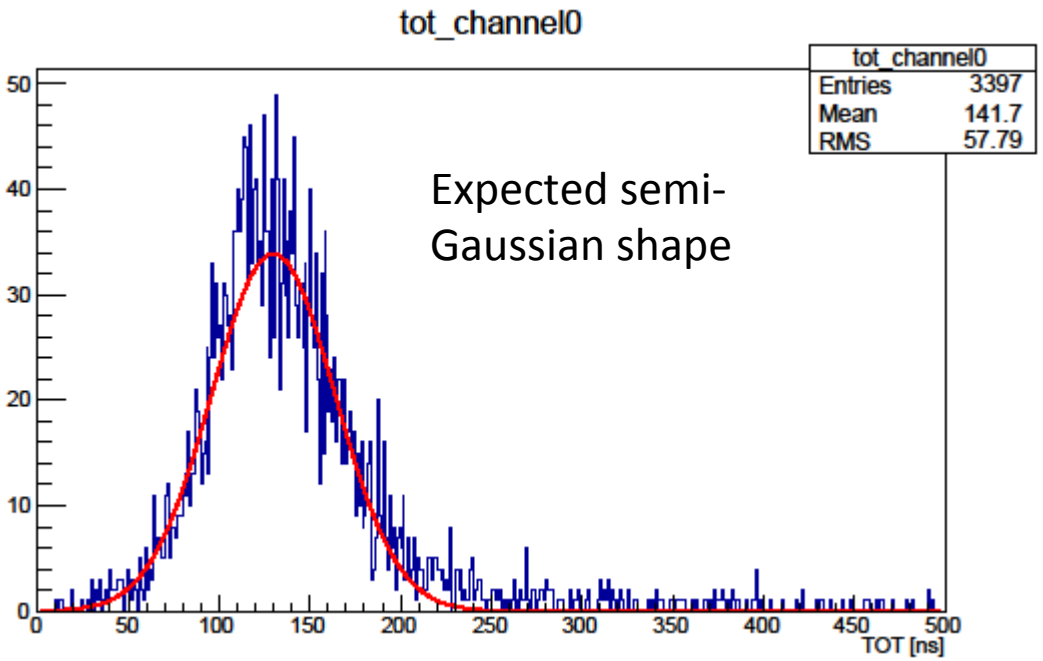


Trigger

Basic Spectra

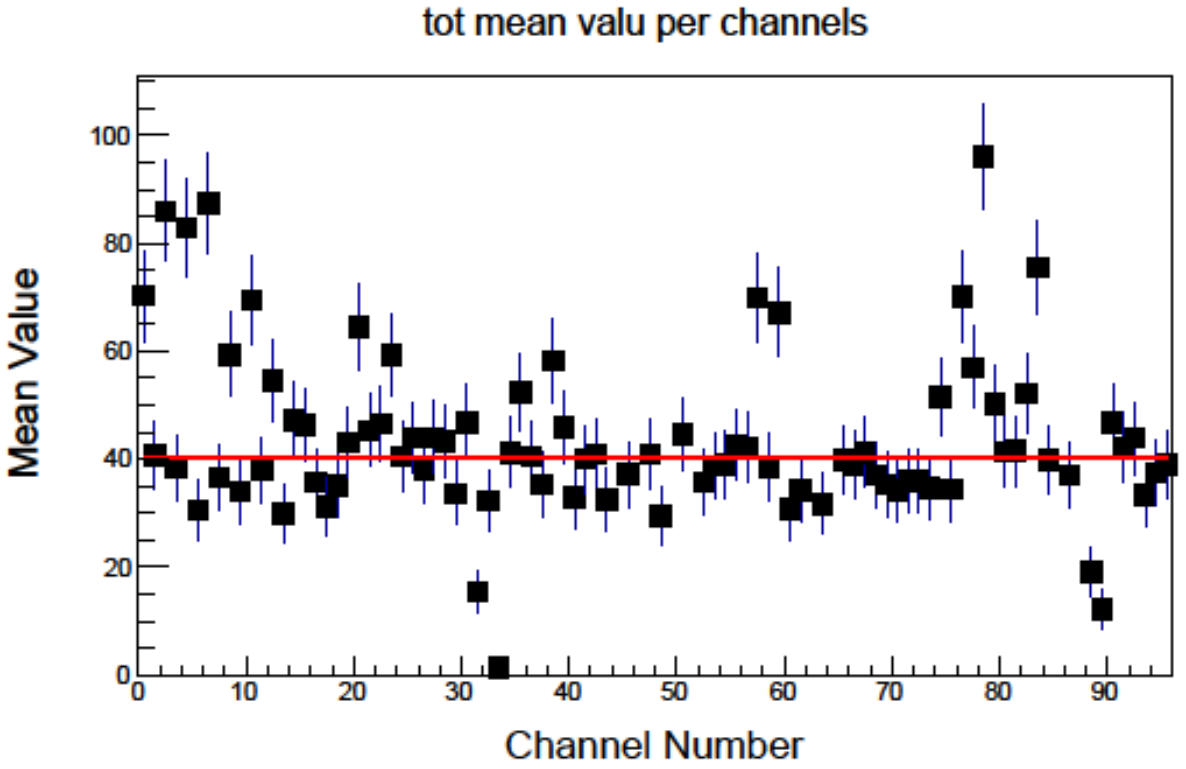




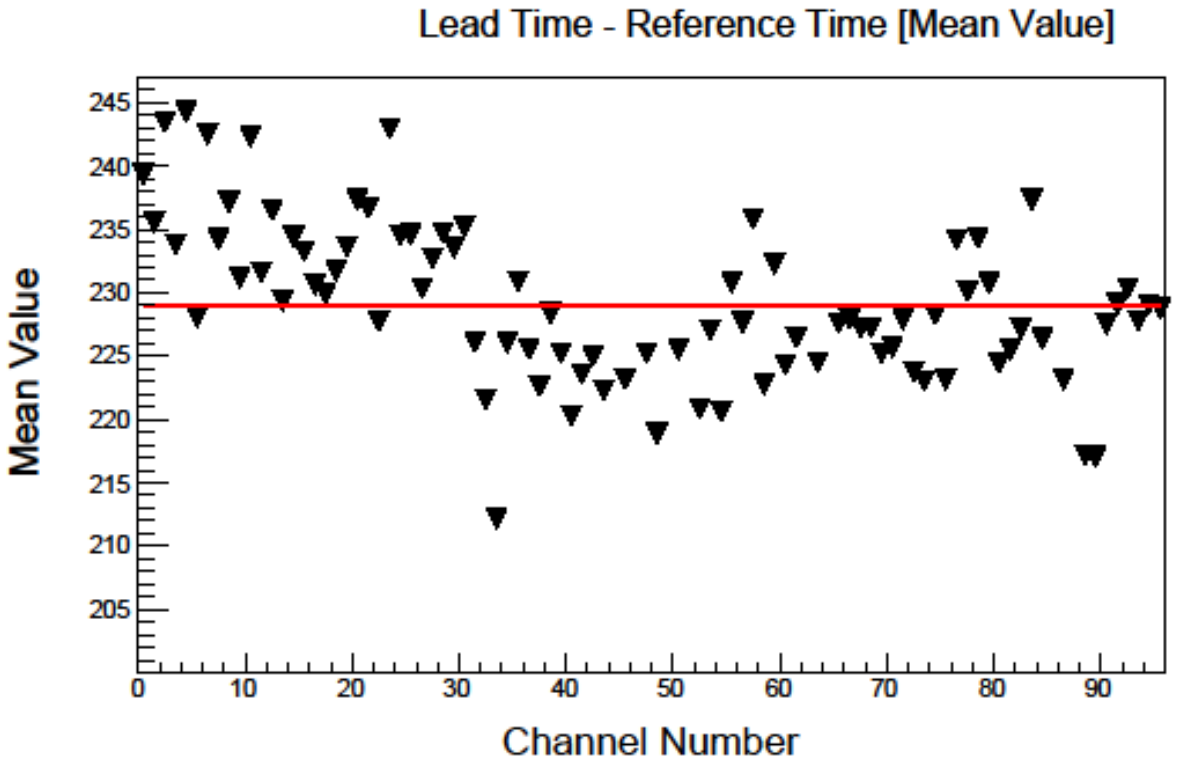


Pulser Tests

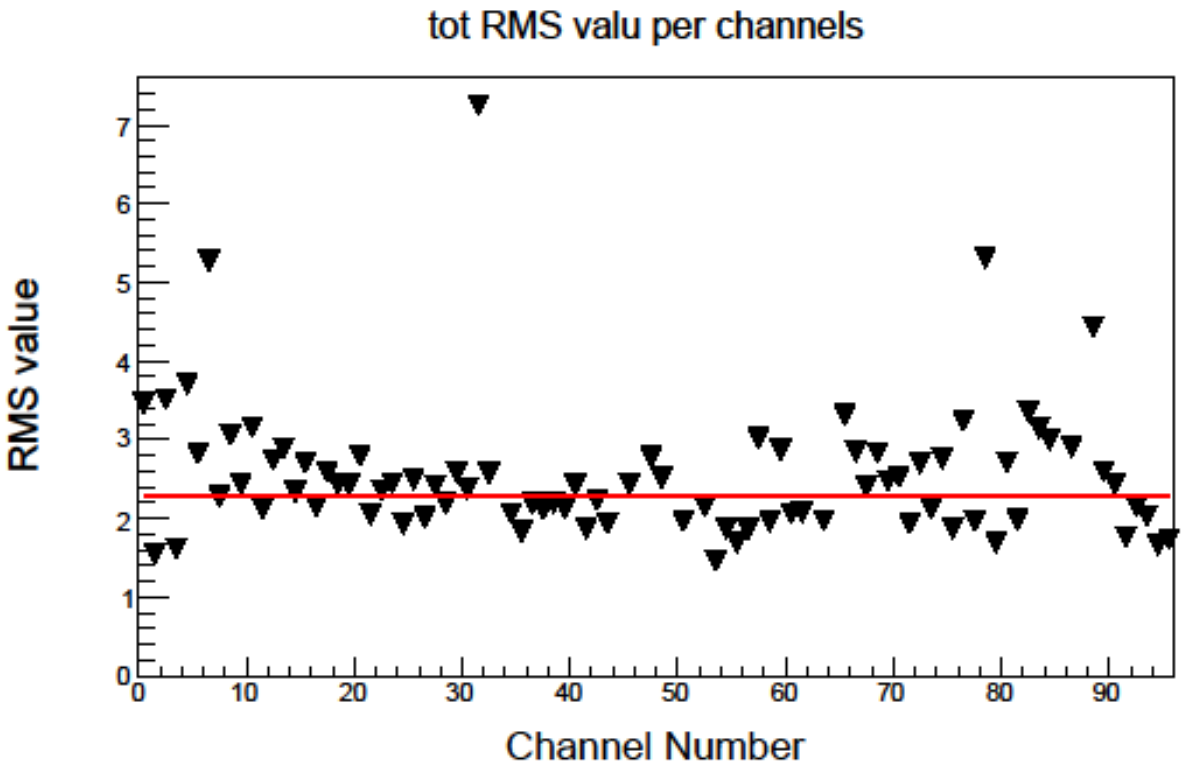
Lead time – Trail time [Time over Threshold]

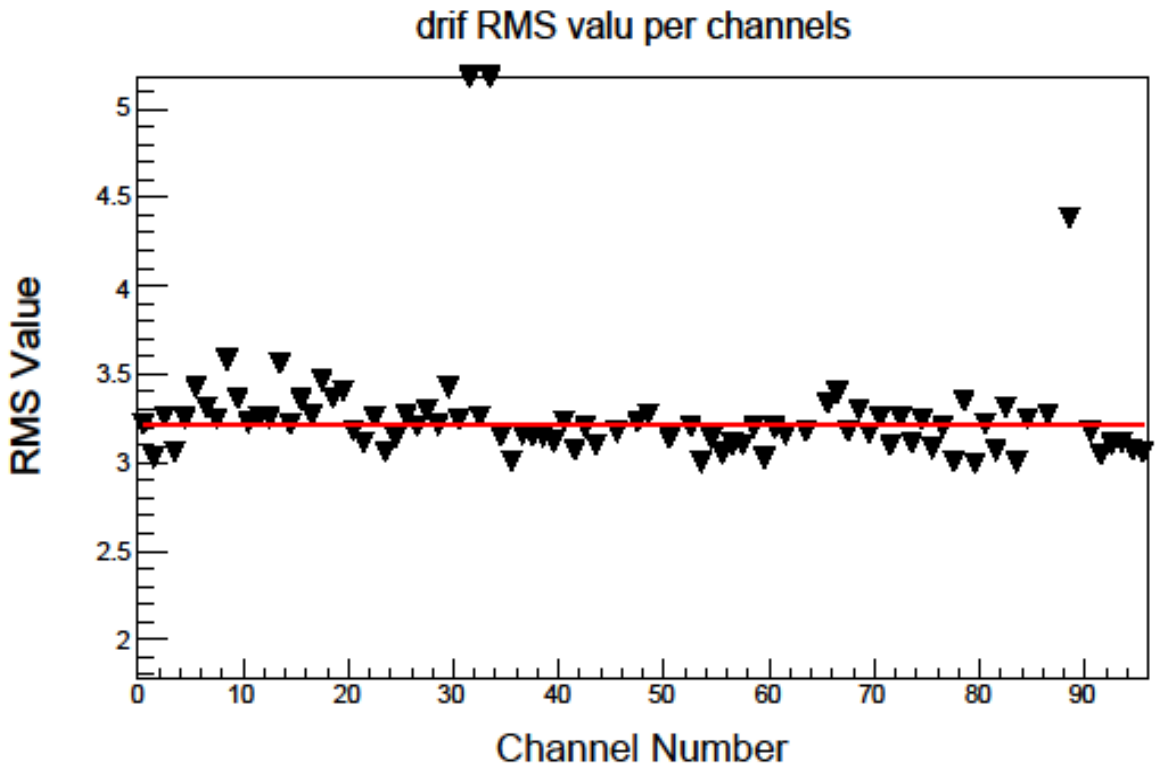


Lead time – Reference Time

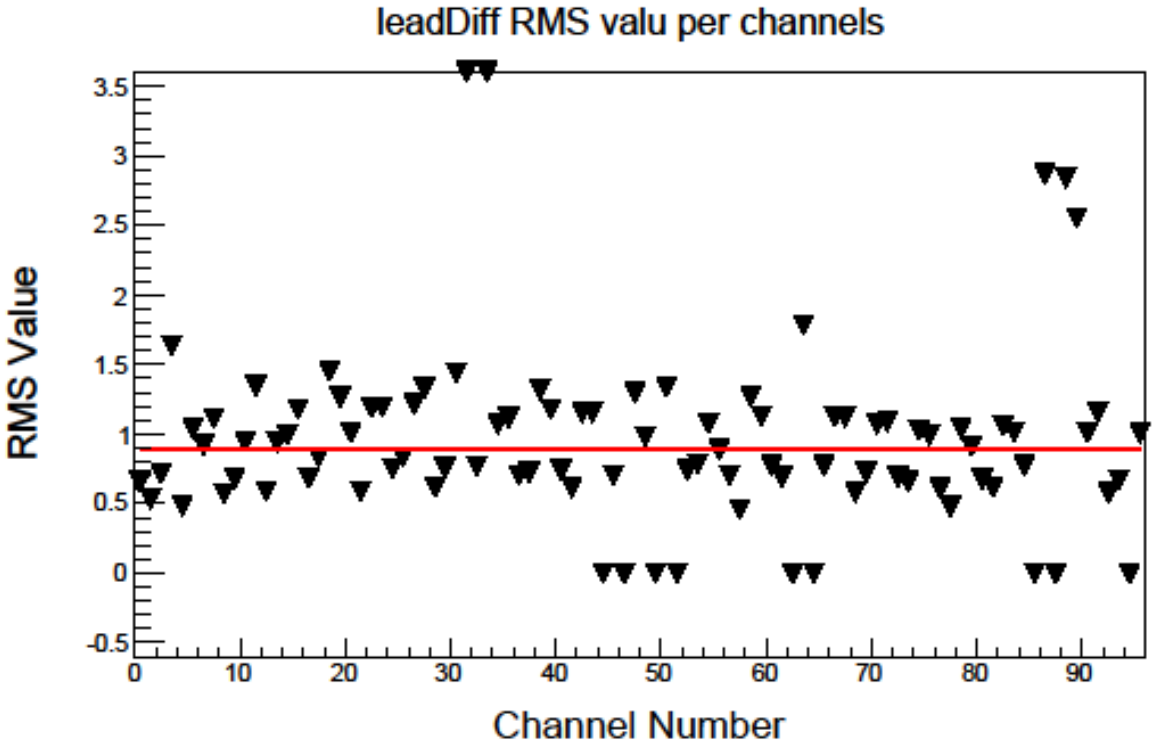


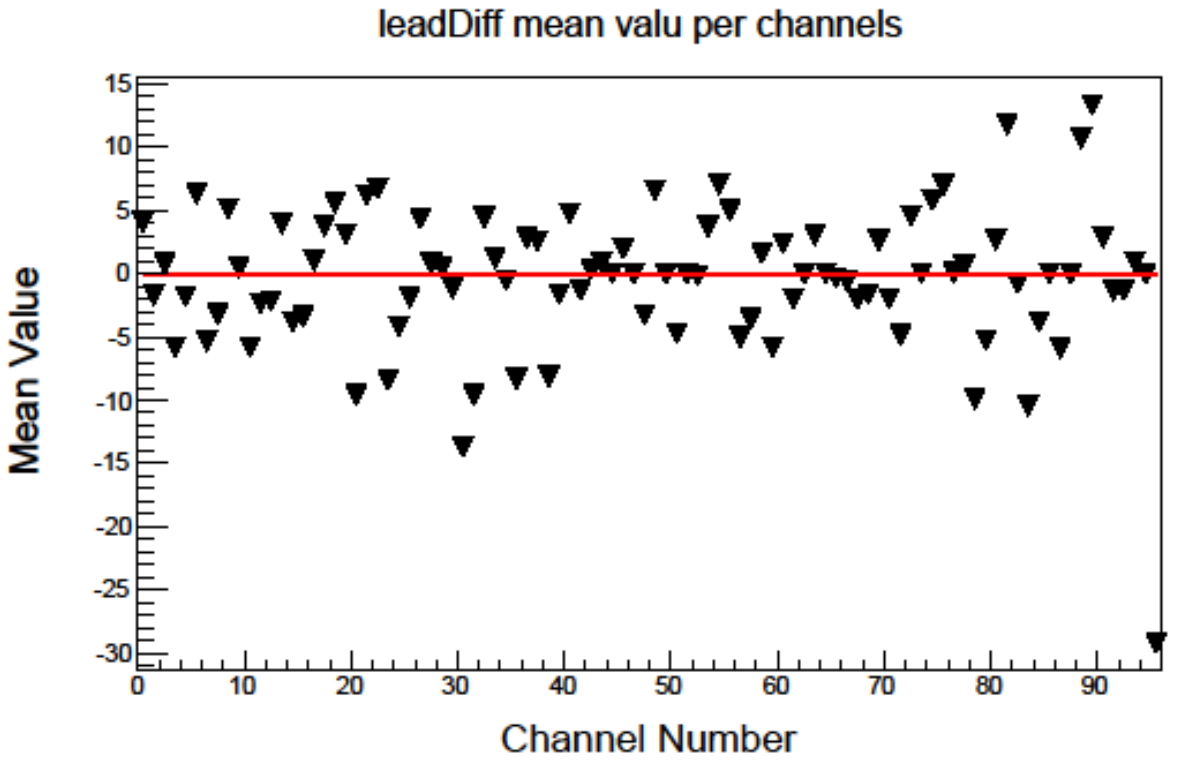
Pulser Test


tot RMS valu per channels
RMS value
Channel Number
0
1
2
3
4
5
6
7
0
10
20
30
40
50
60
70
80
90


drif RMS valu per channels
RMS Value
Channel Number
2
2.5
3
3.5
4
4.5
5
0
10
20
30
40
50
60
70
80
90

Pulser Test (Lead Time [channel] – Lead Time [channel + 2])





Cosmic ray analysis

- Calibration of the drift time

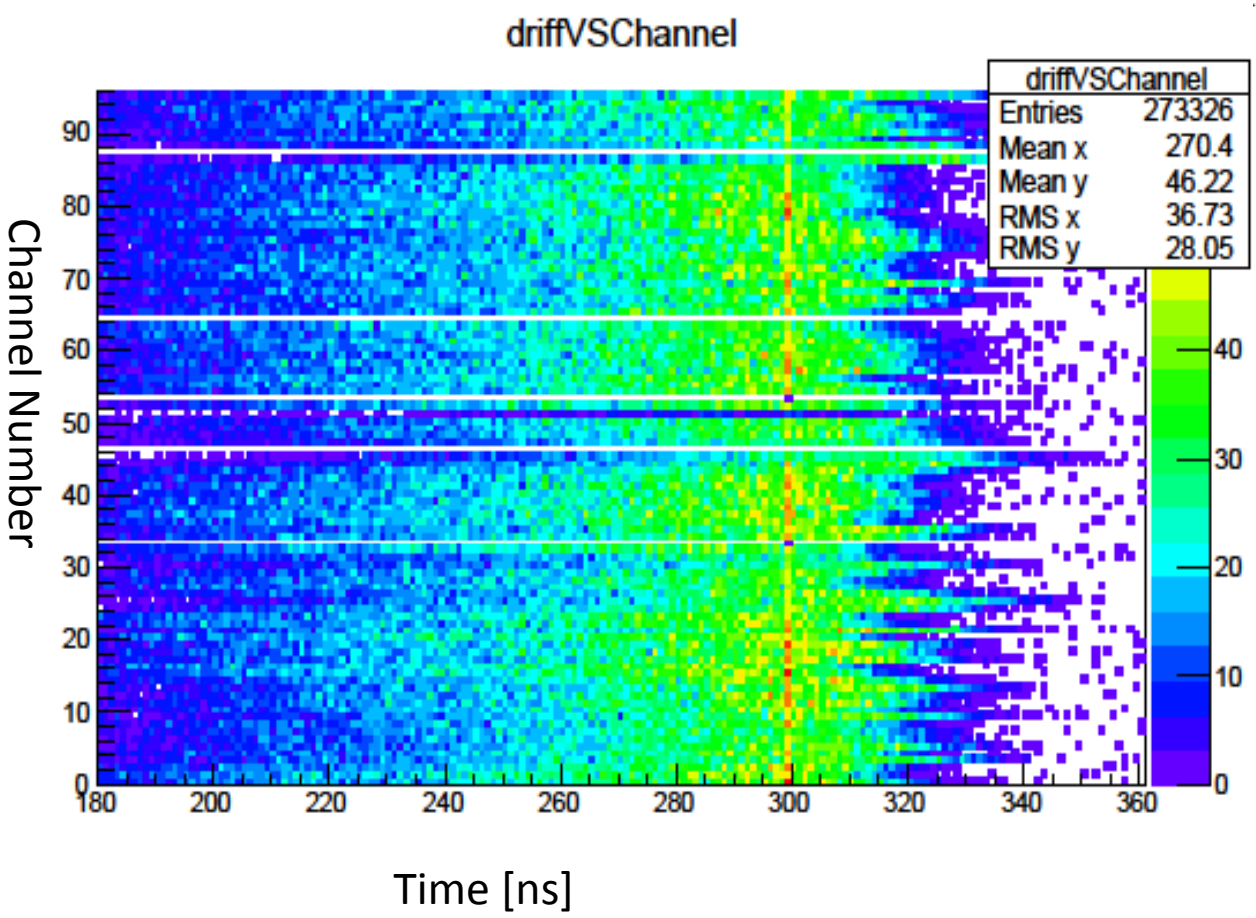
Two ways:

- 1st a threshold was set at 30% of the maximum
- 2nd all spectra were aligned to the bin with the maximum value

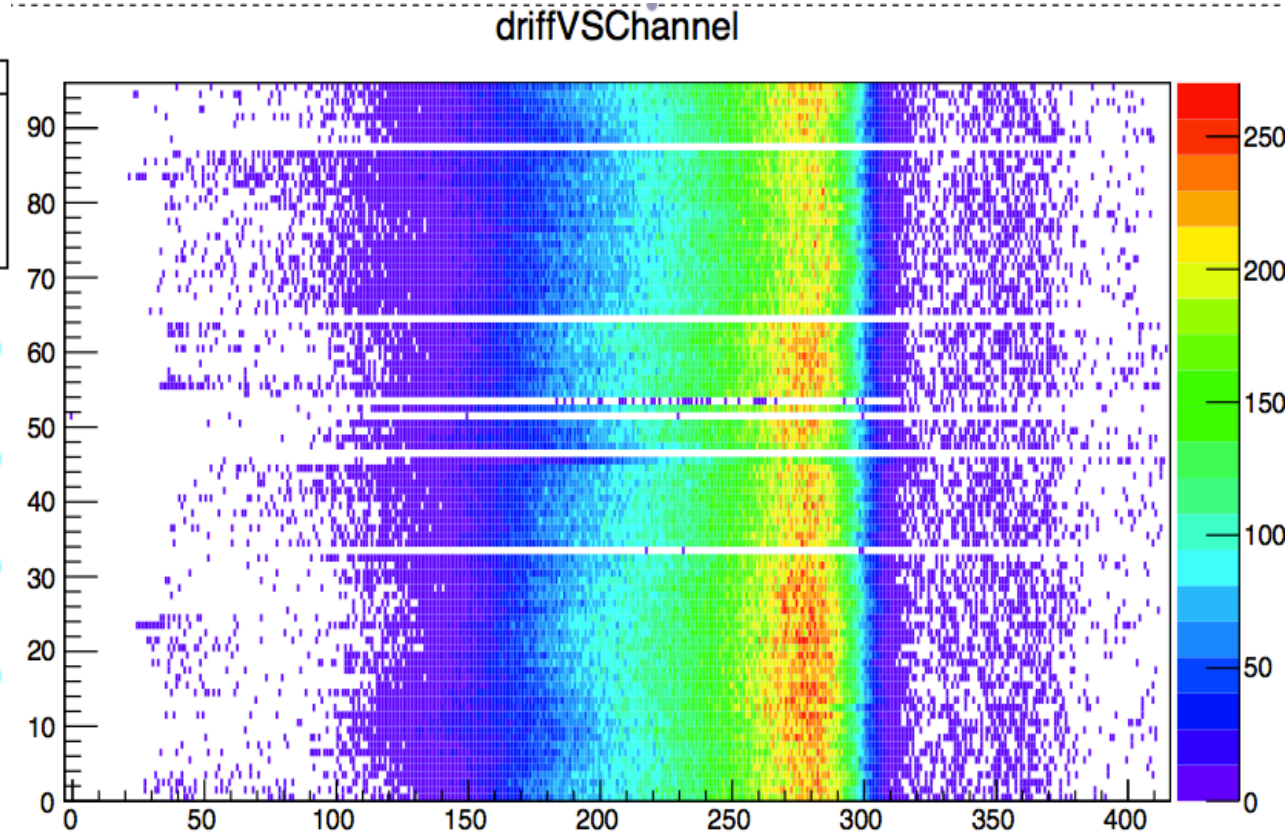
- ToT calibration
- Spatial resolution study and geometry check

Drift Time Calibration

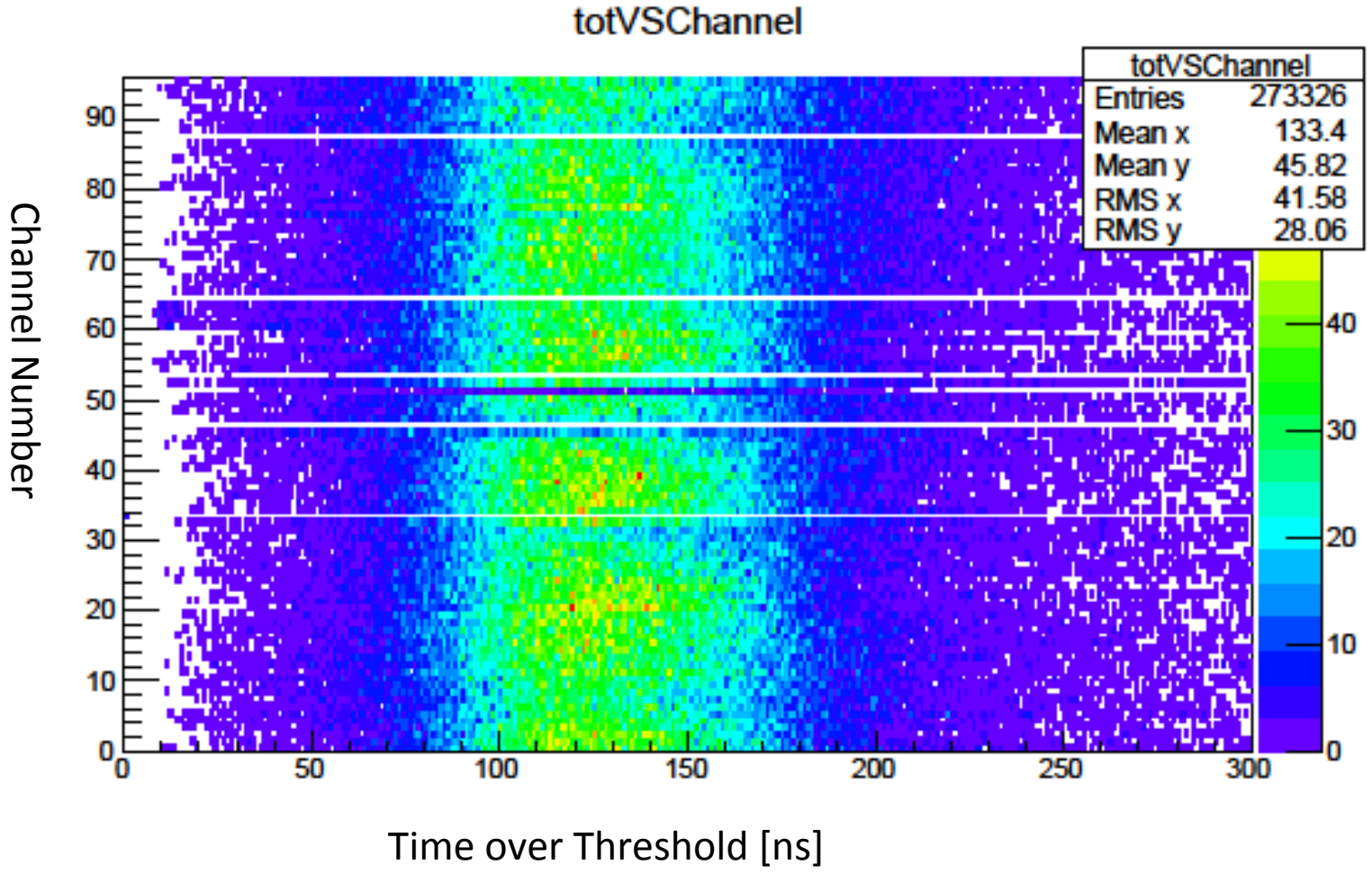
Maximum bin method



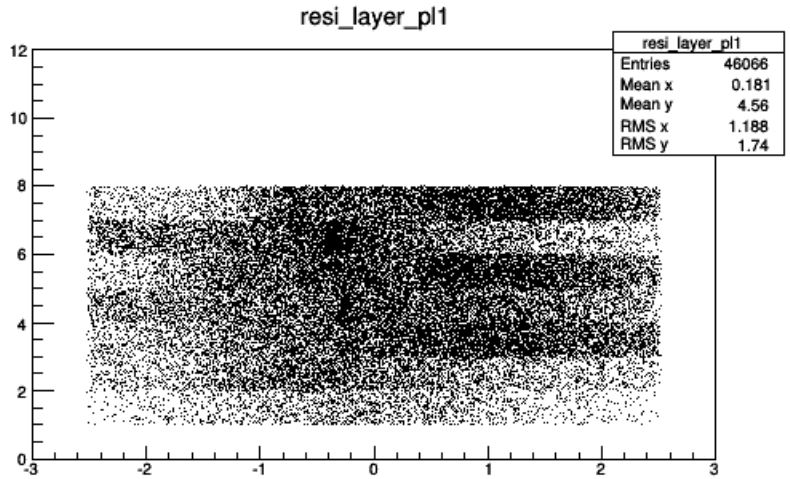
Threshold method

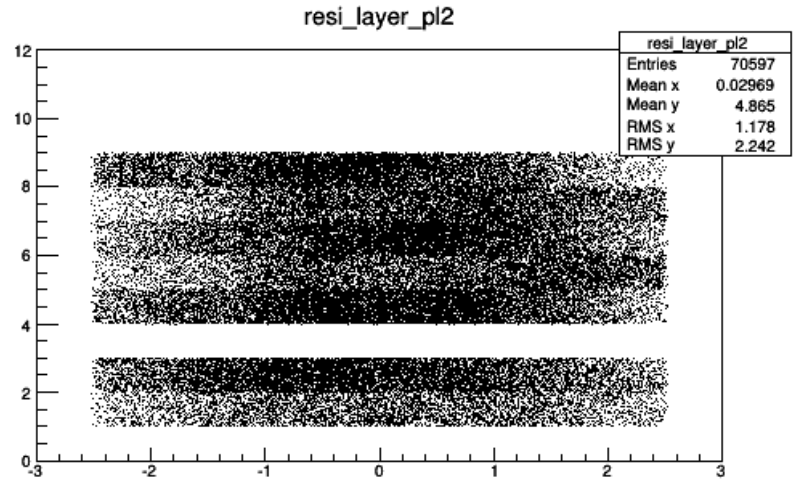


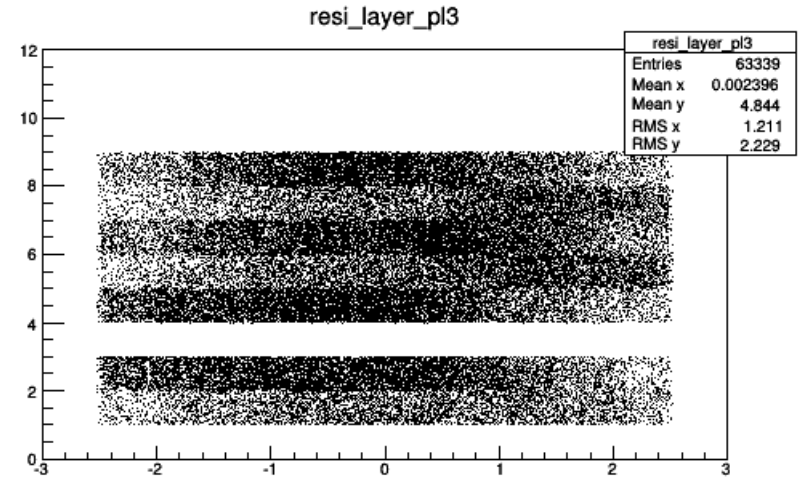
ToT Calibration

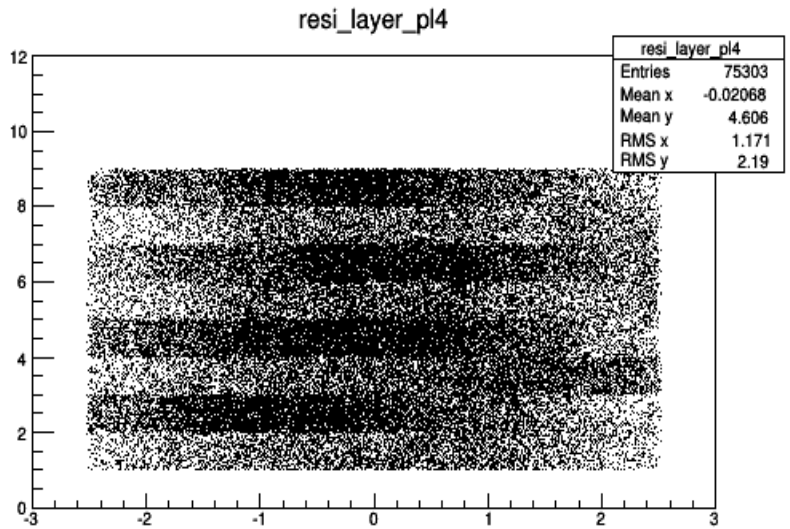


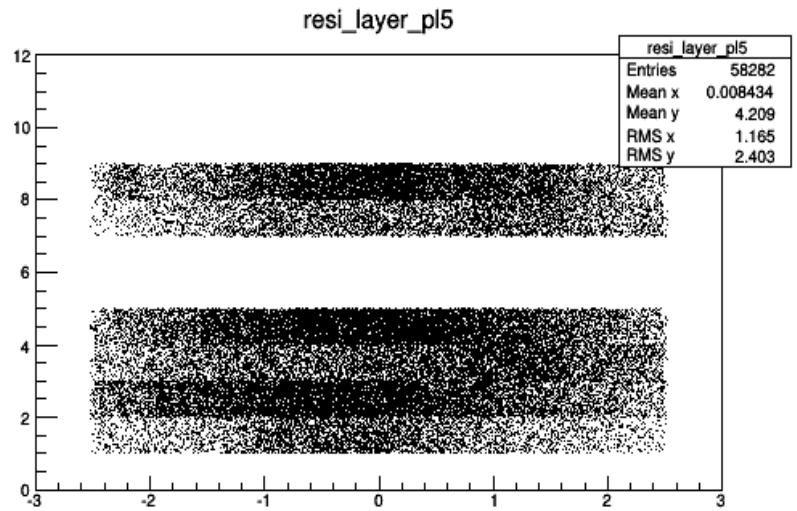
Geometry check

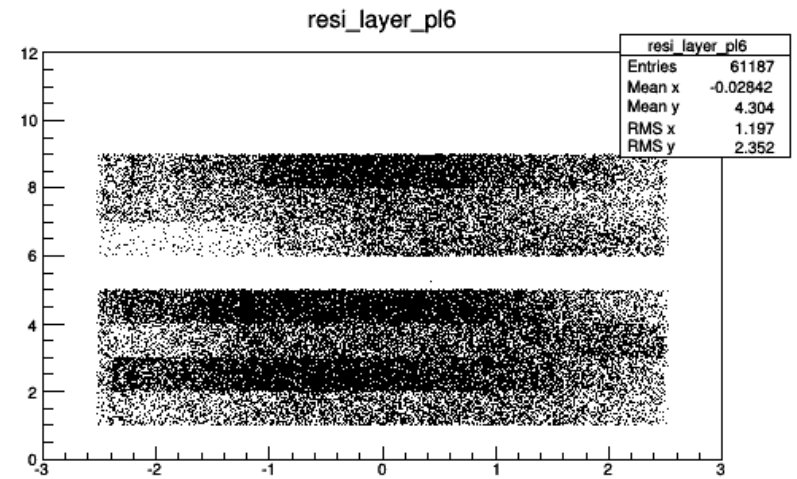




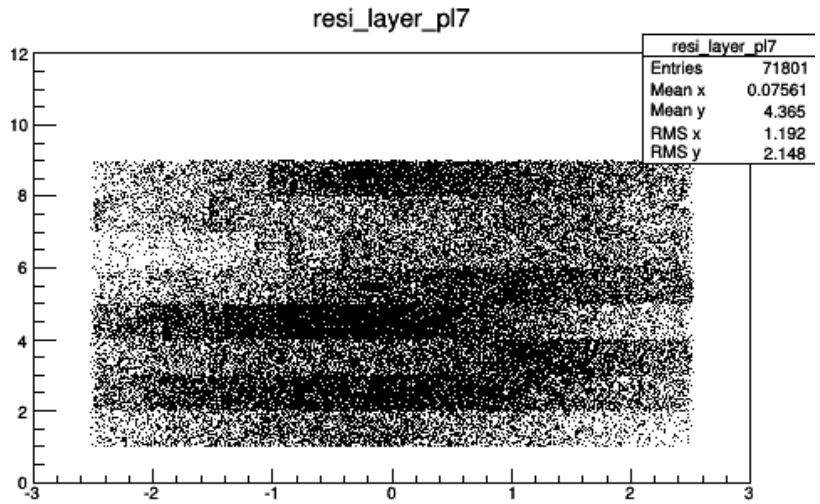


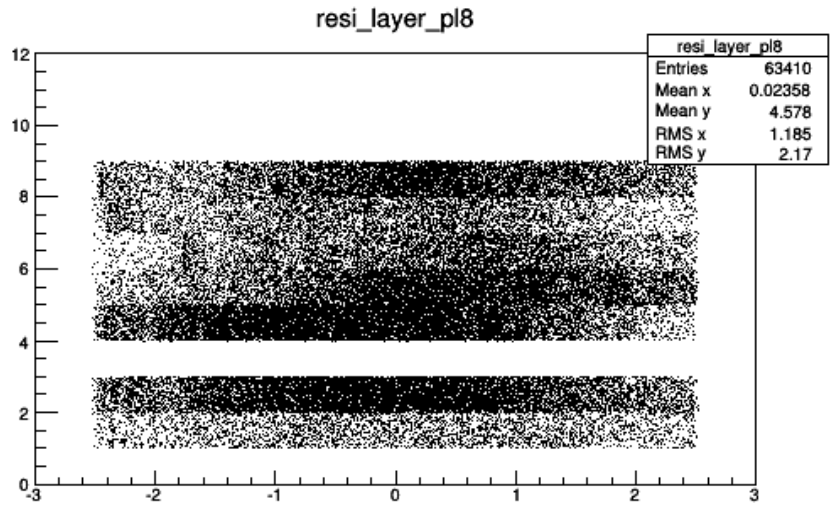


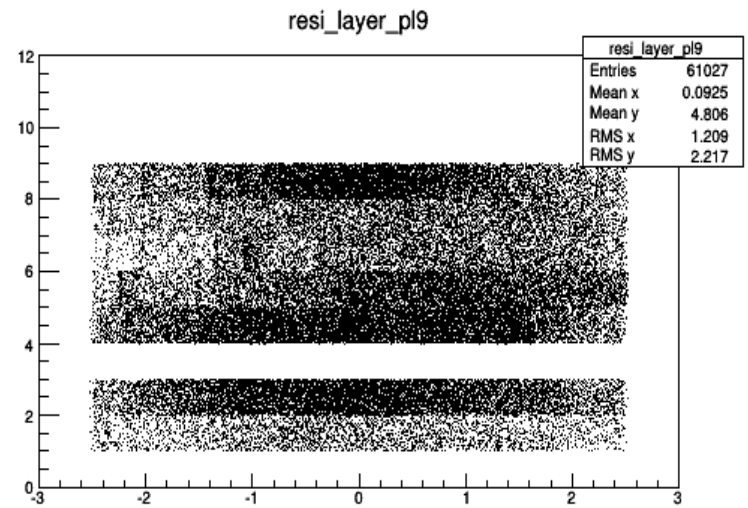


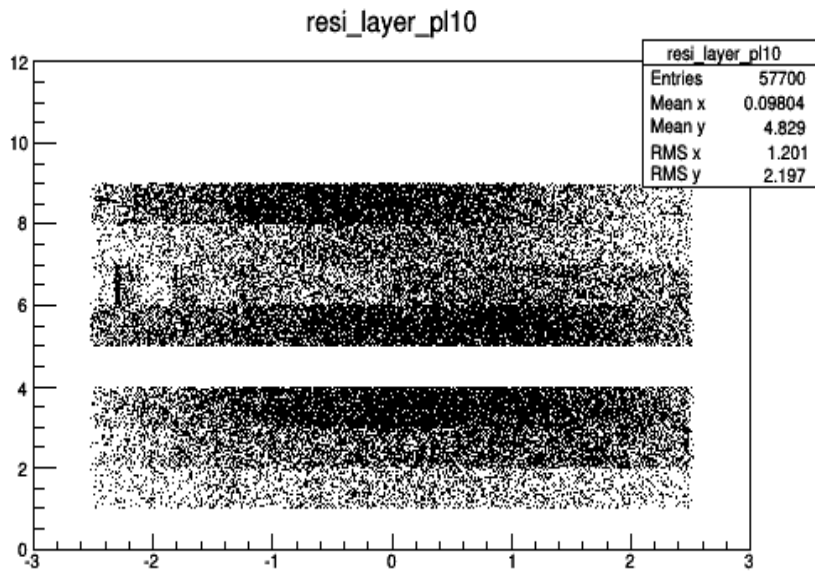


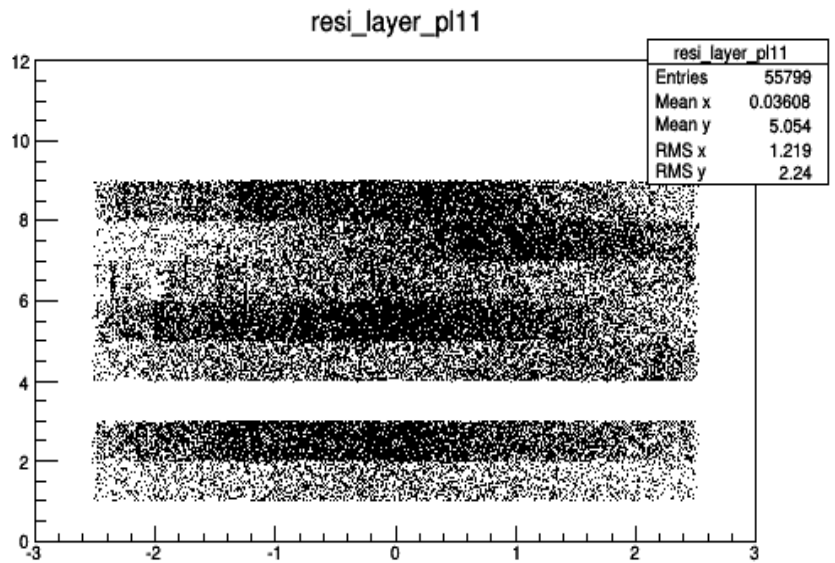
Geometry check

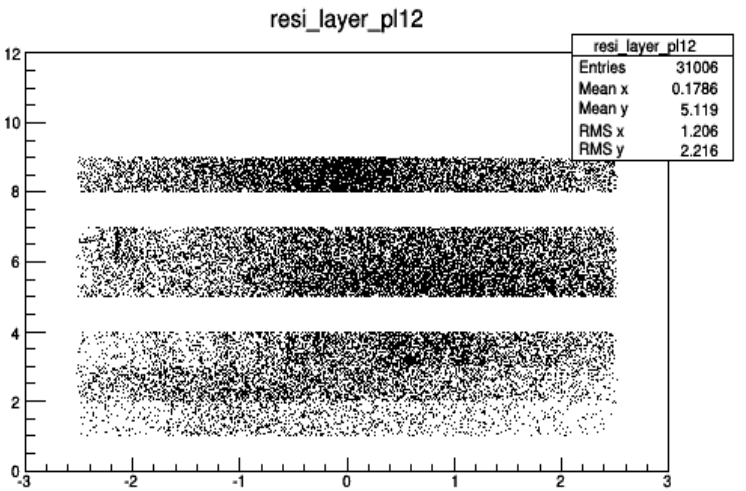




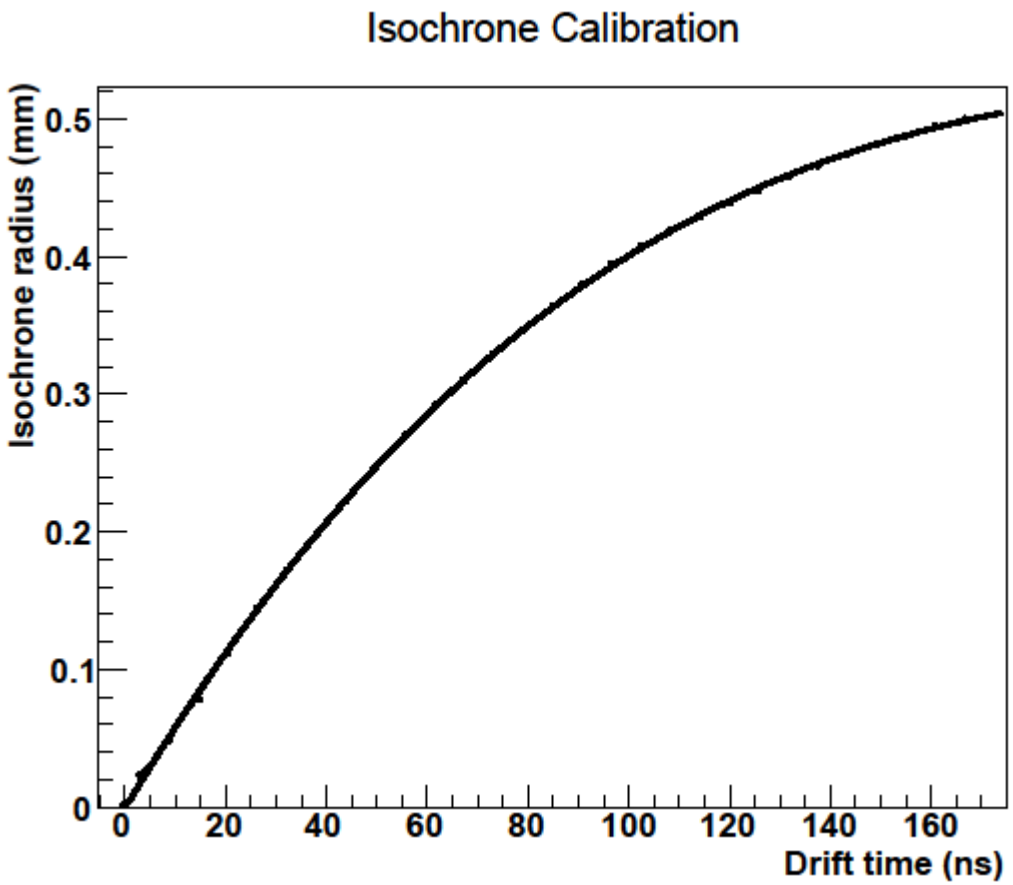


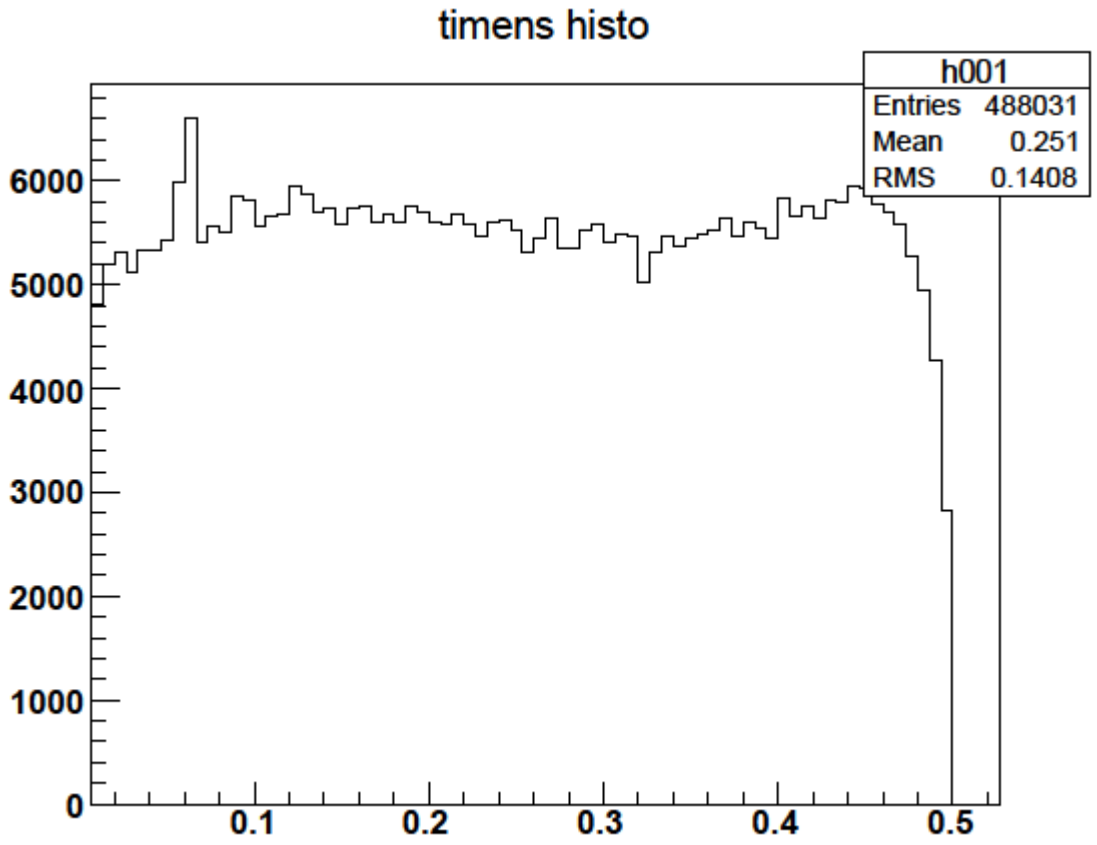






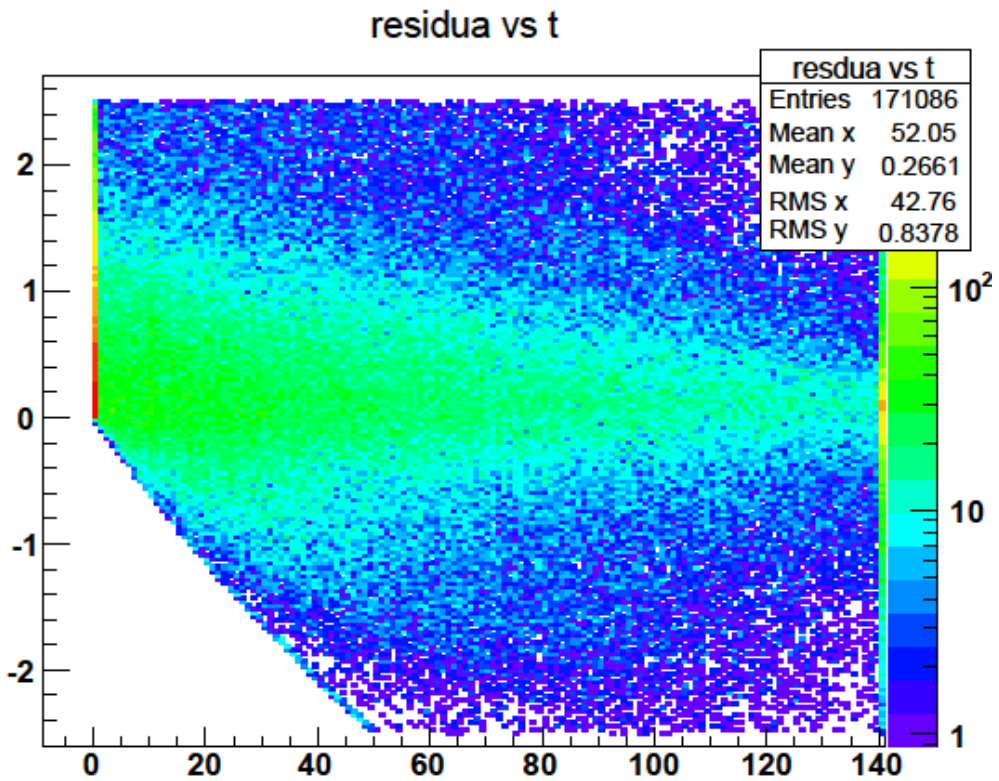
R(t) calibration

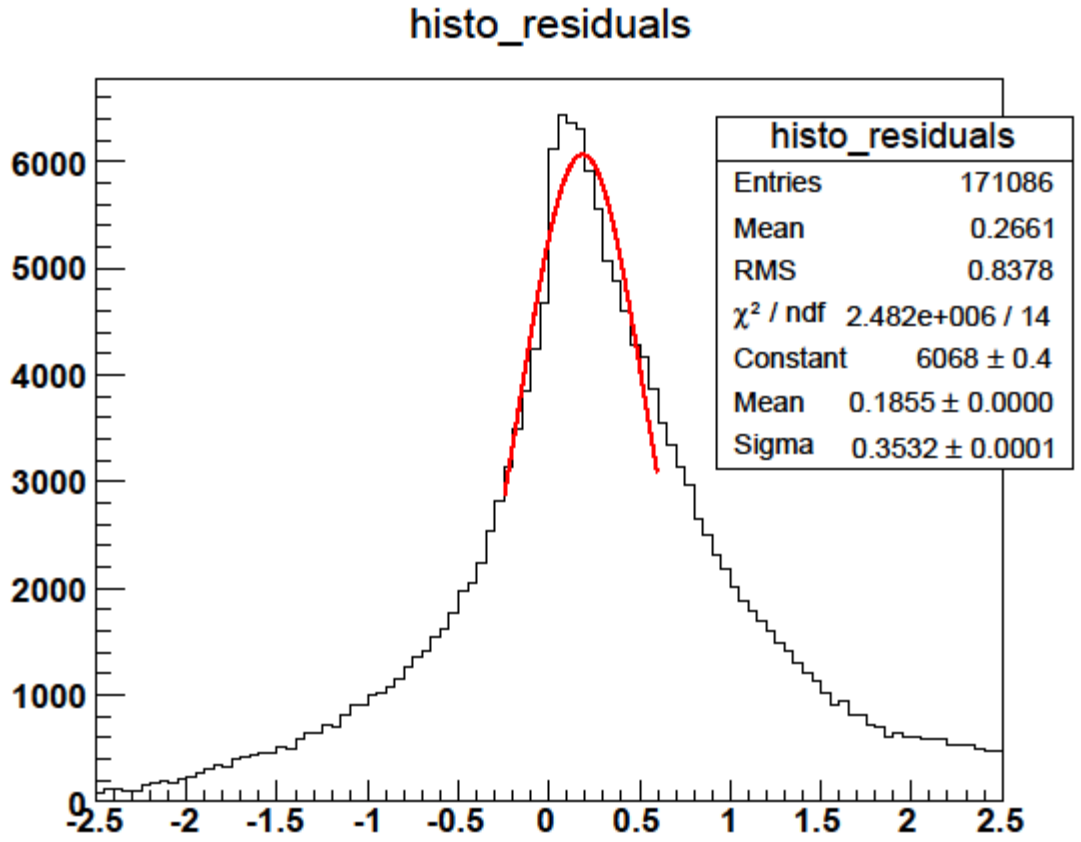




Tracking Results

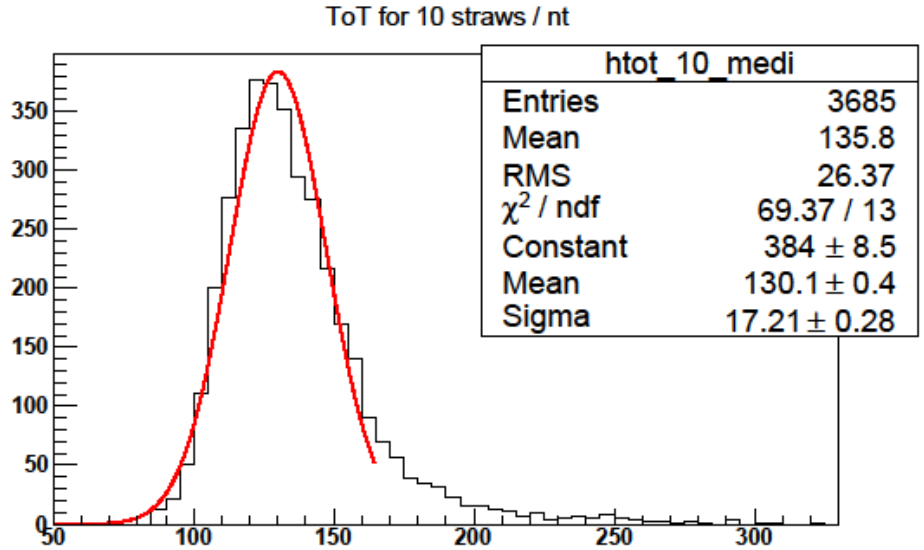
Track reconstruction efficiency: 99 %
Spatial resolution: 350 um

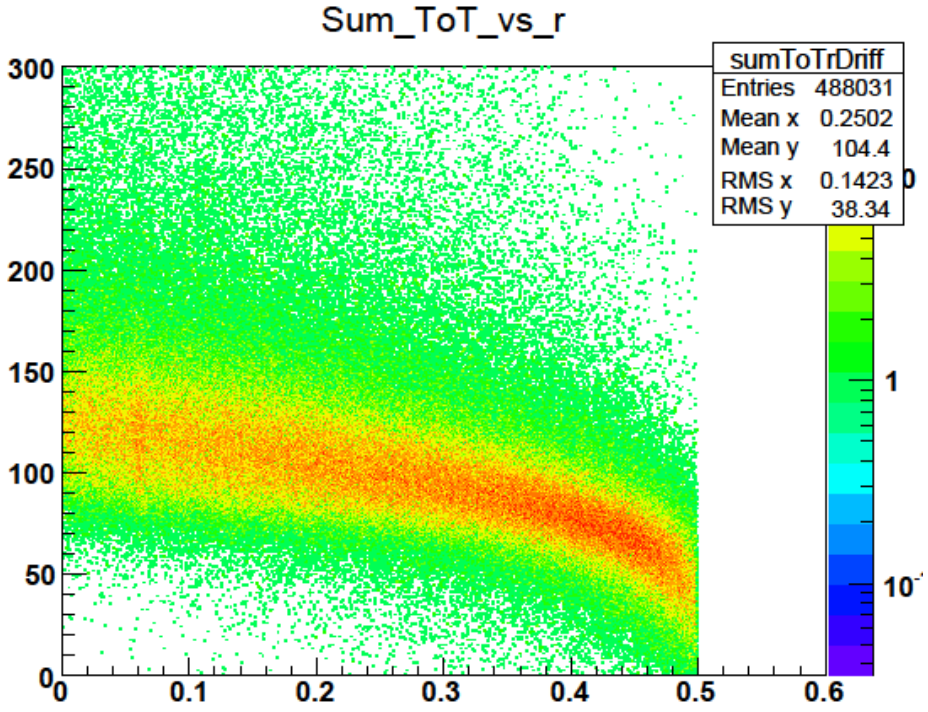


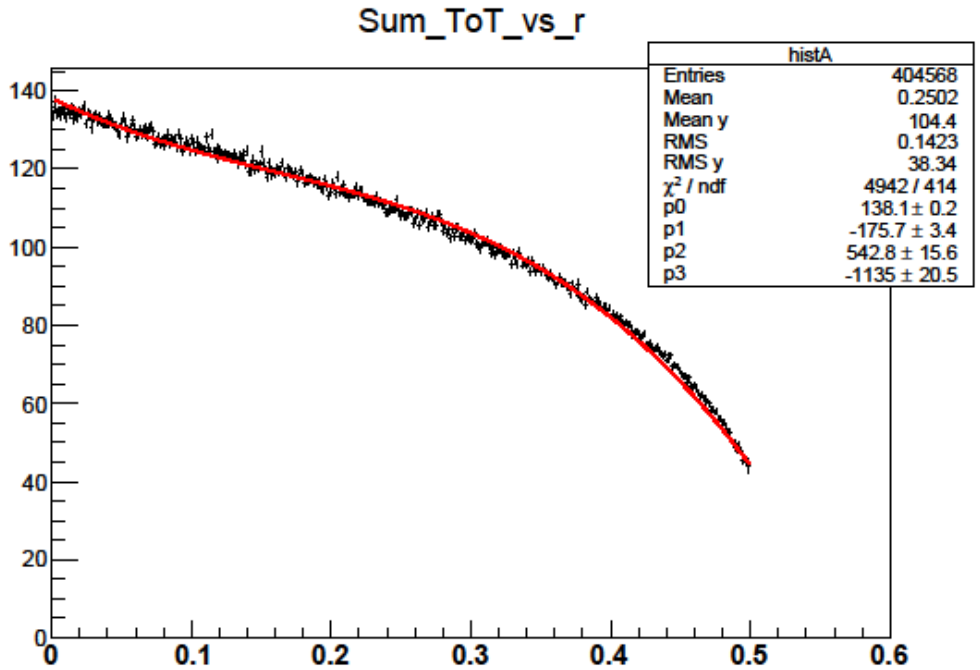


ToT Studies

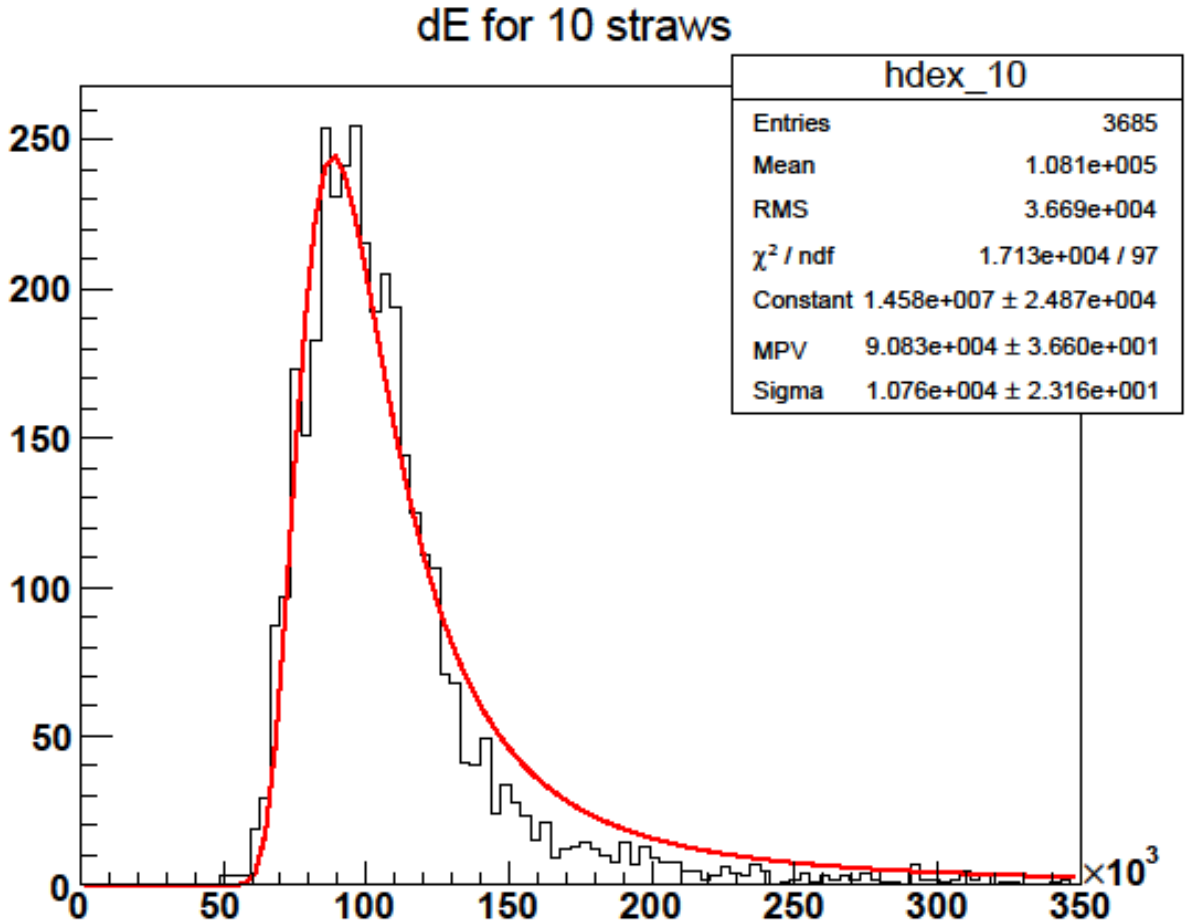
ToT time resolution: 13%







Energy Loss


dE for 10 straws
hdex_10
Entries 3685
Mean 1.081e+005
RMS 3.669e+004
χ² / ndf 1.713e+004 / 97
Constant 1.458e+007 ± 2.487e+004
MPV 9.083e+004 ± 3.660e+001
Sigma 1.076e+004 ± 2.316e+001
250
200
150
100
50
0
0
50
100
150
200
250
300
350
×10³

Conclusions

- Visible difference from channel to channel (ToT & Drift time)
- Poor spatial resolution related to reference time problem
- ToT results are promising and consistent with simulations