…I know what I did last summer…..

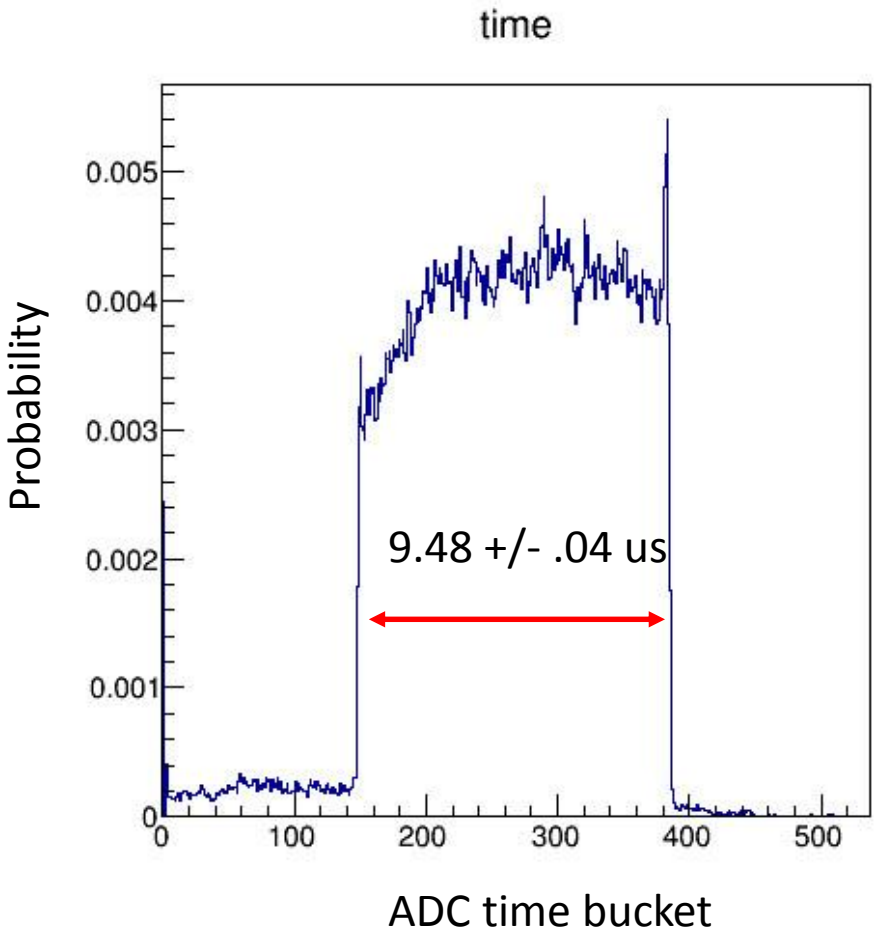
Justin Estee

Time distribution

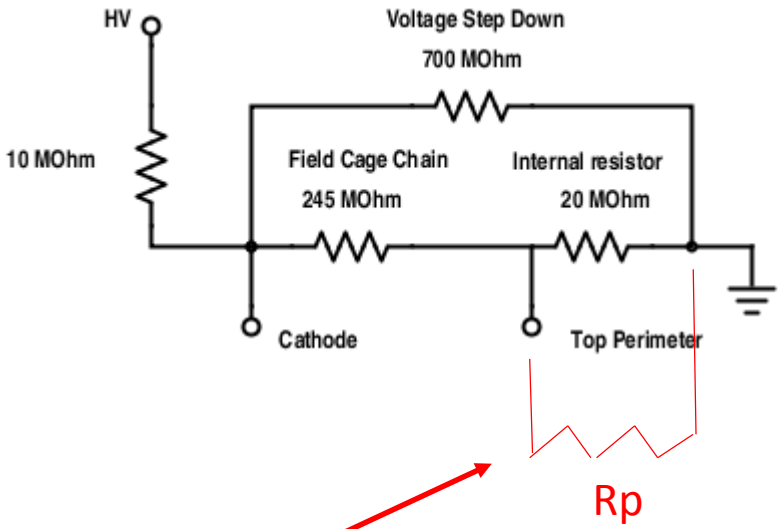
At the time this analysis was preformed I thought the field was uniform.

Expected time 9.37us from Garfield simulation.

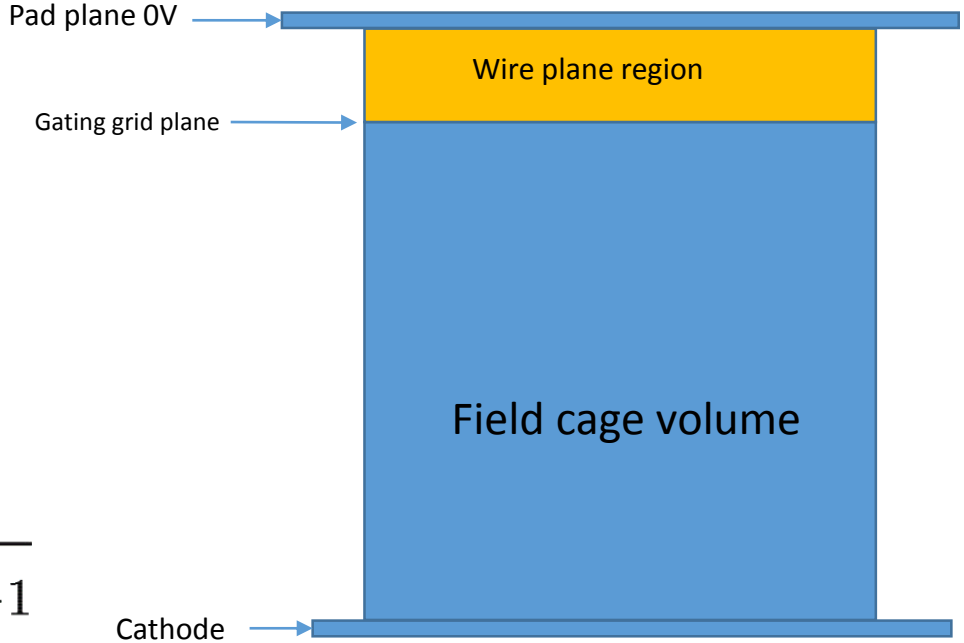
But…..



The field was not uniform

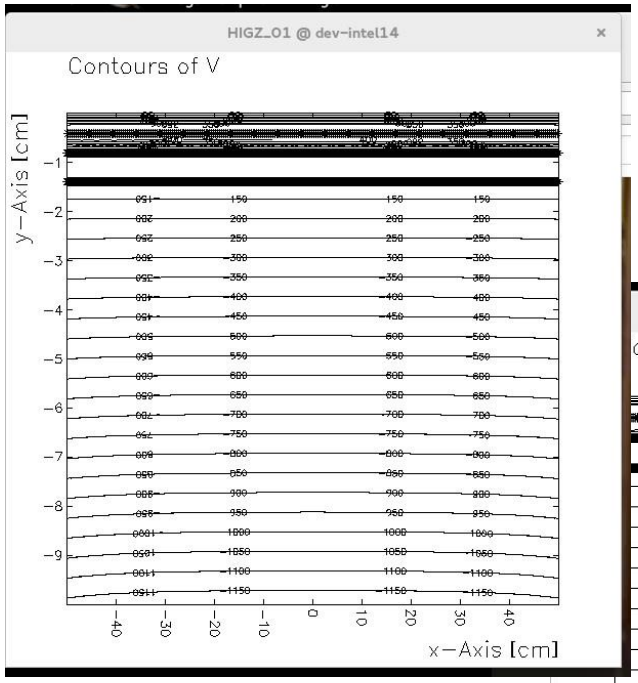


$$R_p = \frac{49 * R}{\frac{y_{g.g.} - y_{cath}}{y_{g.g} - y_{tp} + (y_{tp} - y_{cath})\left(\frac{V_{g.g.}}{V_{cath}}\right)} - 1}$$



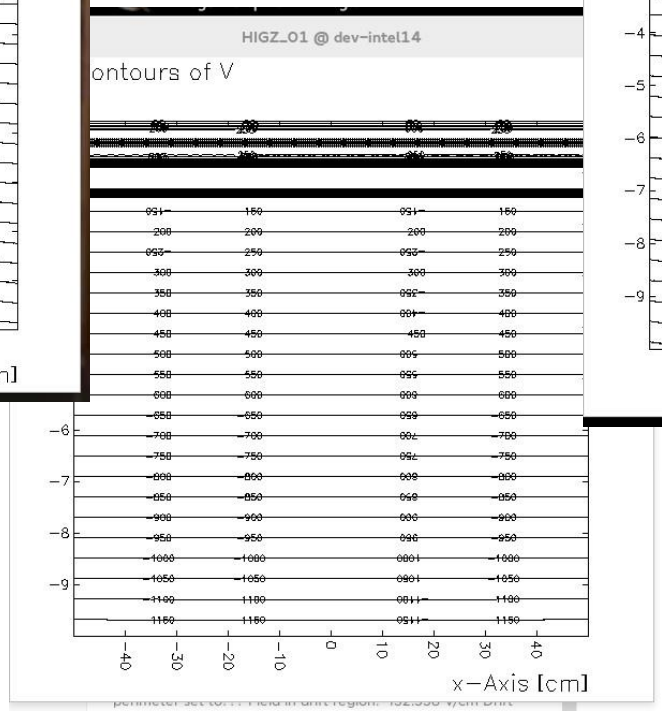
Obviously not a drawing of the real field cage

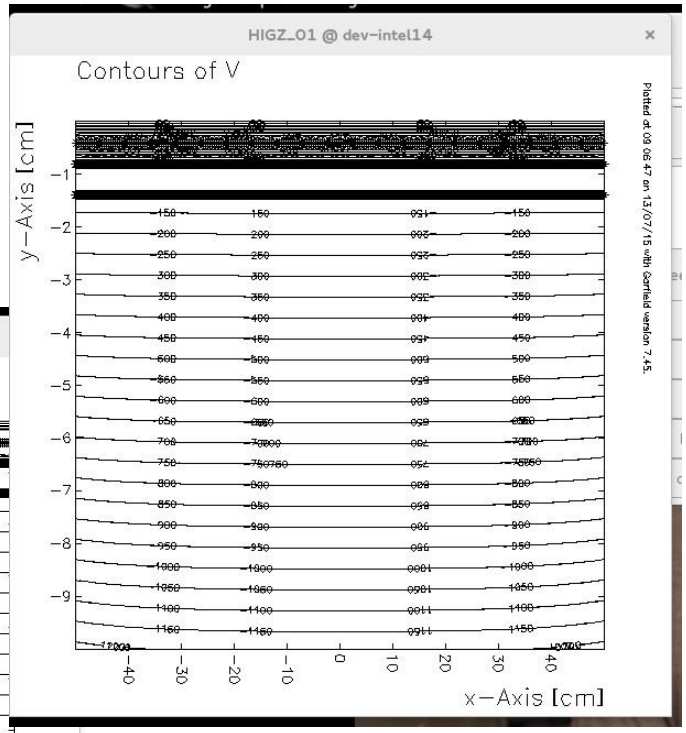
Simulation of the field



Rp=50 Ohm

Rp from equation
I've derived

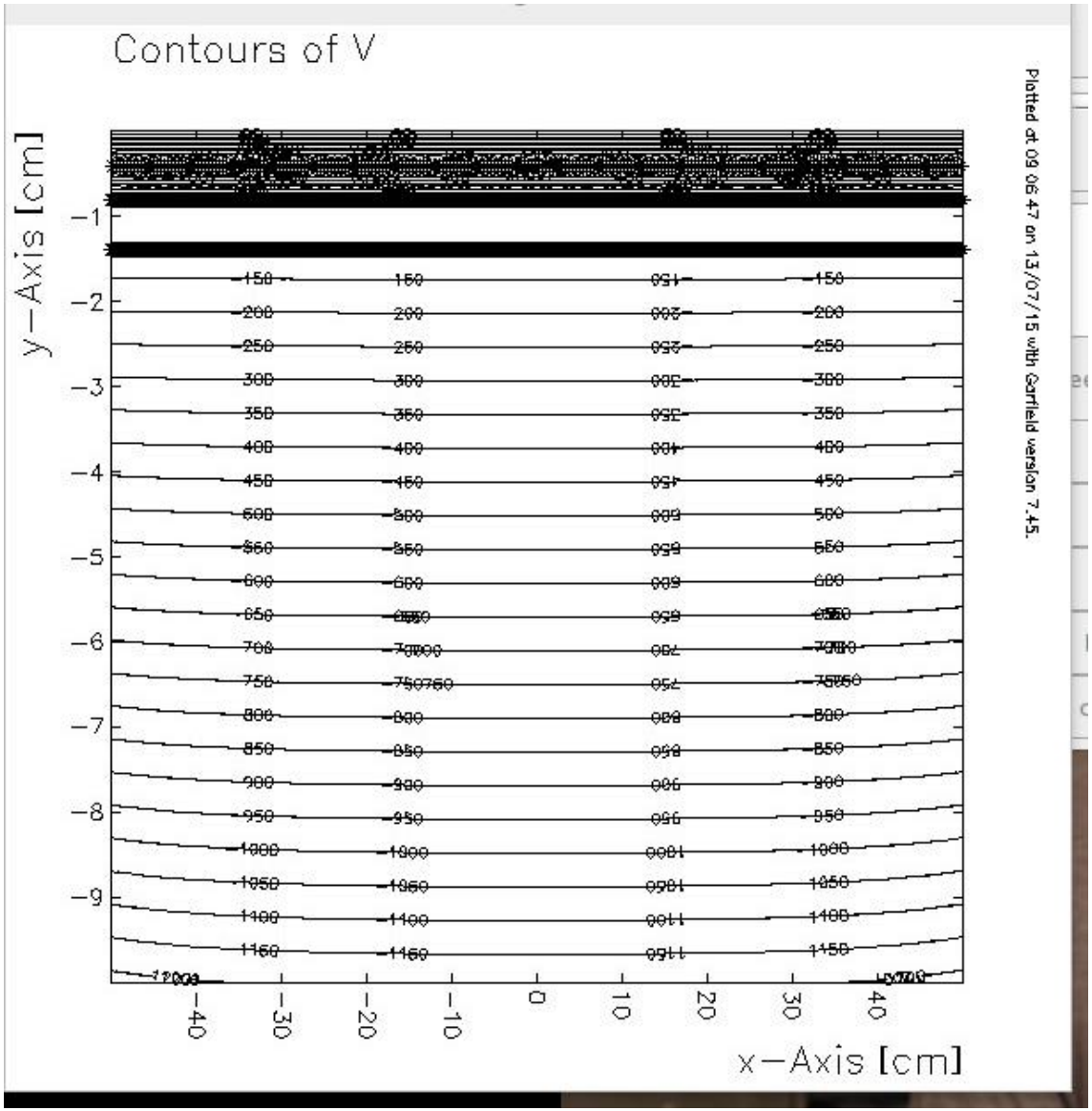




Open connection. Just
20MOhm internal

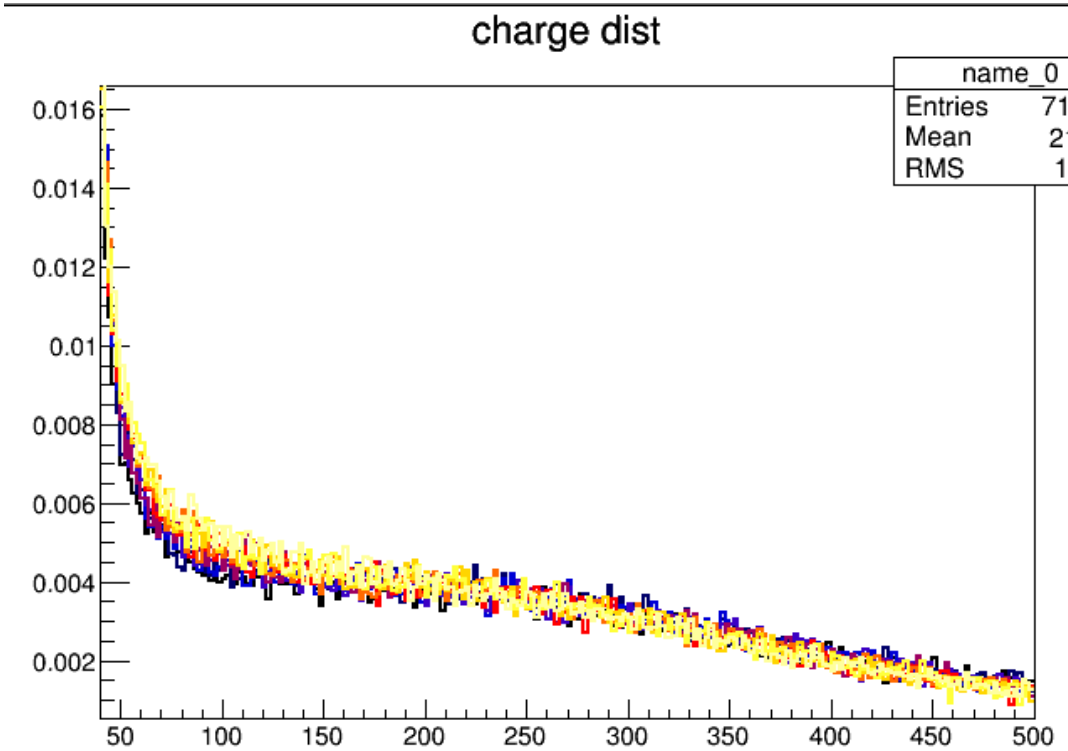
The case of the first cosmic run.

We did not put the correct Rp in parallel so just the 20MOhm internal resistance was used. You can se significant distortion in the field cage.



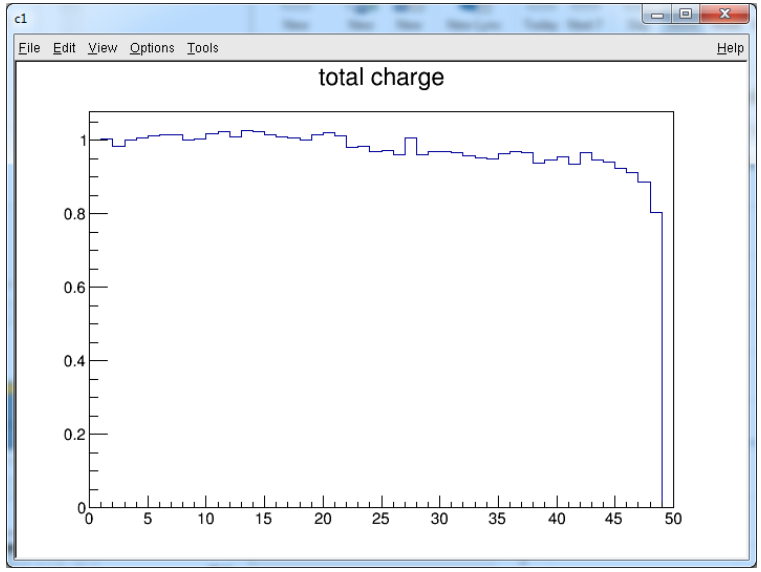
Charge absorption

- The vertical volume was split into many thin slices ~1mm thick. The charge spectrum was plotted
- Clustered hits must be used since diffusion is significant effect.
- Blue/Black curves represent cosmic spectra to the wire planes
- The yellow curve is the spectrum of events furthest away.

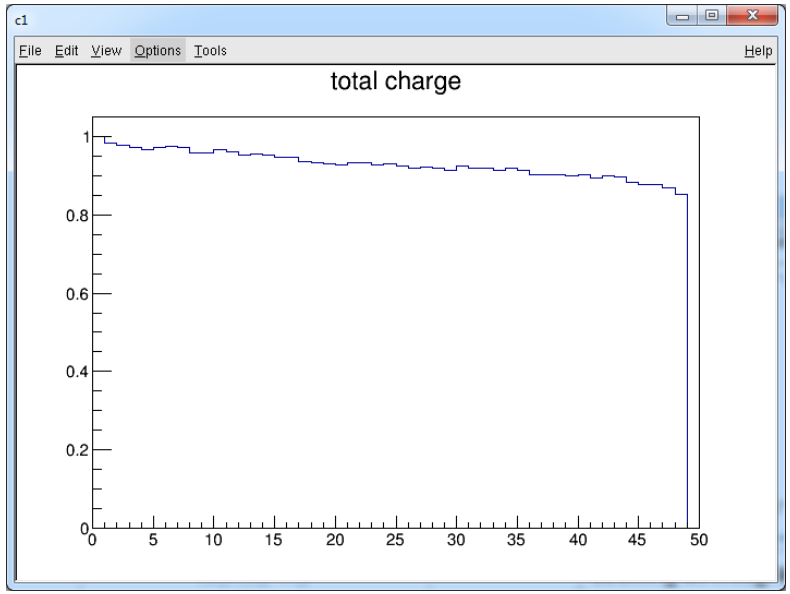


Percent effect

- I expect a 1% effect from the literature and my calculations.
- Diffusion most likely still the culprit.
- Clustering algorithm cannot separate diffusion.



Looking at integral of charge distribution

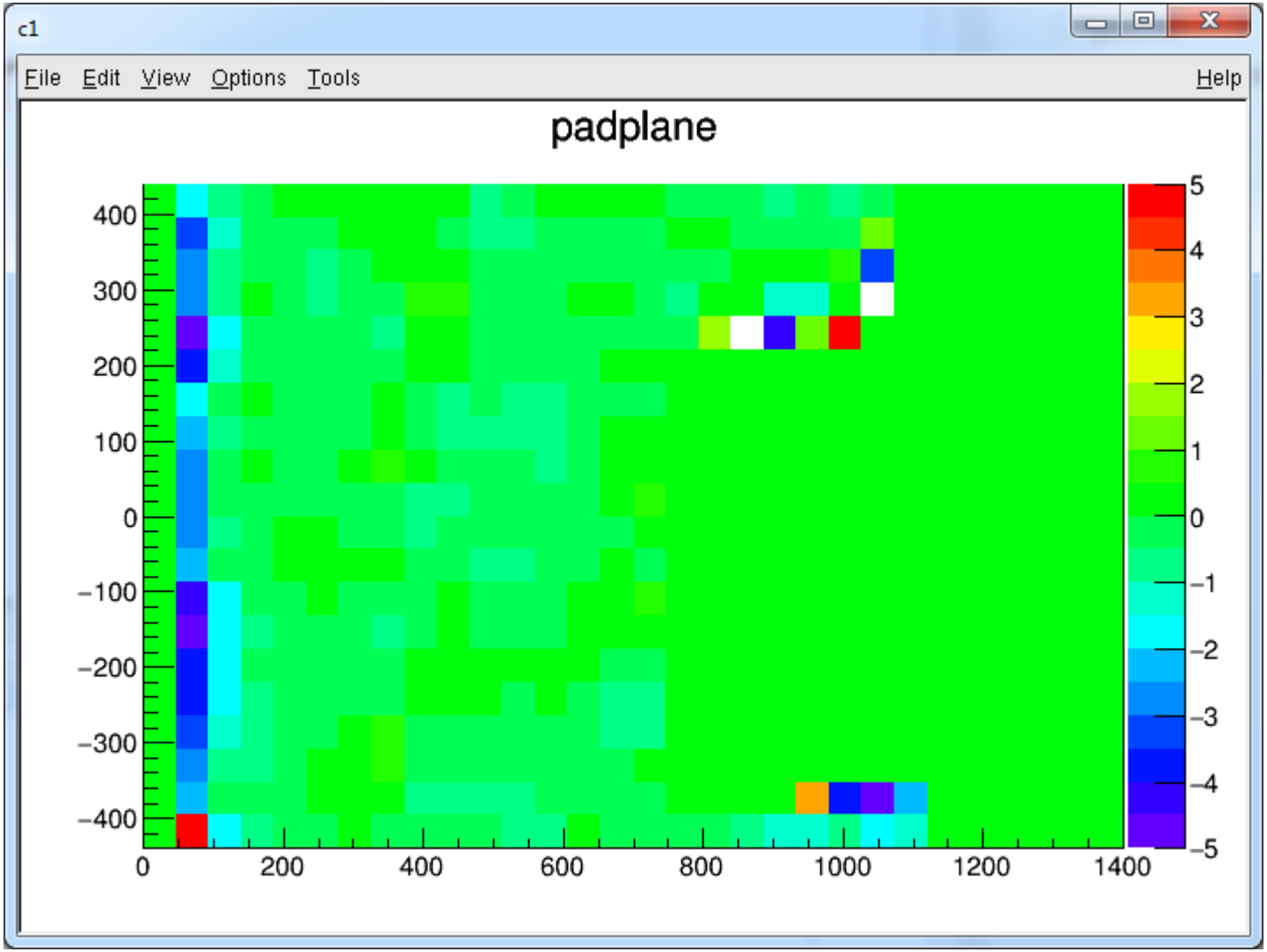


Looking at the mean of the dist.

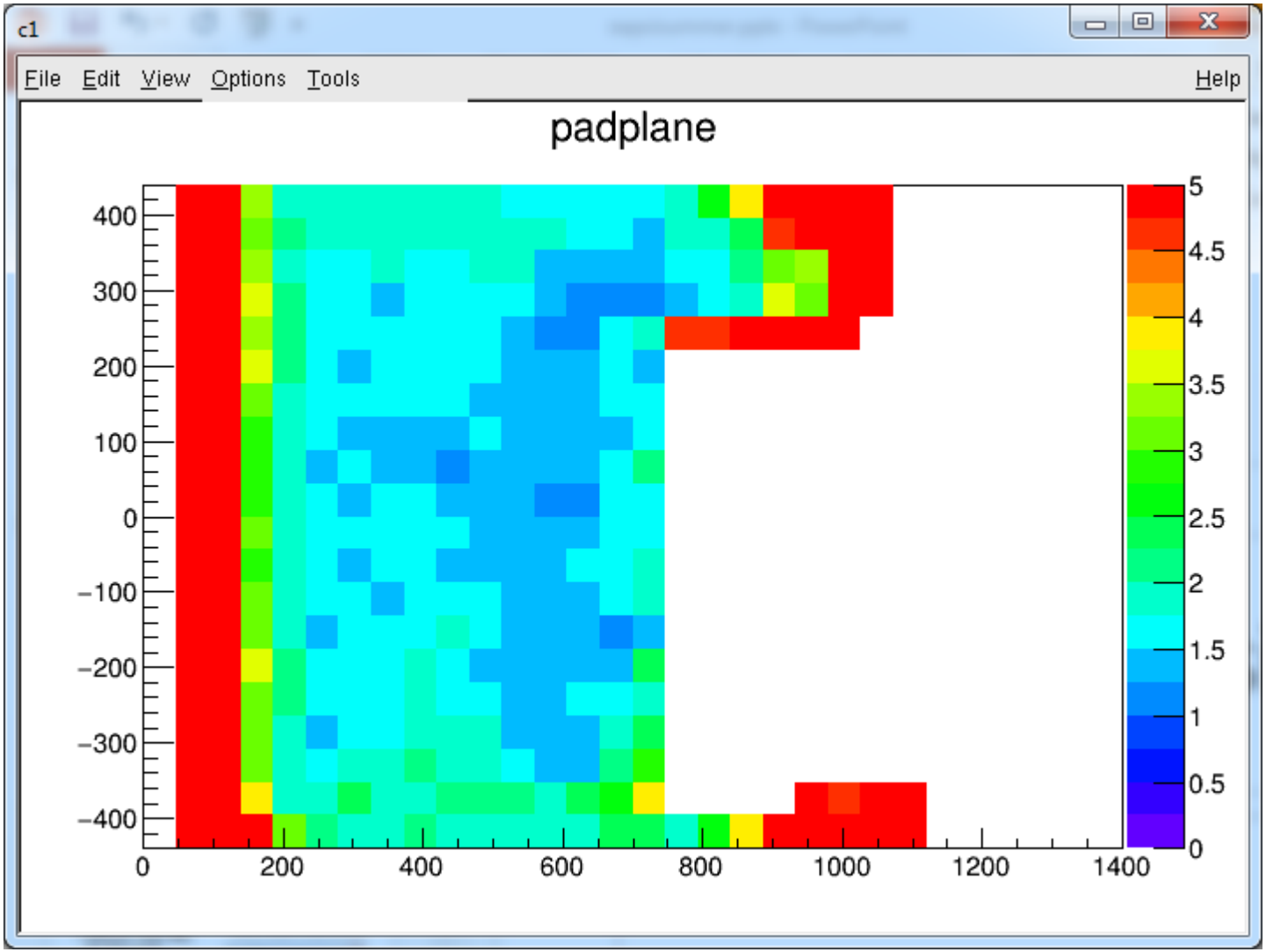
Beginning of position resolution

- Assume cosmic tracks are rigid and therefore straight.
- Perform a fit to the tracks in the volume where the field is most uniform.
- See the deviation

Vertical direction mean



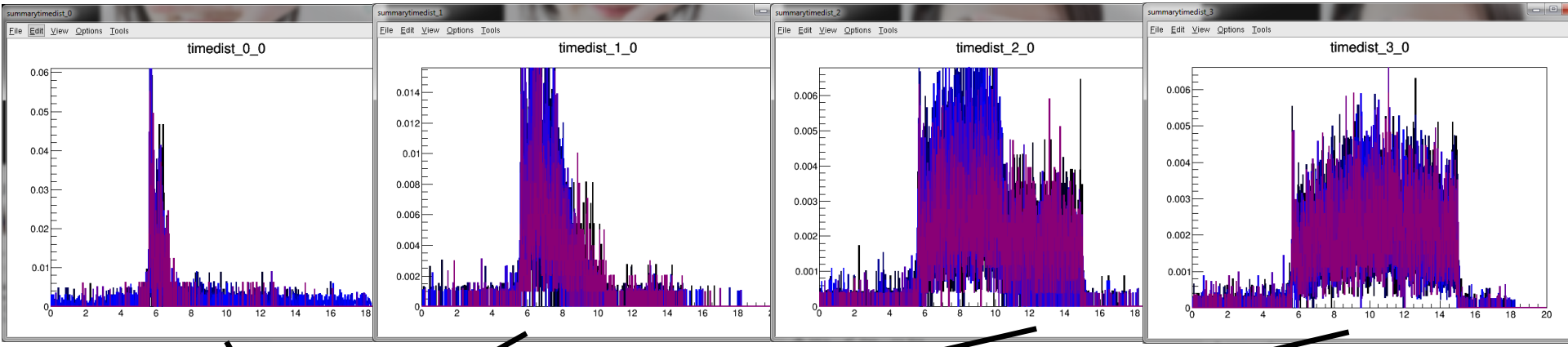
Horizontal residual sigma

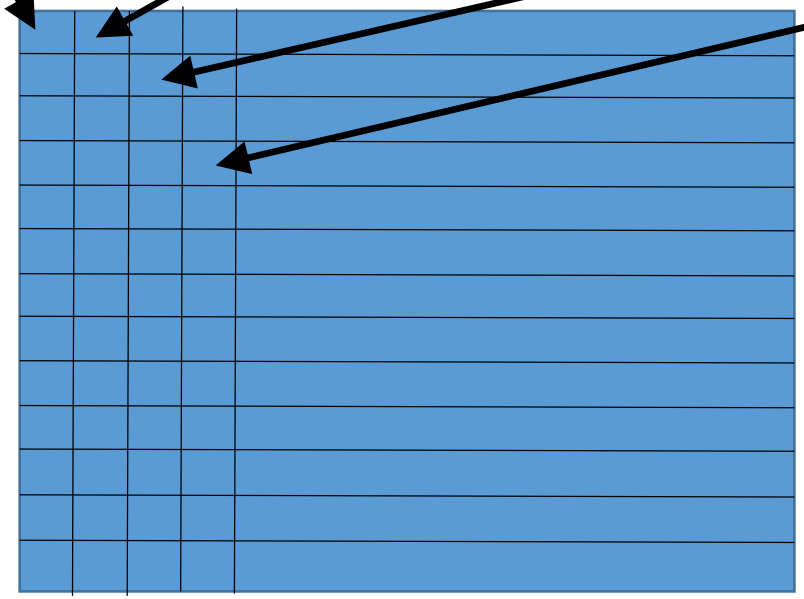


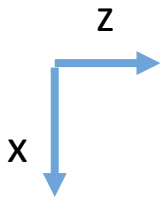
Distortion of field

- Cosmic runs
  - Run taken in July 2015 (with half plane) wrong top perimeter resistor used.
    - Eff resistance is 20 Mohms
  - Run taken in August 2015 (with full pad plane)
    - I put the correct parallel resistance inbefore I left RIKEN. Eff. Resistance now ~7MOhms (Cant remember exact value. Its written down on box)
    - Given from my formula I derived

Time distribution of cosmic (bad tunning)



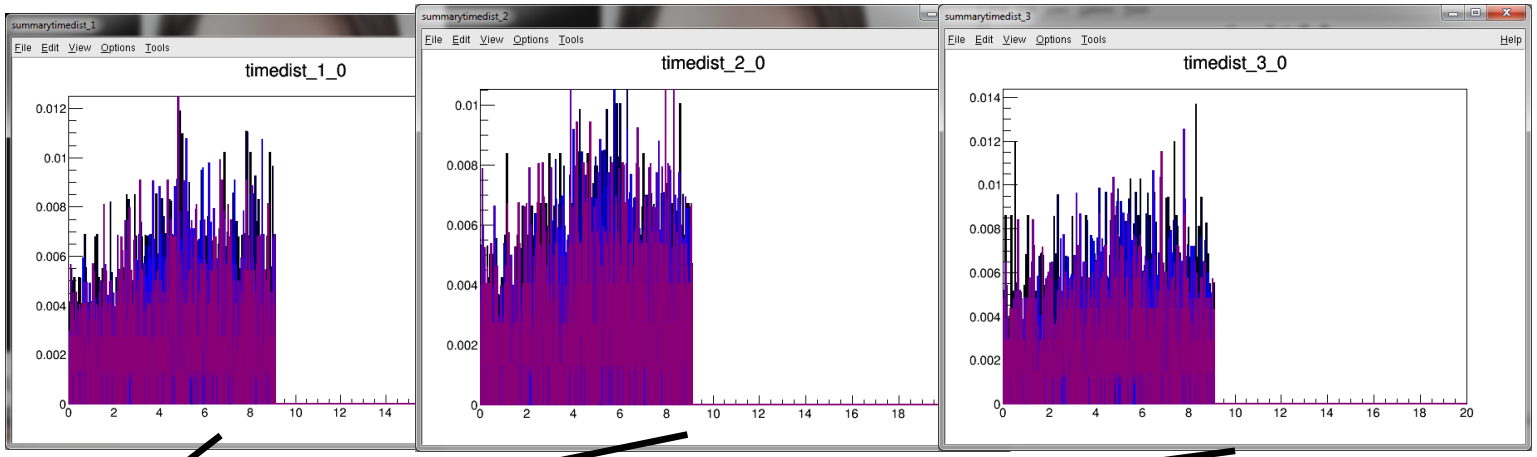




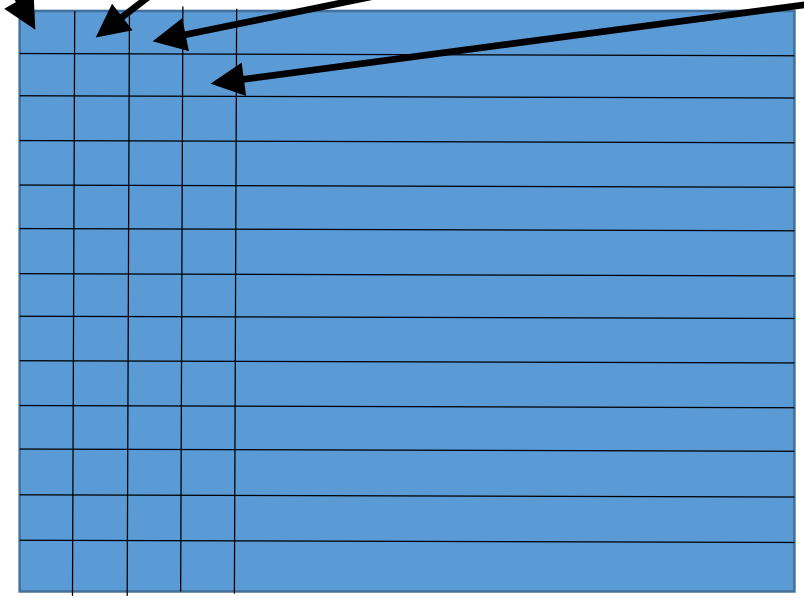
Pad plane
cartoon
(top view)

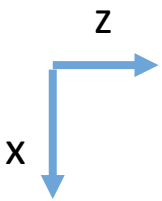
Time distribution (good tuning)

*Note I set the time window in these distributions. I.e. starts at 0 goes to ~9.5us.



I don't see any events still. I'll check that I didn't clip the window.

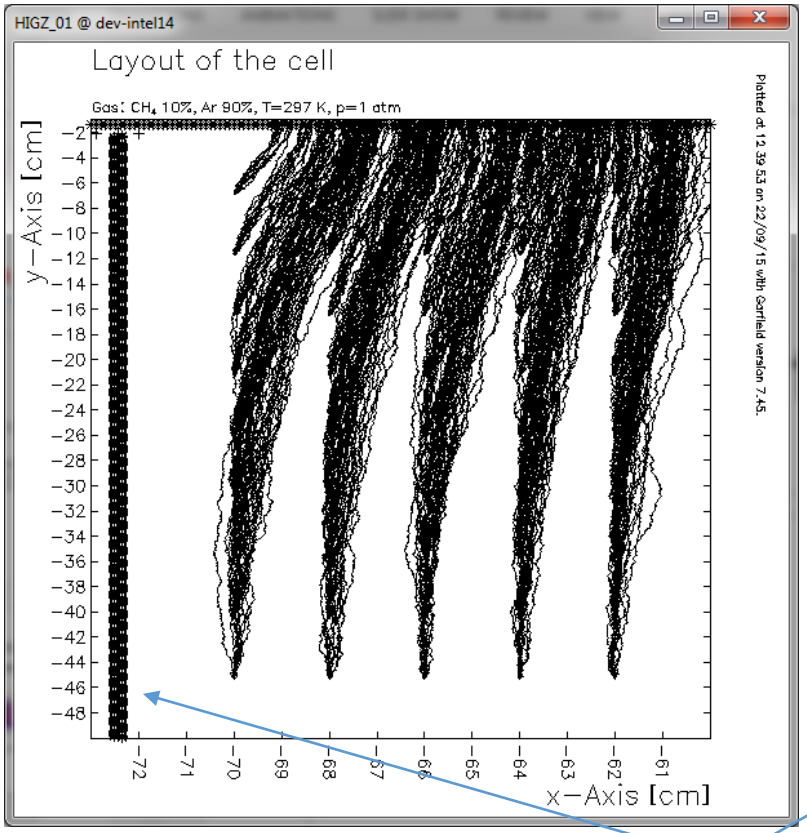


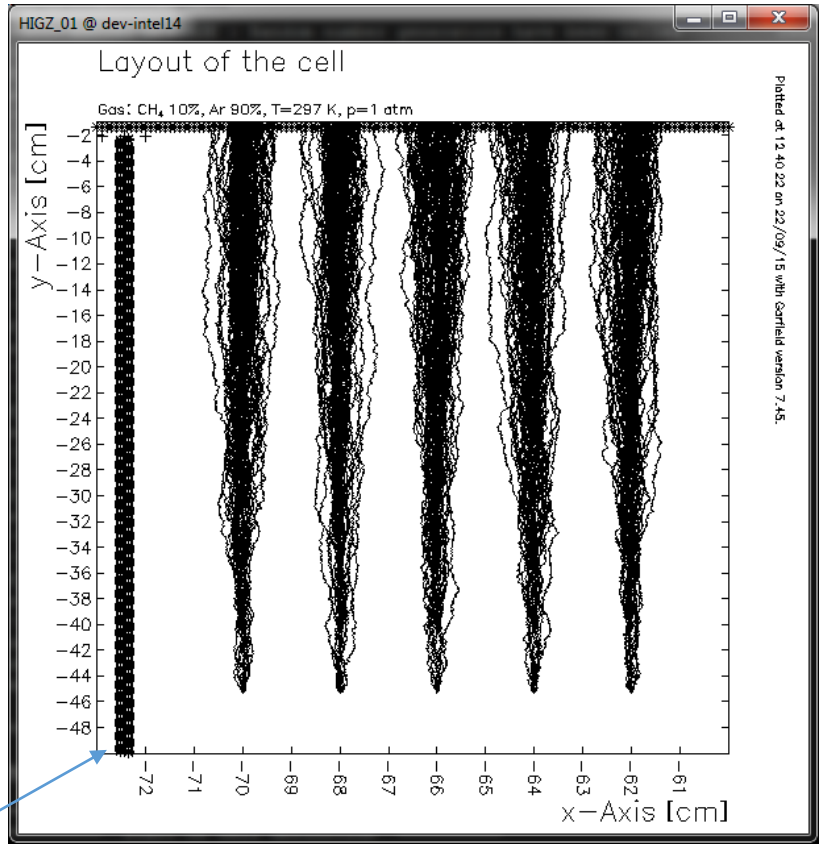


Pad plane cartoon (top view)

Monte Carlo drift of e- (Garfield simulation)

Beam Direction





Field cage front wall

20 MOhm WRONG tuning
July Cosmic data (half pad plane)

Correct tuning!
August Cosmic data(full asad)