

Resolution plots and related support data. (Plots for public?)

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Intro

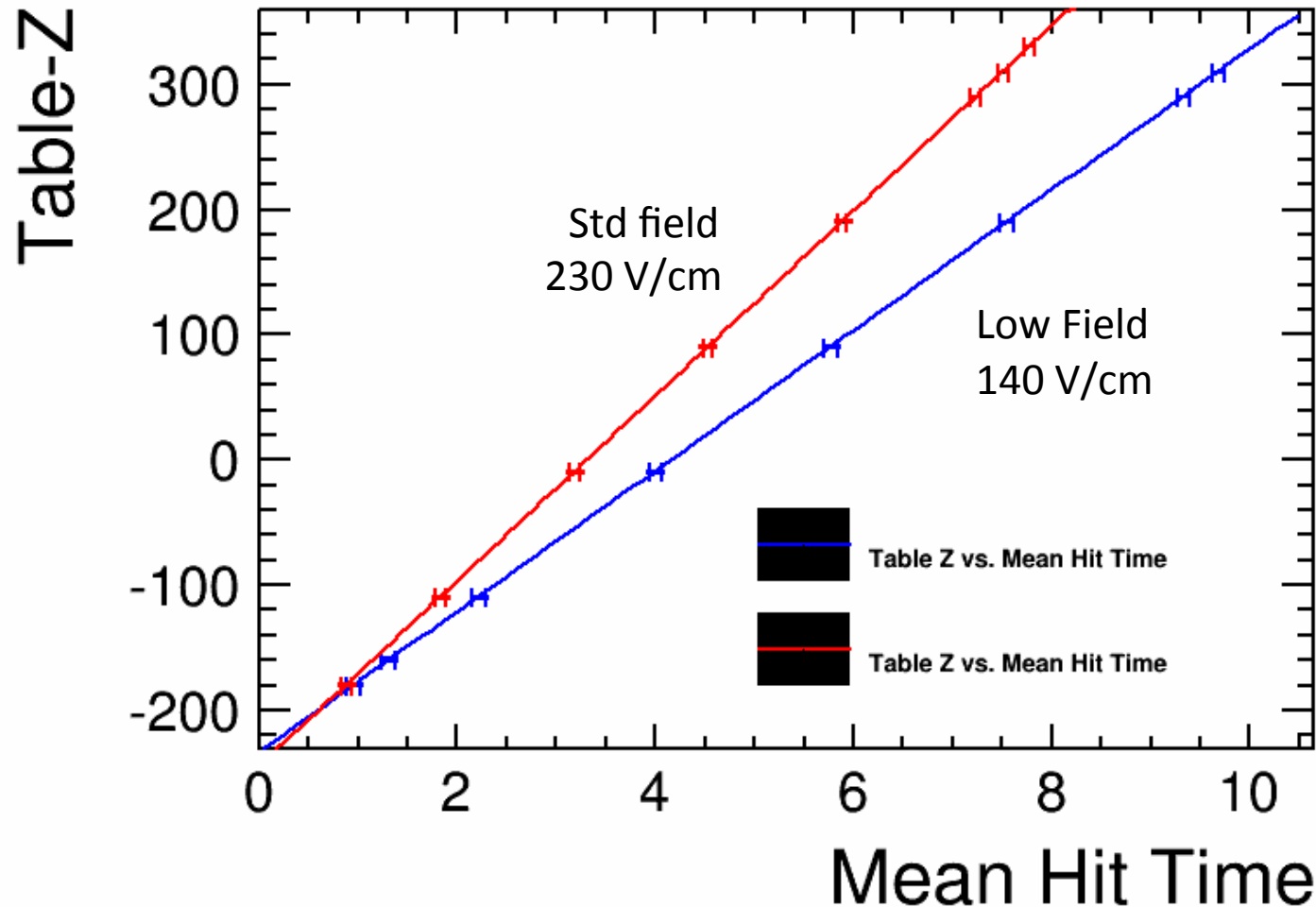
- This document is to reflect the current status of the analysis efforts.
- Summary transverse resolution plots in this document are based on my recent data analysis.
- Feel free to ask me for additional plots you may think that are important to present.
- It is also an attempt to raise the question of “public” or “official” plots/images that we need to organize it.

Why we need it?

- We accumulate certain amount of plots and images in our analyses.
- We need to share materials what we can use in public presentations/conferences/workshops.
- The place for common plots/images could be a public html page accessible for all group members or a wiki page (which, actually, we've set at Carleton) with corresponding links to the material.
- Here is my start of collecting plots/images that could be "blessed" by group members to become "official".
- Style/captions/legends could be discussed and agreed upon – these plots are just merely an input for future "official" plots and images.
- I will add more plots to this file as soon I have them ready.

T_0 determination from data

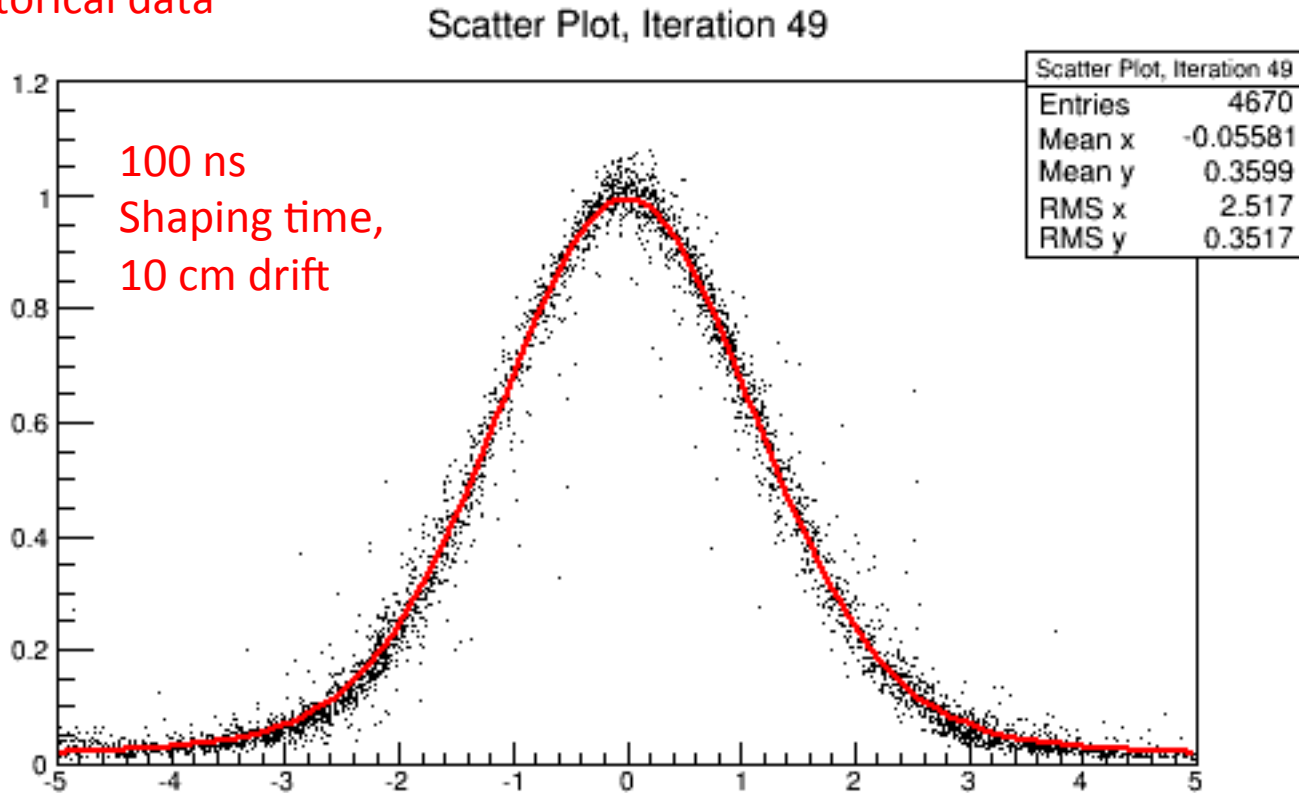
Table Z vs. Mean Hit Time



$T_0 = 632$ ns, $V_{\text{drift_stdfield}} = \sim 74$ $\mu\text{m/ns}$, $V_{\text{drift_lowfield}} = \sim 56$ $\mu\text{m/ns}$.

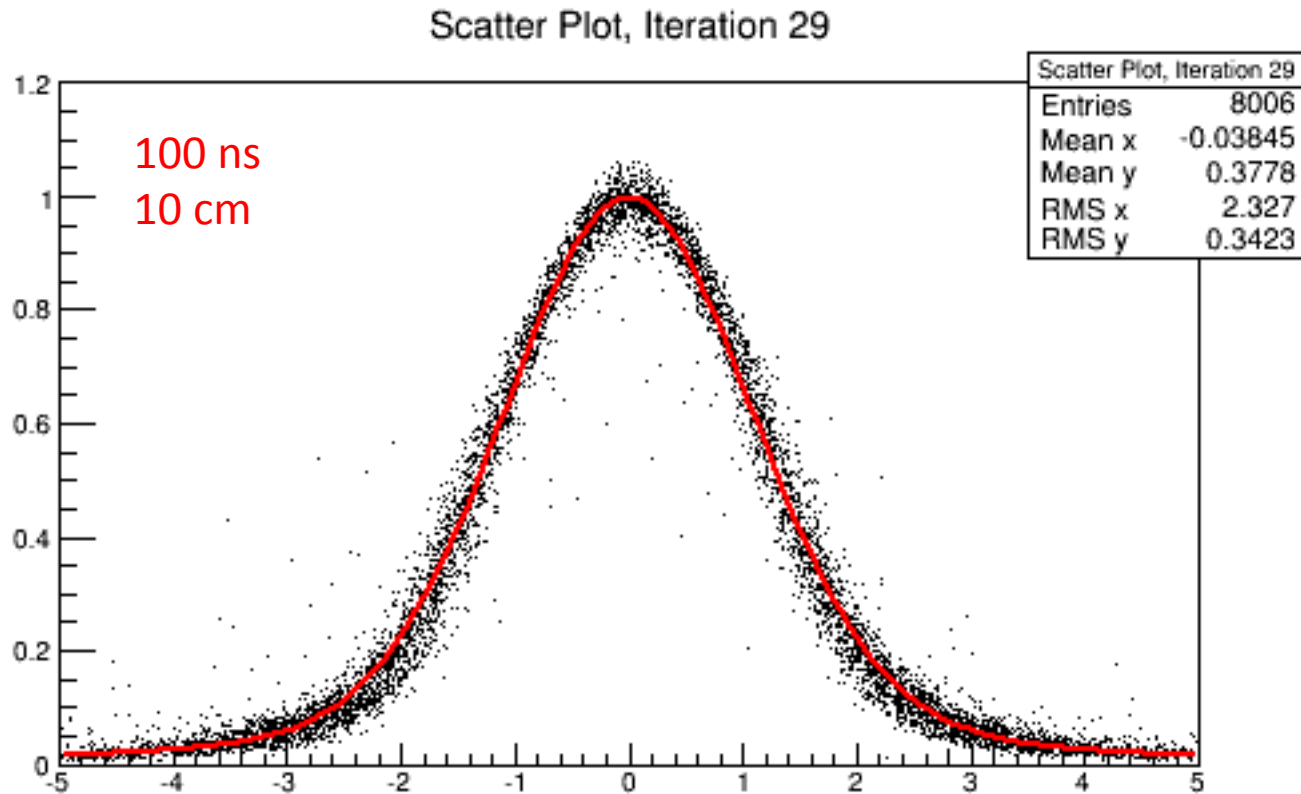
PRF Fit, Sum form, Run 2015, 2011

Old historical data

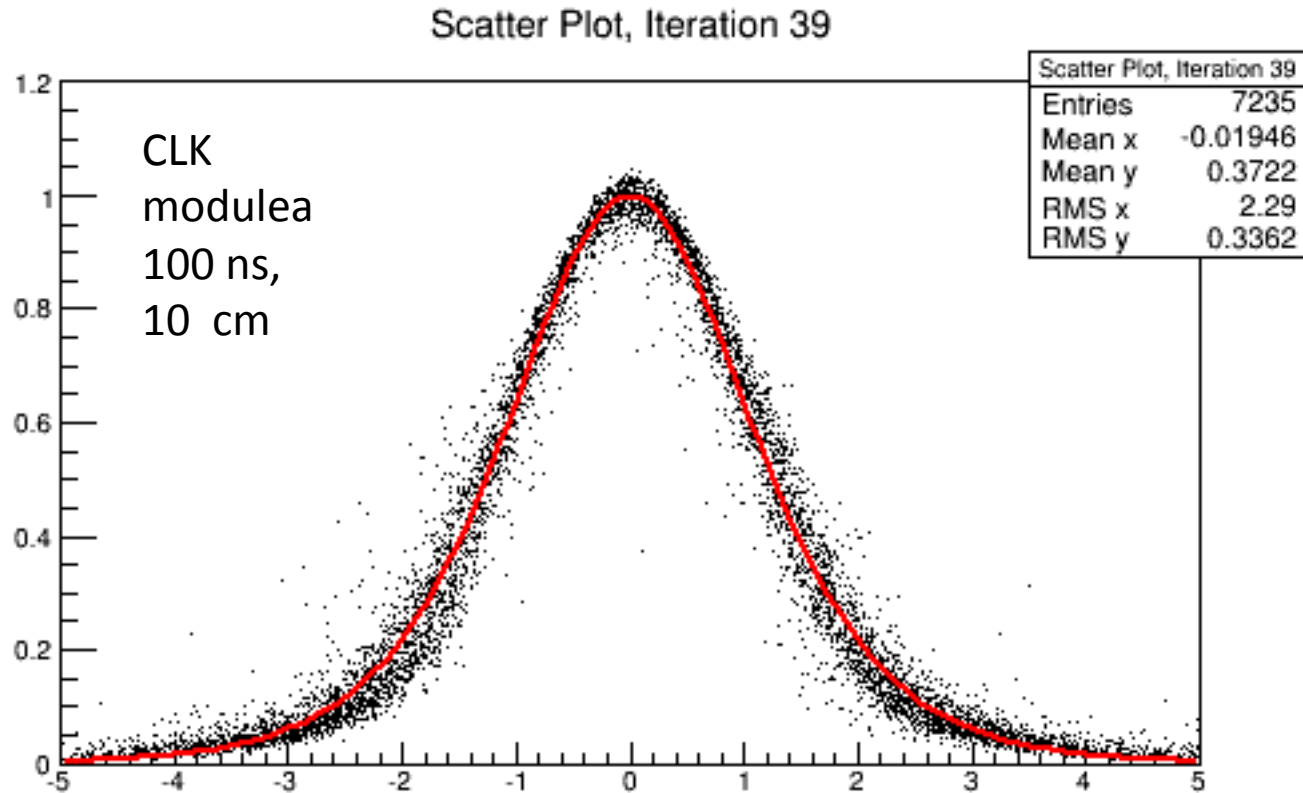


This is an automated MarlinTPC process to determine the PRF width. Title shows how many iterations were needed to converge for this case (should not appear in the “public” plot).

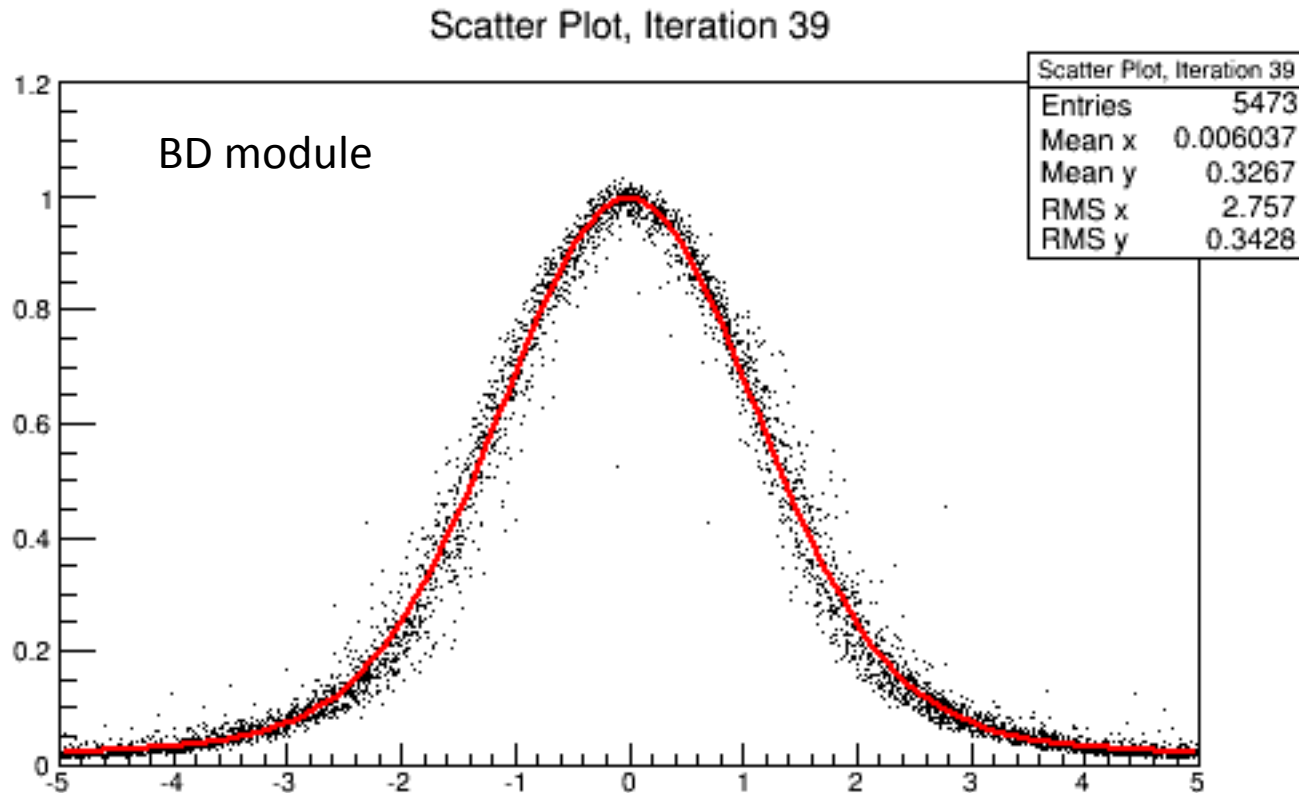
PRF Width, Sum Form, Run 4108, 2014



PRF width, Sum form, Run5119, 2015

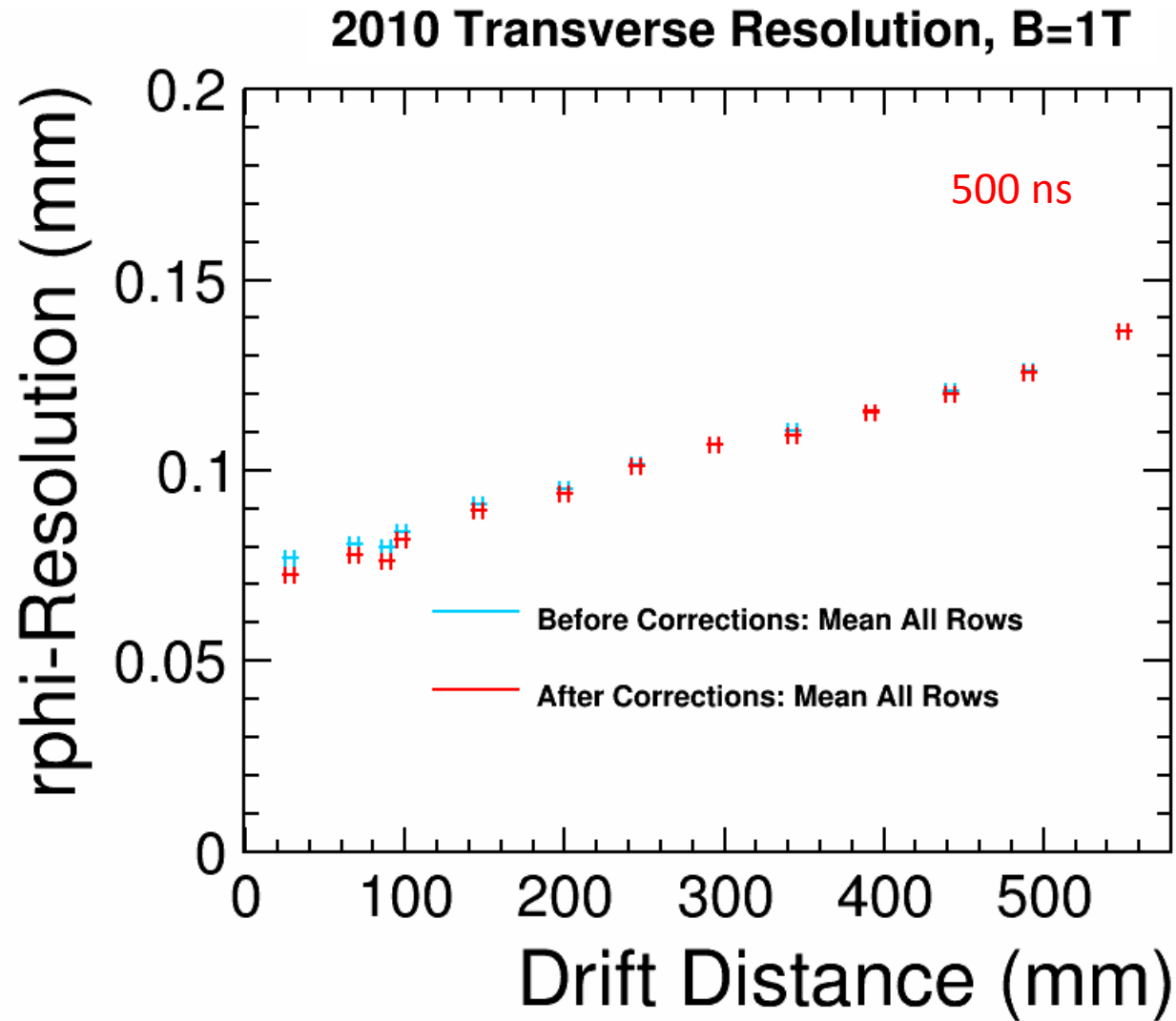


PRF width, Sum form, Run5119, 2015



PRF for BD2 clearly wider than for CLK, which does make perfect sense. Fit looks OK. Even better than for 2011 data (at the same drift distance). This is very important to get optimal resolution parameters.

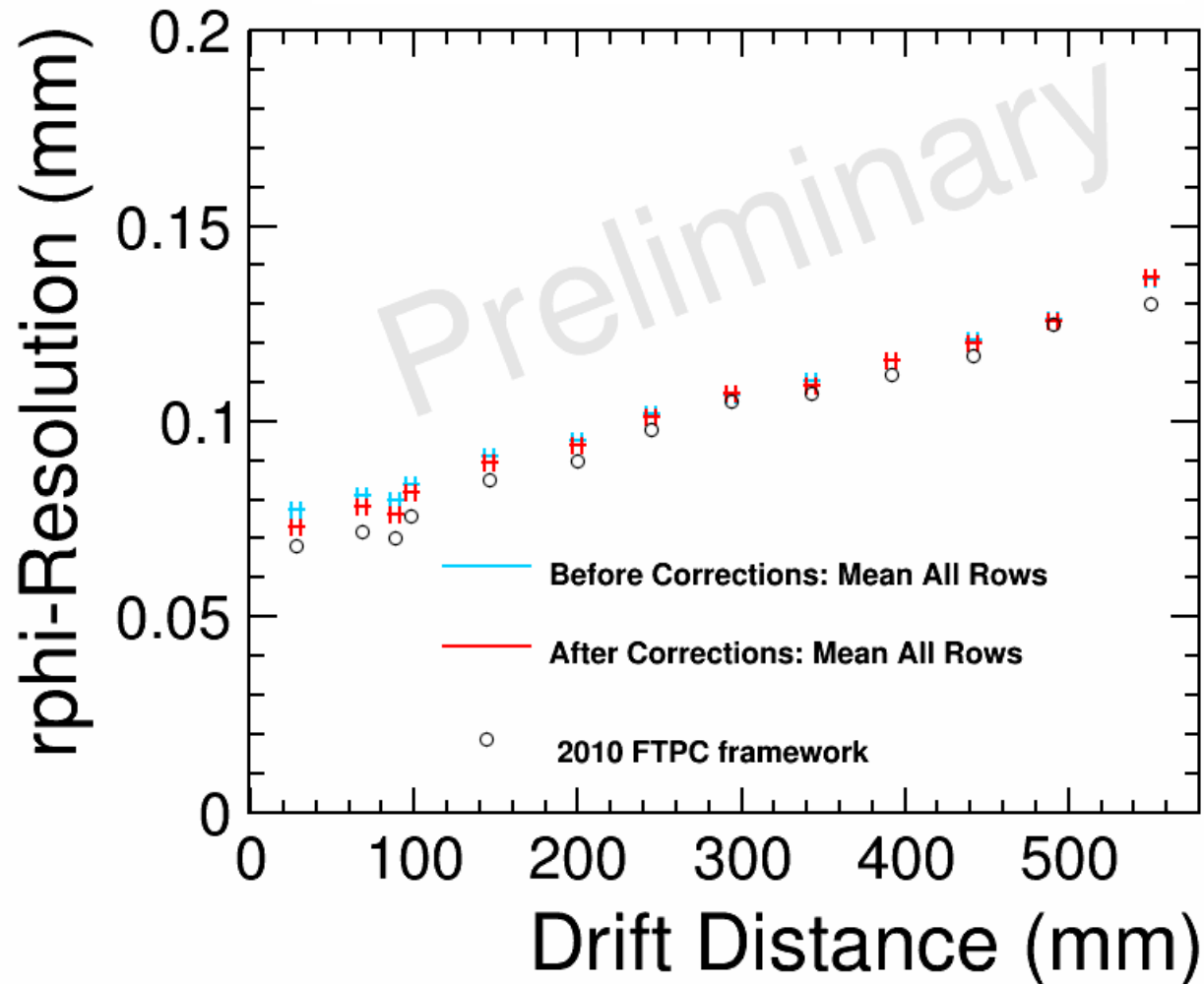
2010 – one module setup



This is a “final” plots for one module 2010 and 500 ns shaping time data.

2010 – One module setup

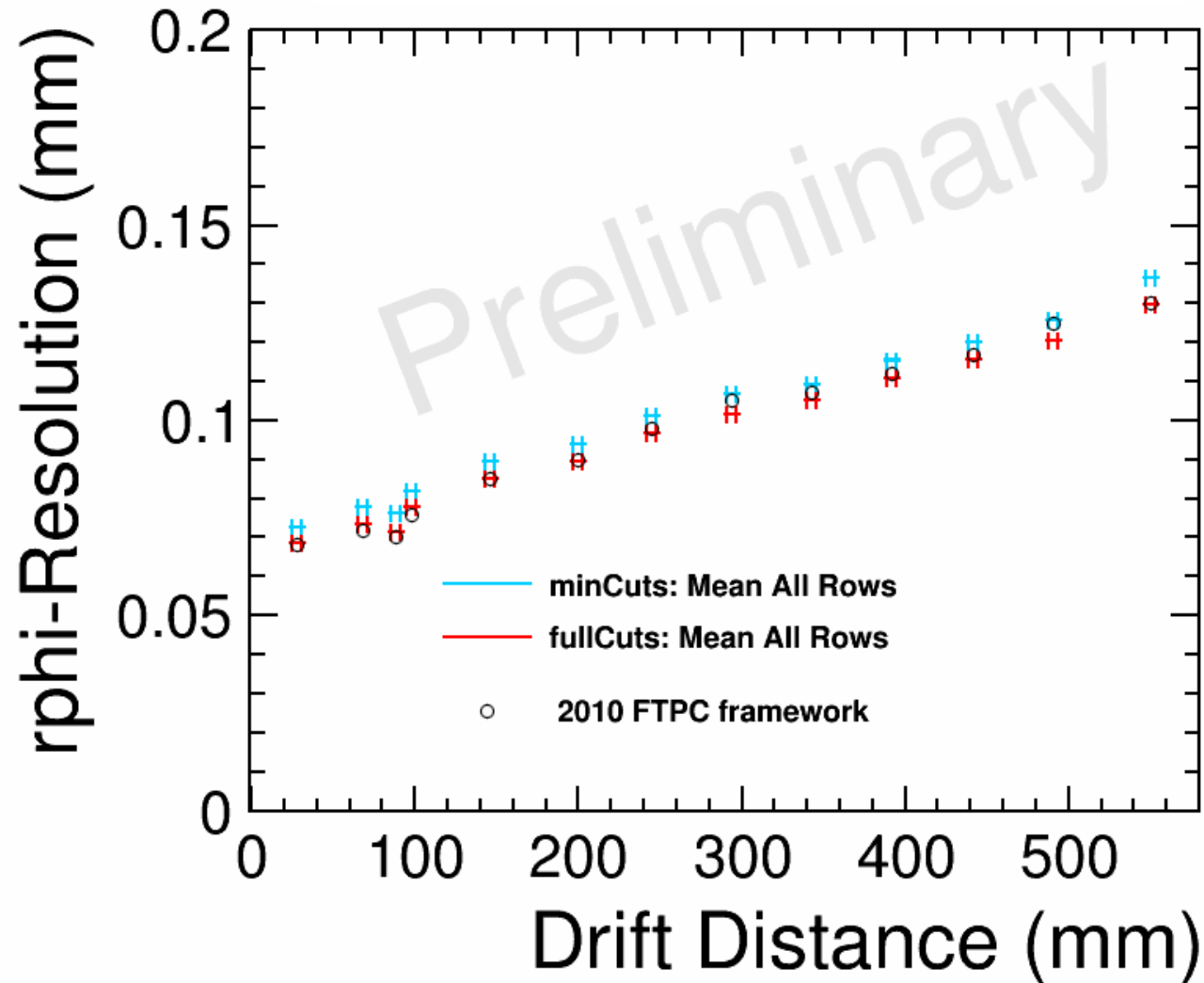
2010 Transverse Resolution, B=1T



The same plots as on Page 9, but with FTPCP framework just for comparison.

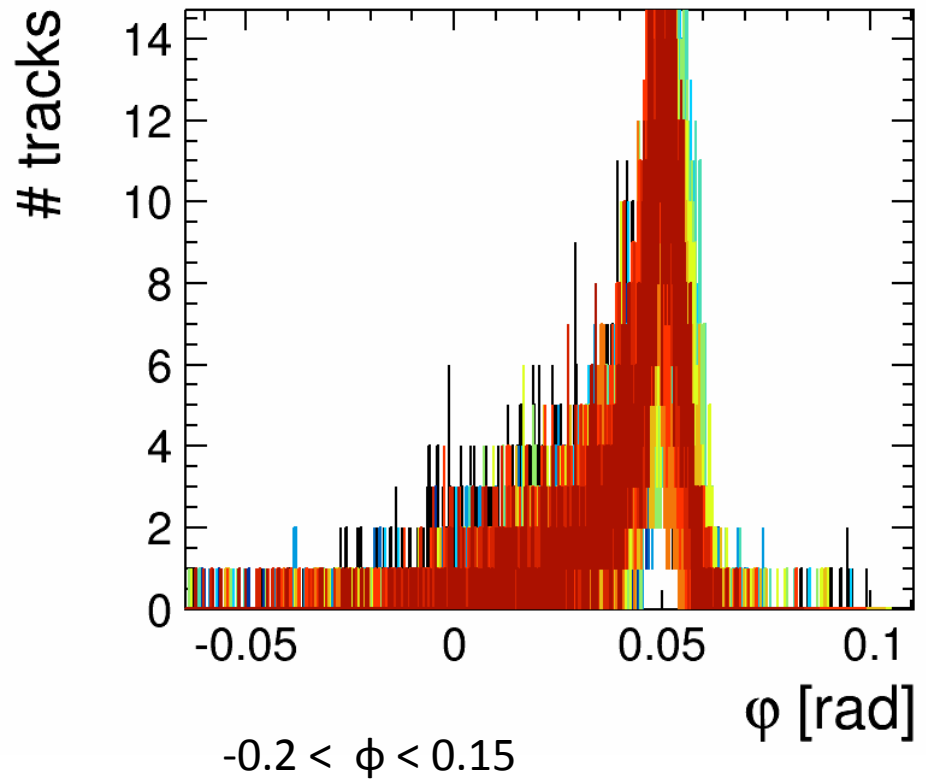
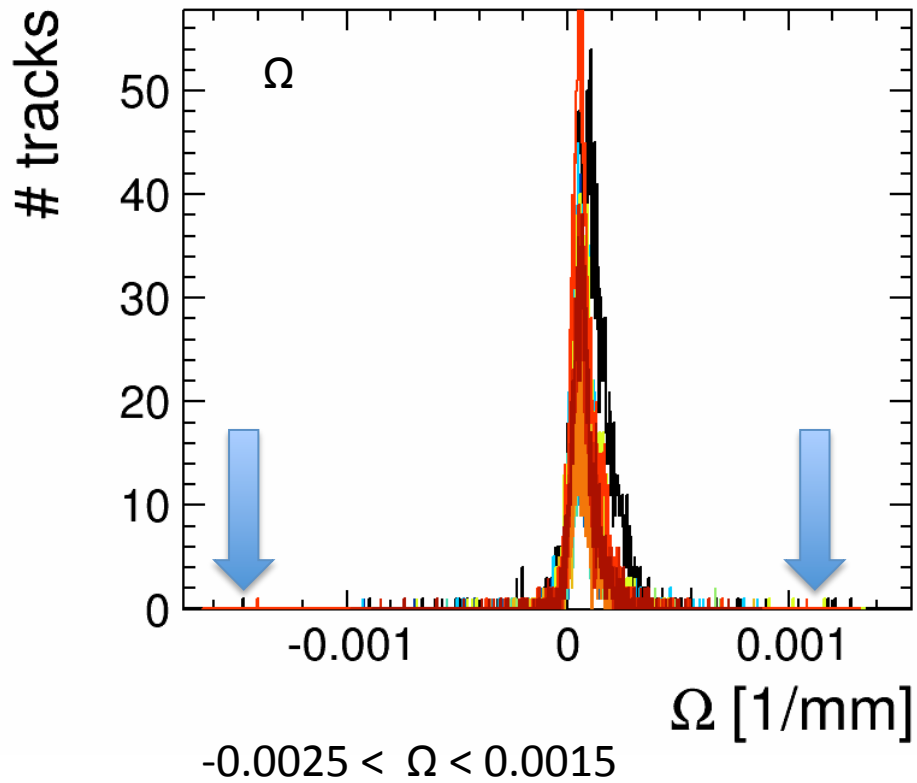
2010 – One module setup

2010 Transverse Resolution, B=1T



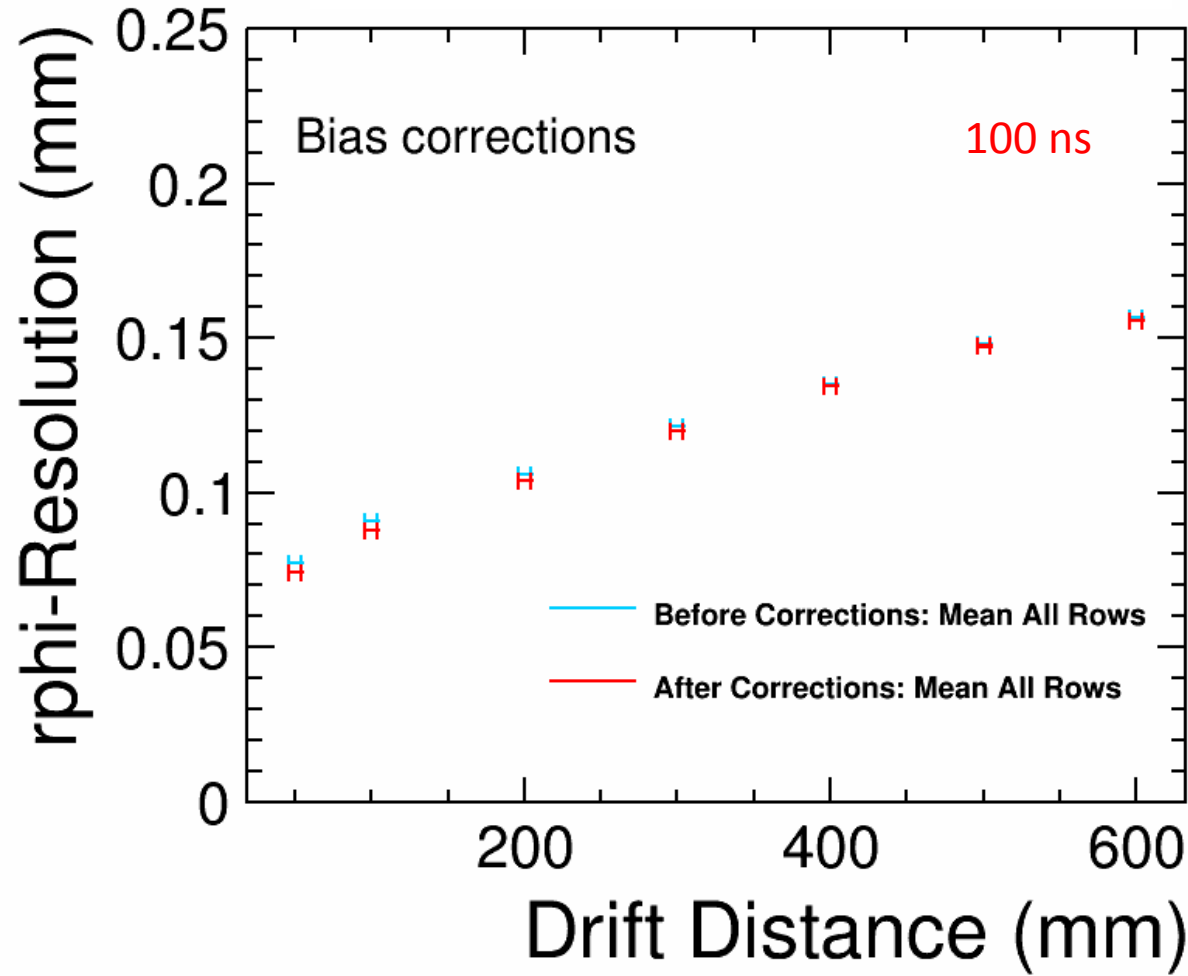
The same plots as on Page 10, but applying additional cuts on omega (curvature) and phi. See next slide.

Extra Cuts



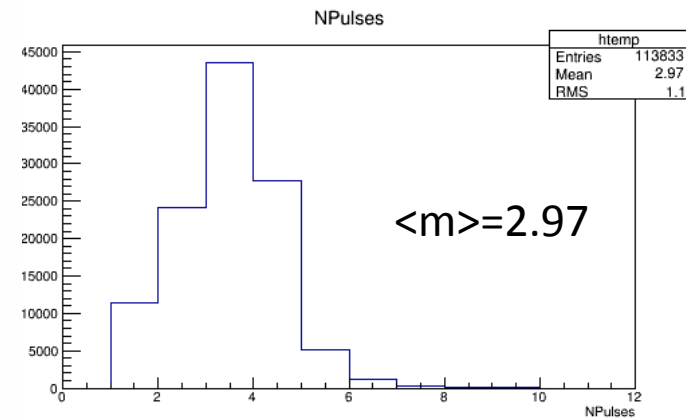
2011 – one module setup

2011 rphi Resolution Comparison, B=1T



Follow those small plots below - to assure good resolution results, those numbers should be large enough.

Number of pads per hit



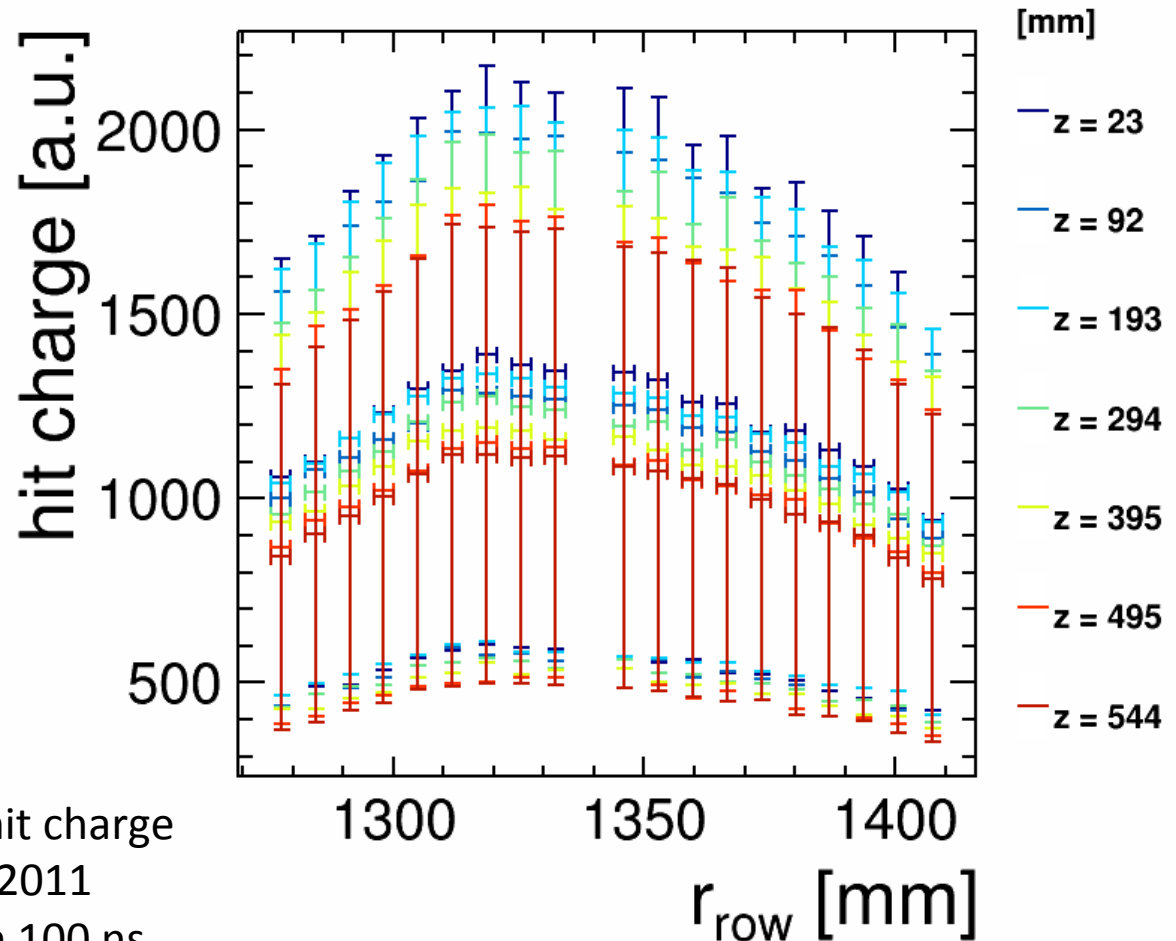
2011: Hit Charge (100 ns).

This is MEAN90 of the hit charge spectrum

Note approximate mean value level
Vertical error bars are quite distracting and should be removed for better view!

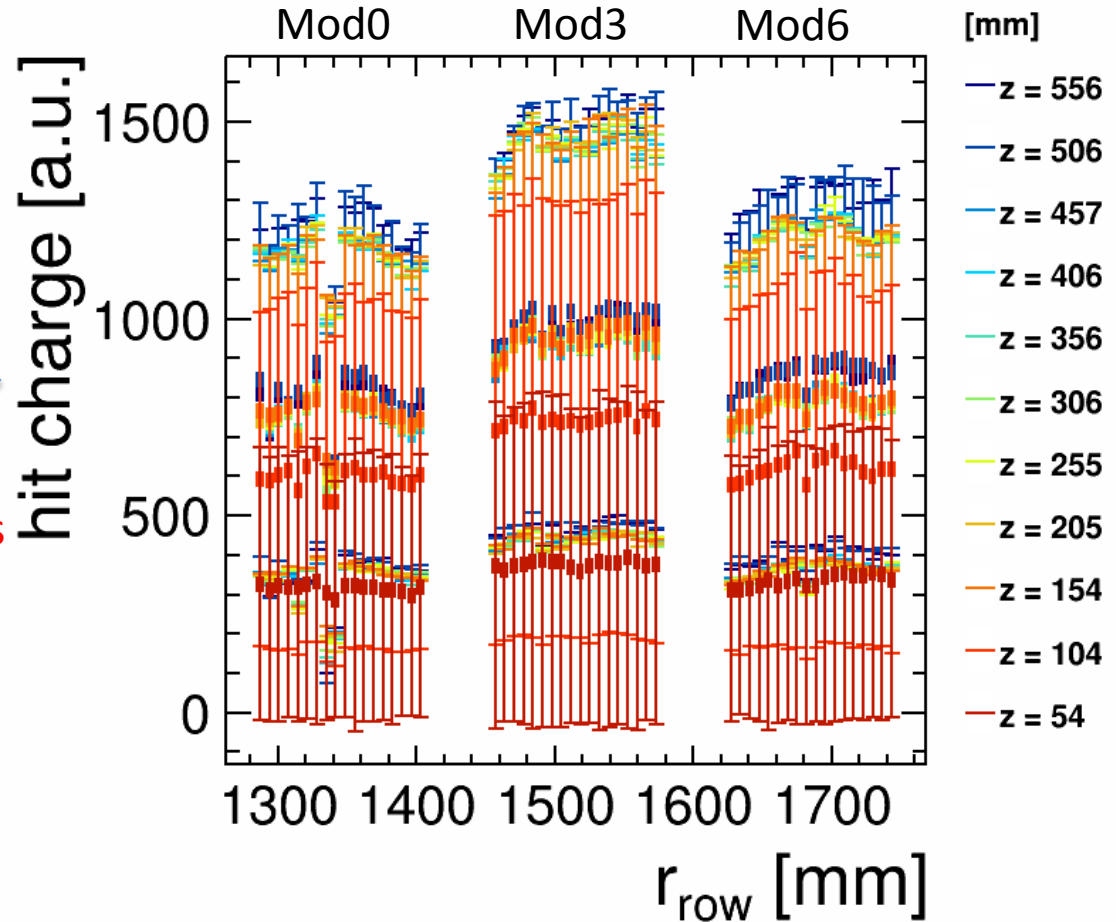


Amount of hit charge collected in 2011 module with 100 ns shaping time.



2014 Hit Charge in CLK

This is MEAN90 of the hit charge spectrum



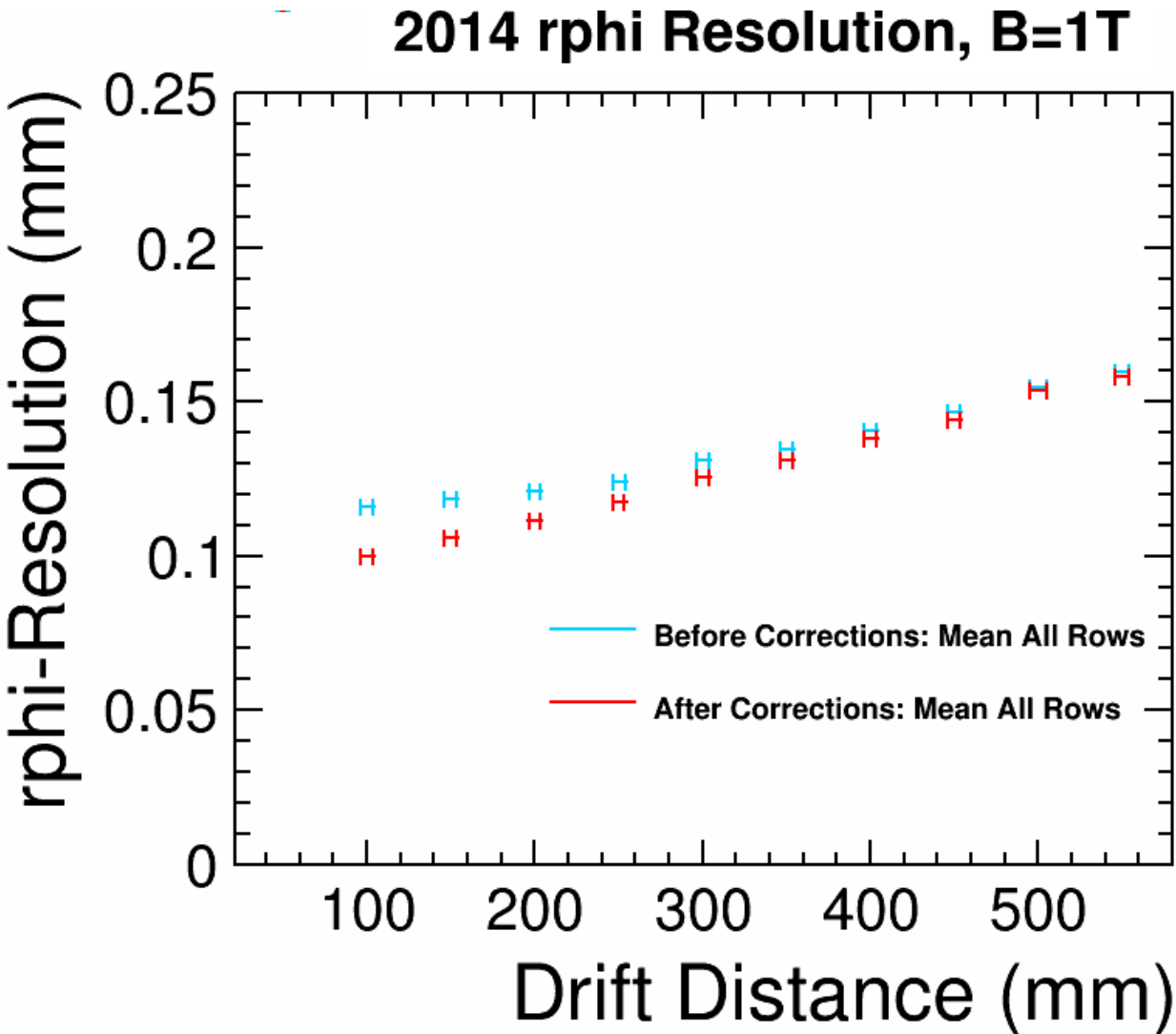
Note approximate mean value level.
Even with max in Mod3,
It is less than in 2011.



If you cannot get the level
Of charge collection as good as
In 2011, do not expect perfect
resolution results.

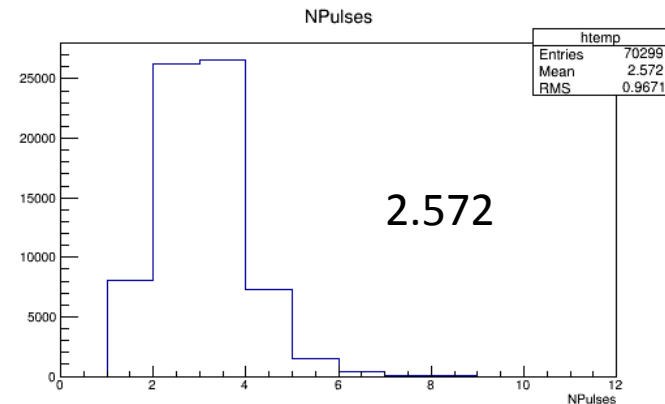
Amount of hit charge
collected in 2014
3 modules with 100 ns
shaping time.

2014 – only central module

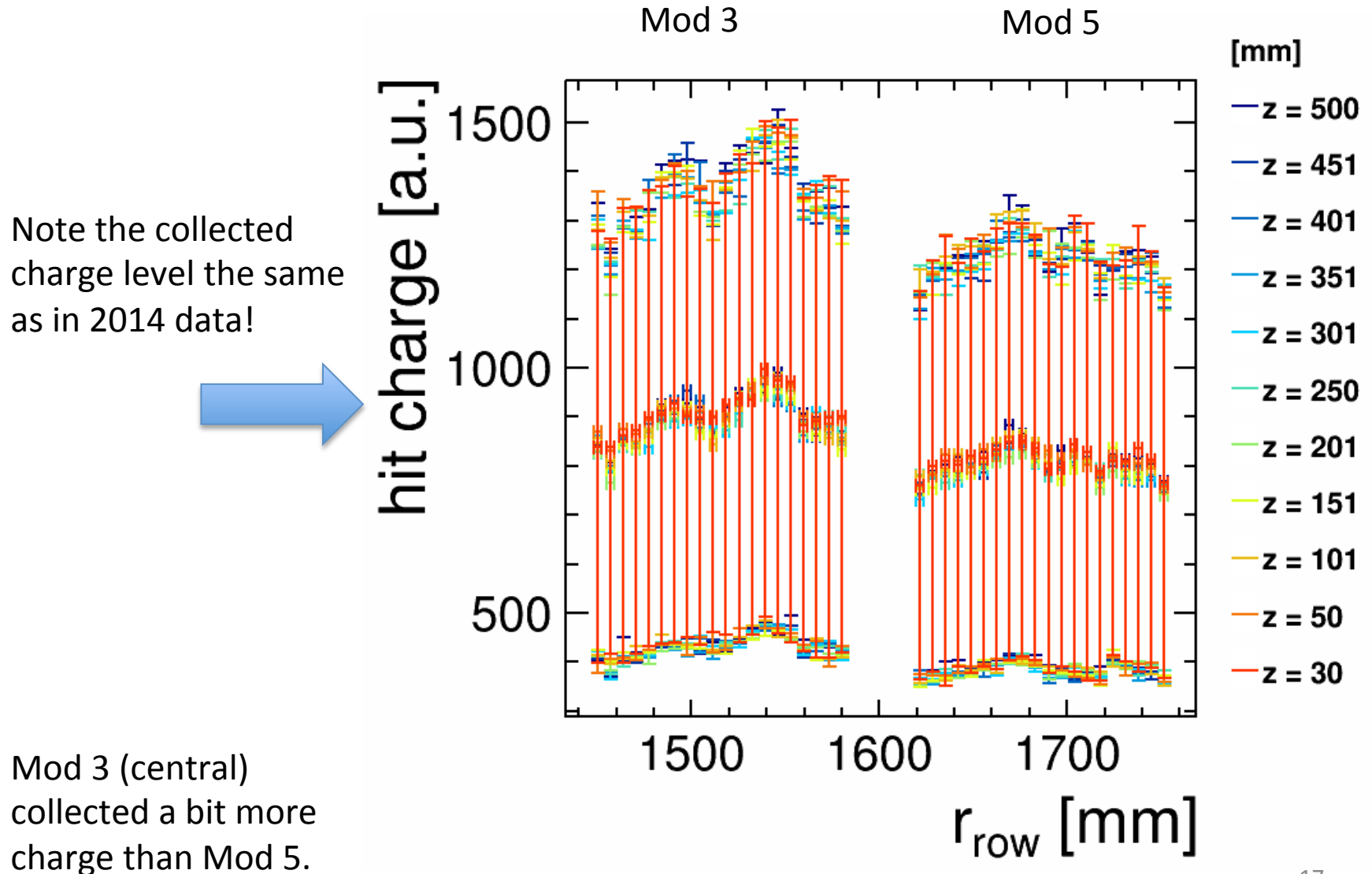


Note: One data point below $D=100$ mm was taken, but not possible to get resolution calculated. Produce a point outside the scale.

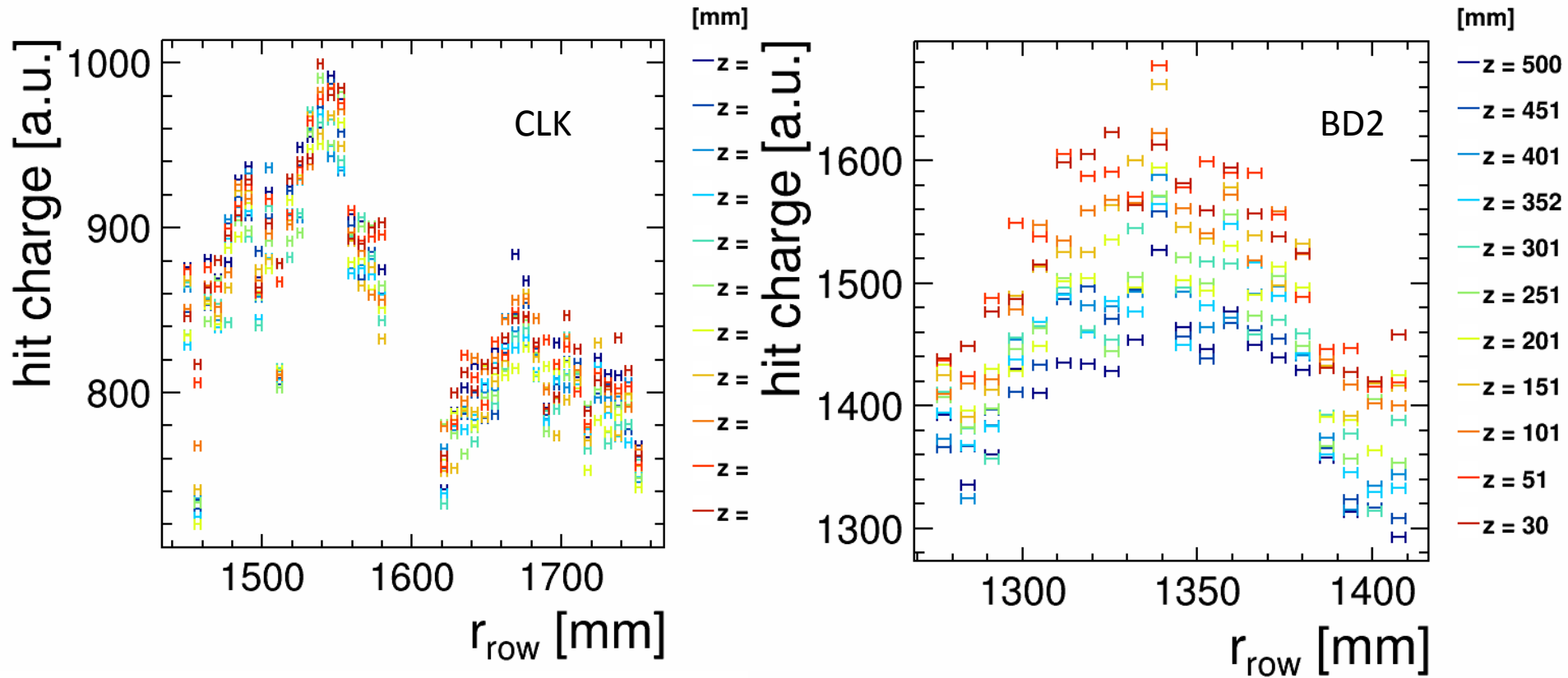
Number of pads per hit



2015: 2 CLK Hit Charge

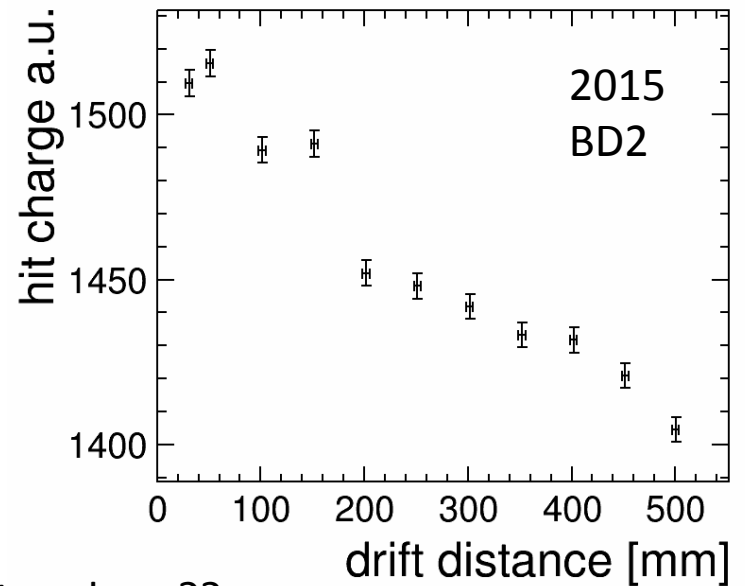
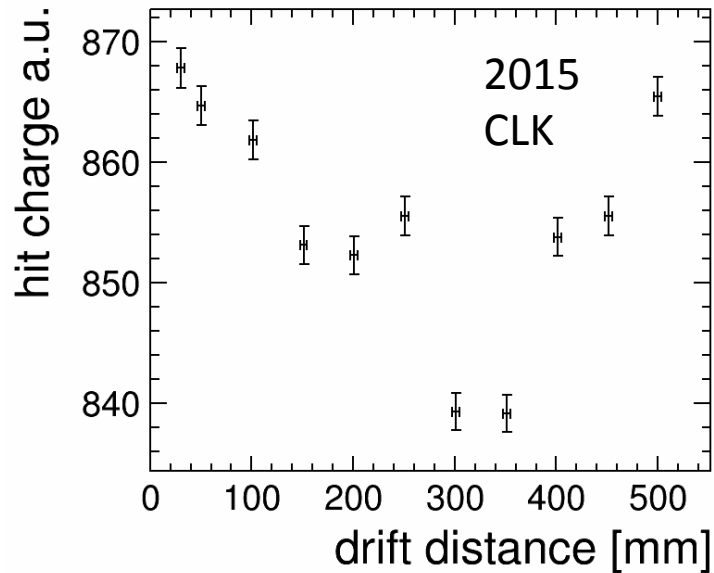
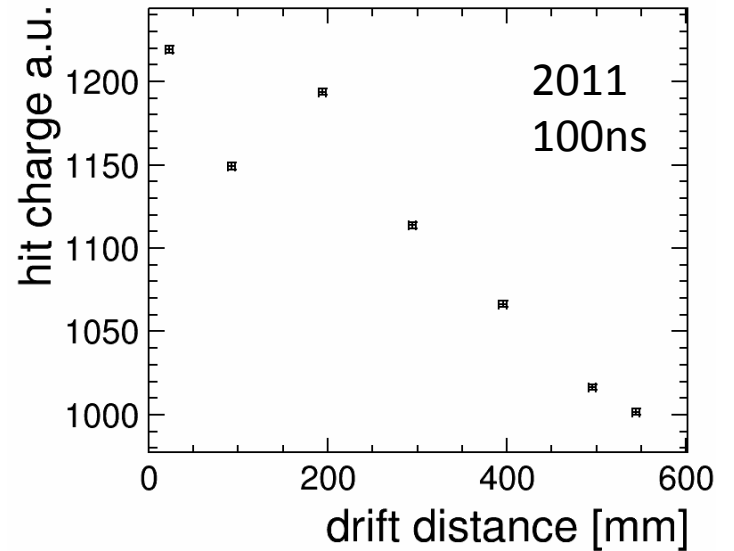
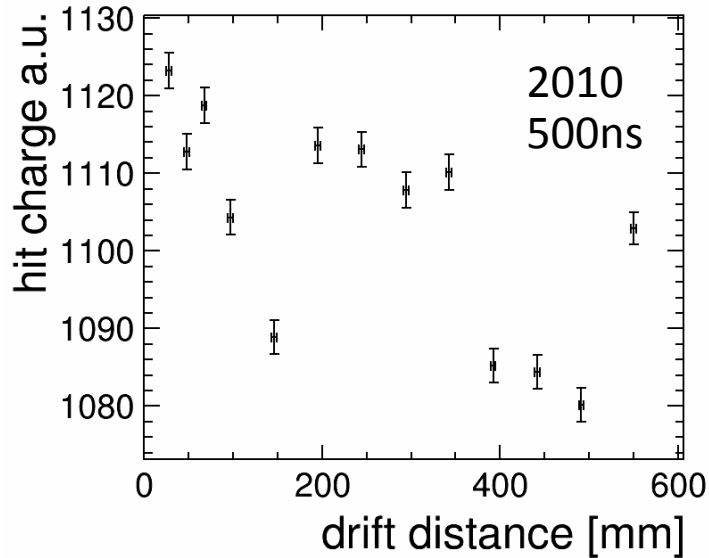


Hit Charge per Row - 2015



No error bars!

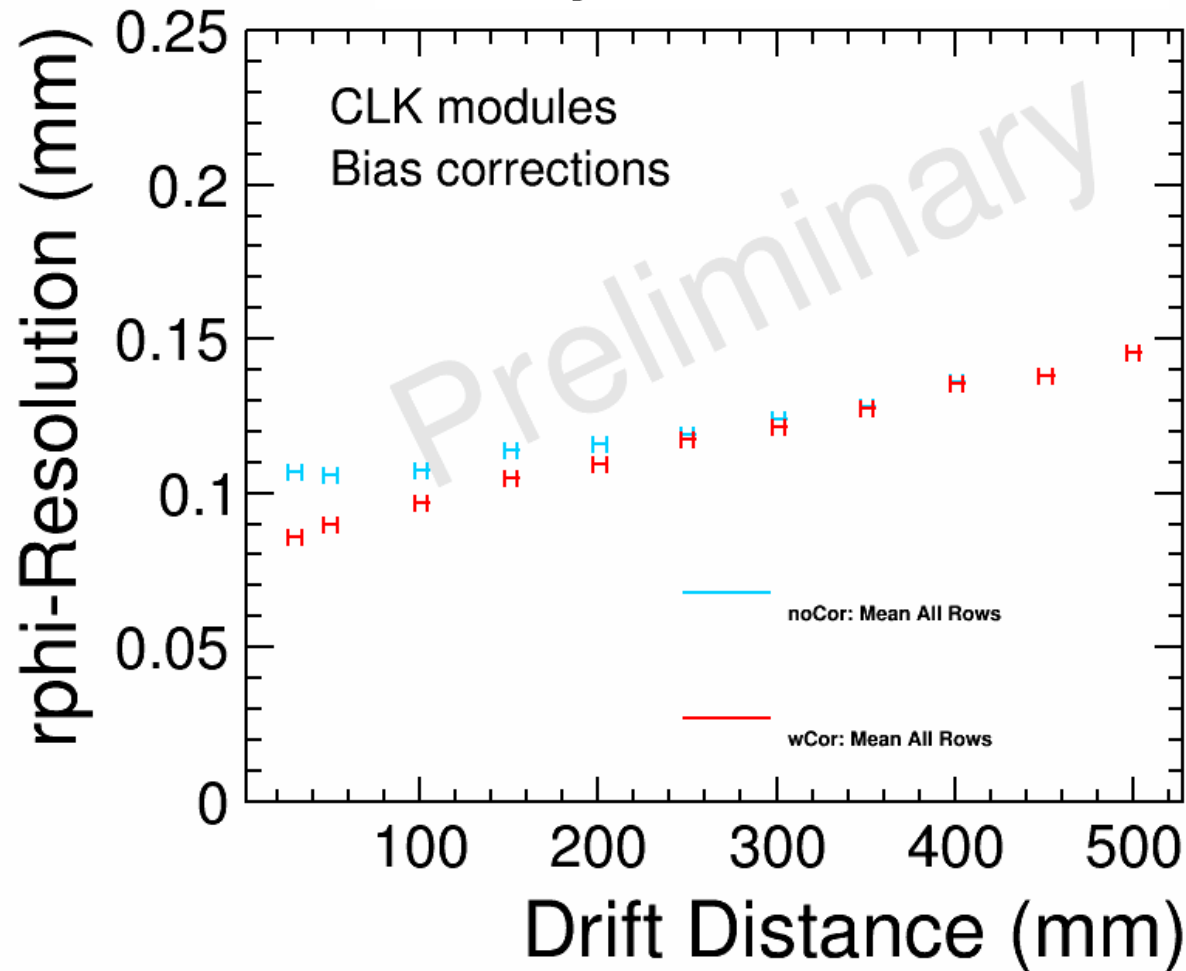
Hit Charge Vs Z



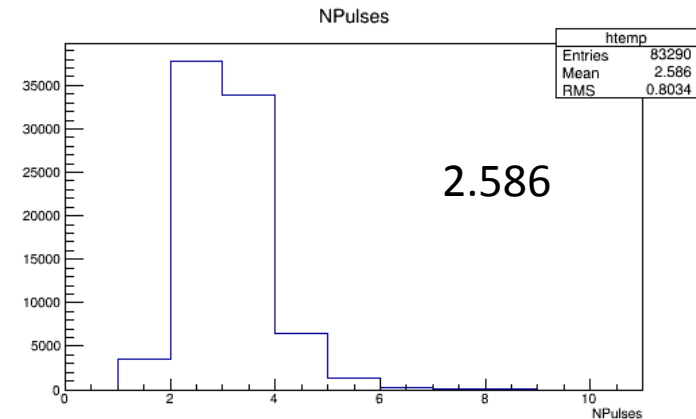
Do we see pattern here??

2015 - 2 CLK modules

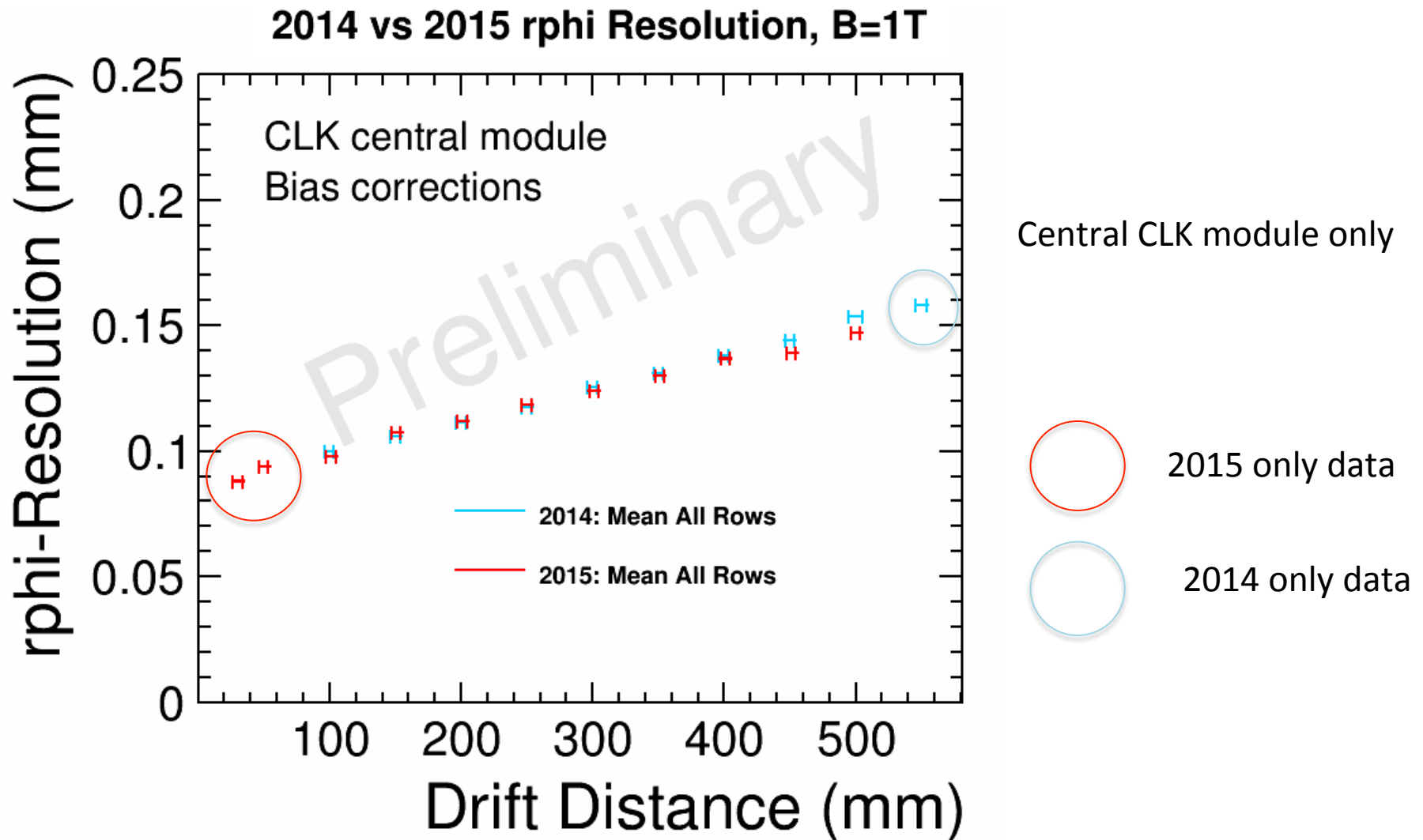
2015 rphi Resolution, B=1T



Number of pads per hit



2014 vs 2015: **only** CLK modules



There is not much difference with CLK modules in 2014 and 2015, after all!

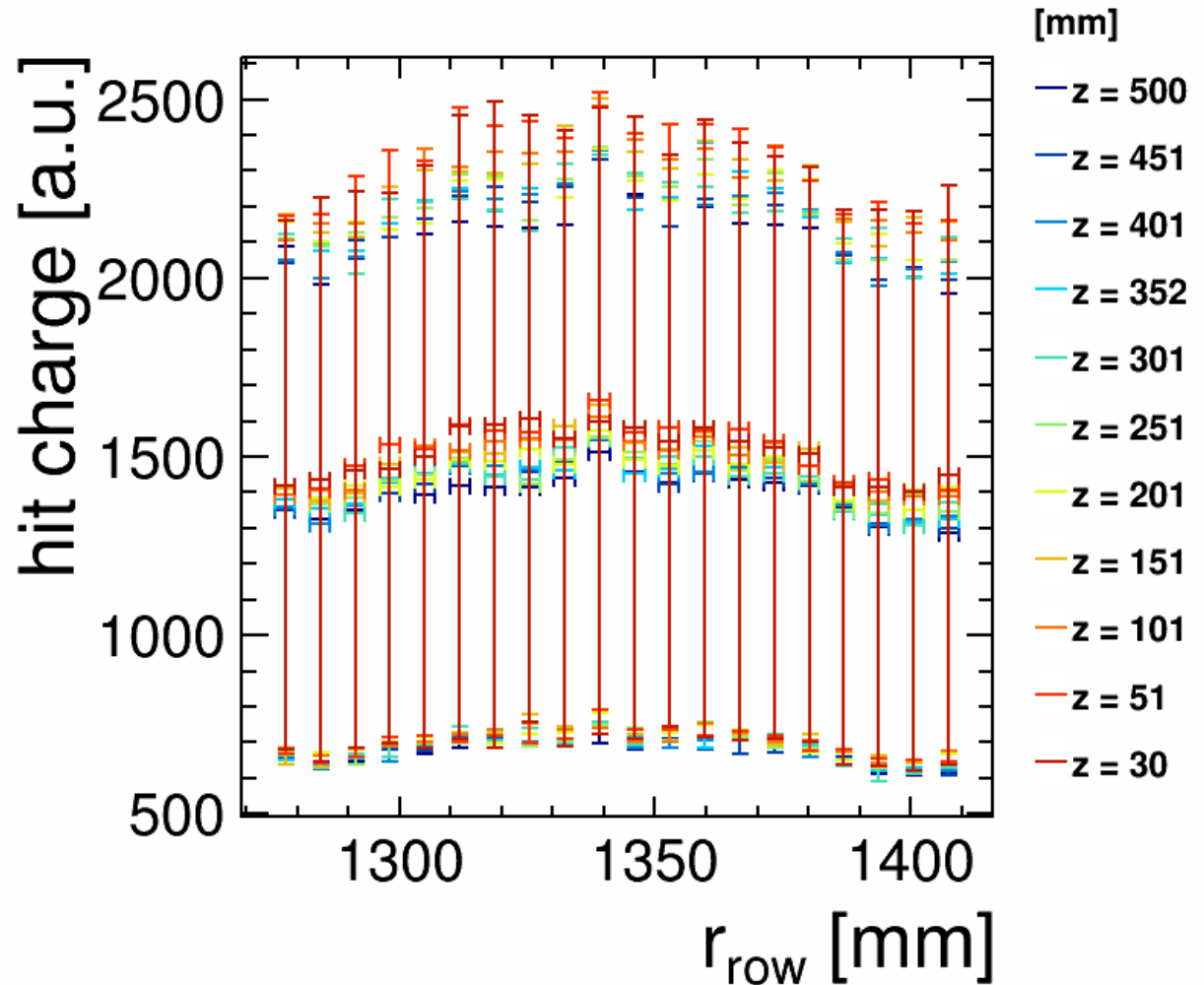
All CLK module are **consistent in 2015 and 2015**, Note that charge collection is **not** great.²¹

2015: BD module Hit Charge



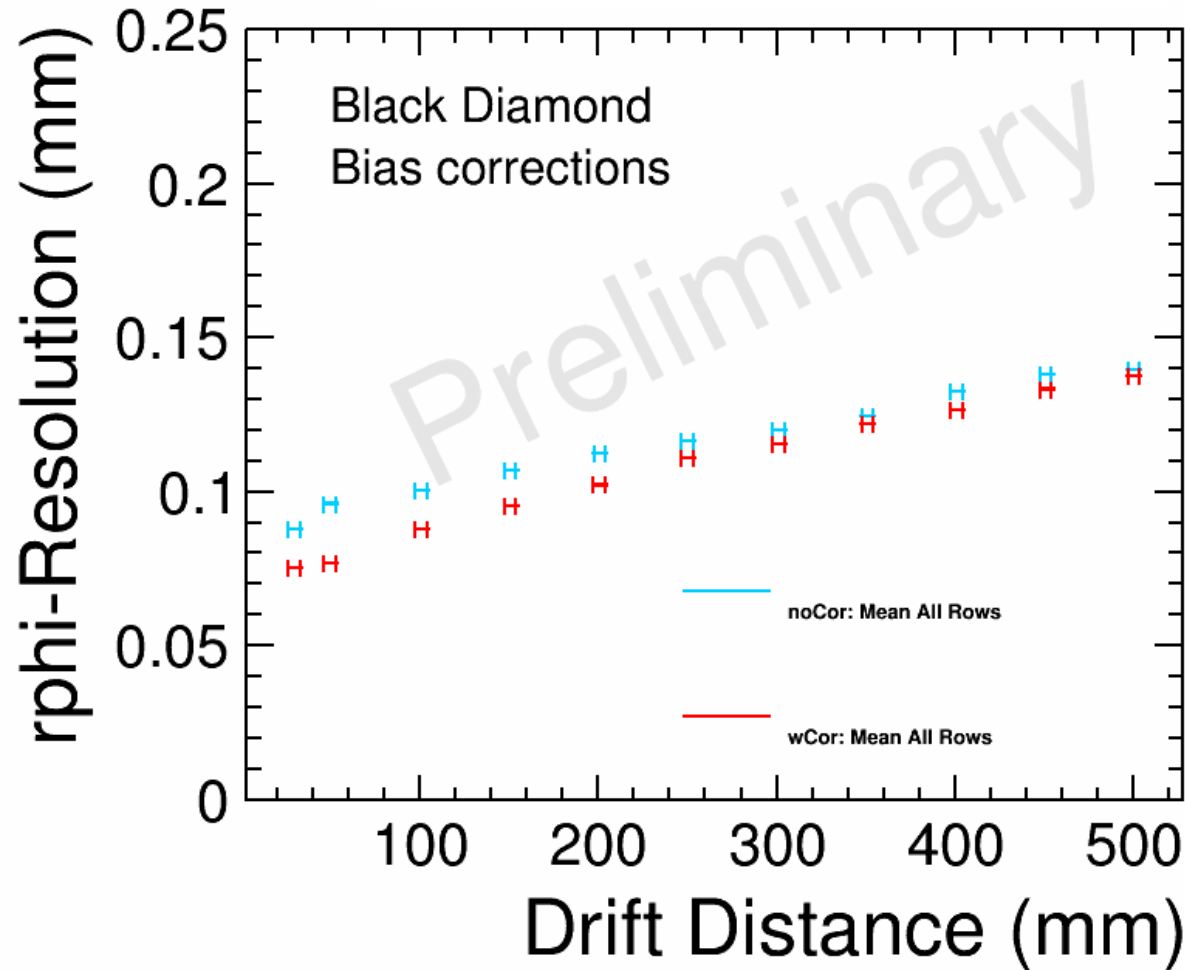
Quite significant increase ($\sim \times 1.5$) in charge collection!

Even $\sim 25\%$ more than in 2011 (100ns shaping time).



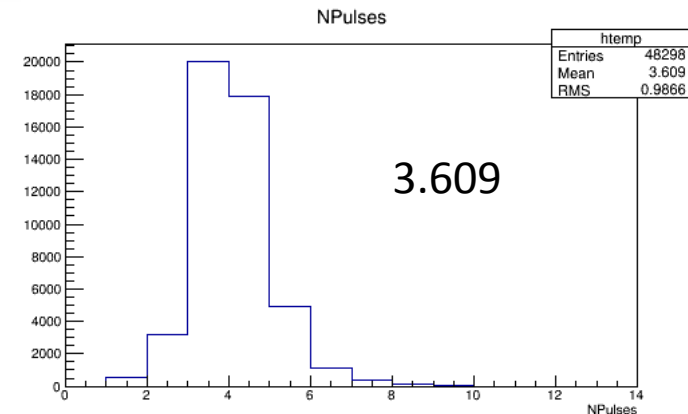
2015 – one BD module

2015 rphi Resolution, B=1T



Even before bias corrections (which are very important), the resolution results are better than in previous years!

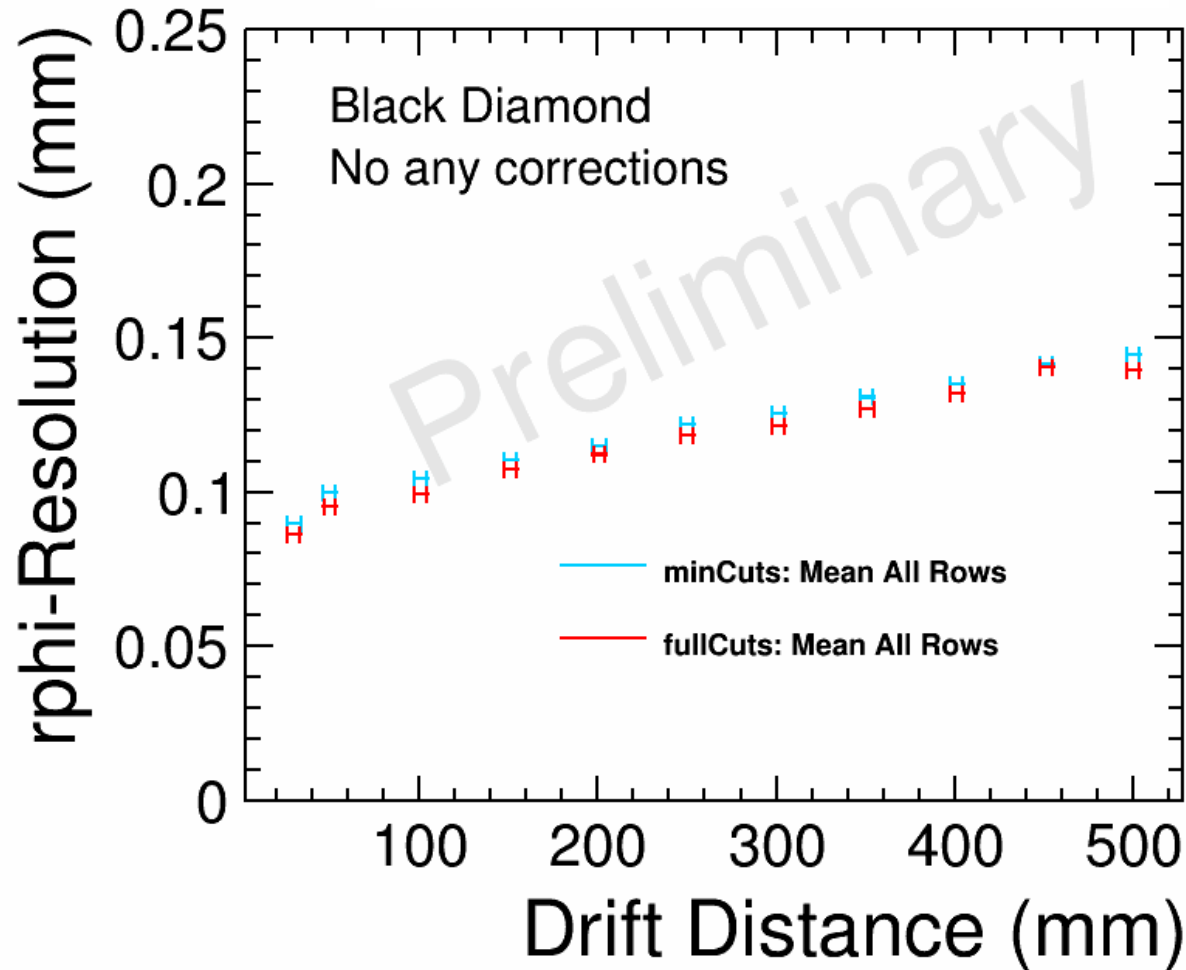
Number of pads per hit



BD module shows much better rphi - resolution results – is it due to much larger charge collection using this new resistive layer?

2015 – one BD module

2015 rphi Resolution, B=1T



The same plot as on Page 20, but with applying extra cuts on omega and phi or without them.

BD module shows much better rphi-resolution results – is it due to much larger charge collection using this new resistive layer?

Back up

Hit Charge – GEM 2013 data

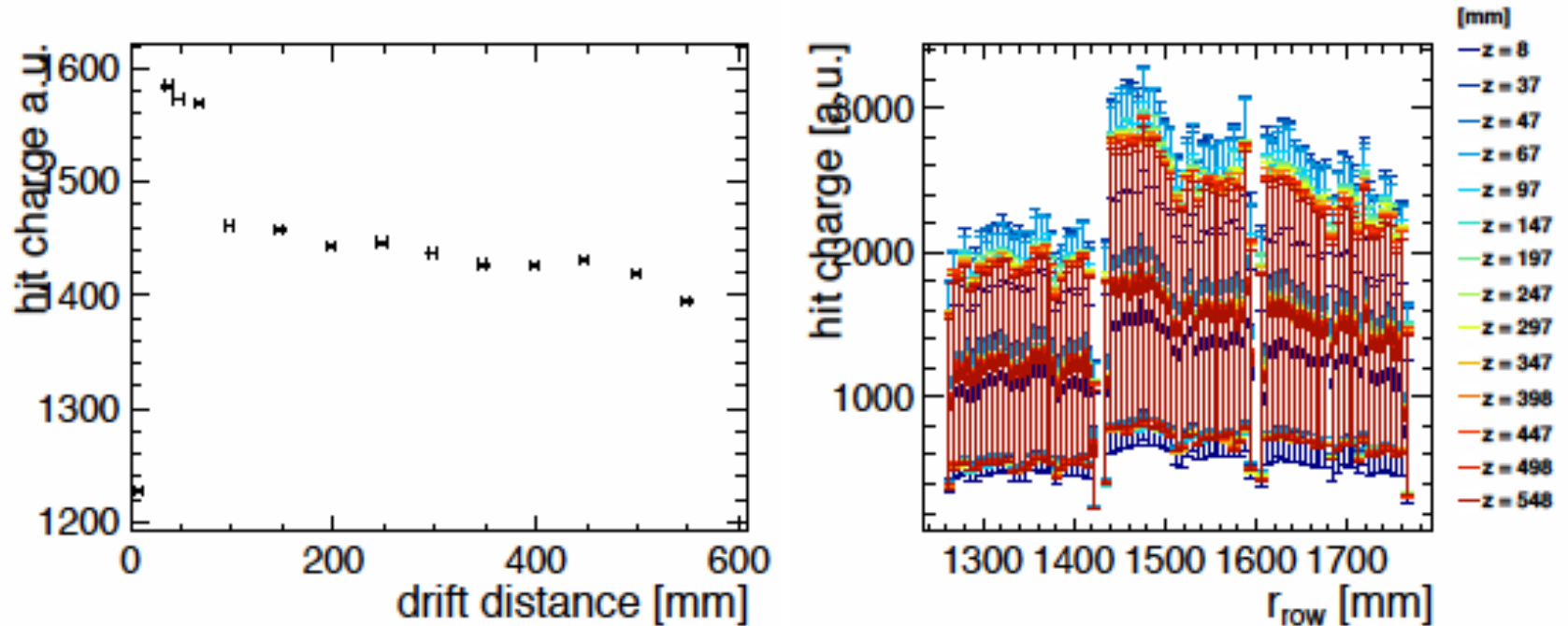


Figure 5: The mean charge of a hit as function of drift distance (left) and measurement row (right).