

Update on PRF Determination and Beam Test Preparations

New parameterization of PRF:

$$PRF(x; a, b) = \frac{1}{2} (G(x; a) + G(x, b))$$

- Sum of 2 Gaussian's with widths a and b.
- Currently using a fixed mixing between the Gaussian's of 0.5
- Motivation for changing was to eliminate truncation of PRF parameters at “physical limits”. (ie. Parameter must be between 0 and 1)

Method used for calculating PRF parameters:

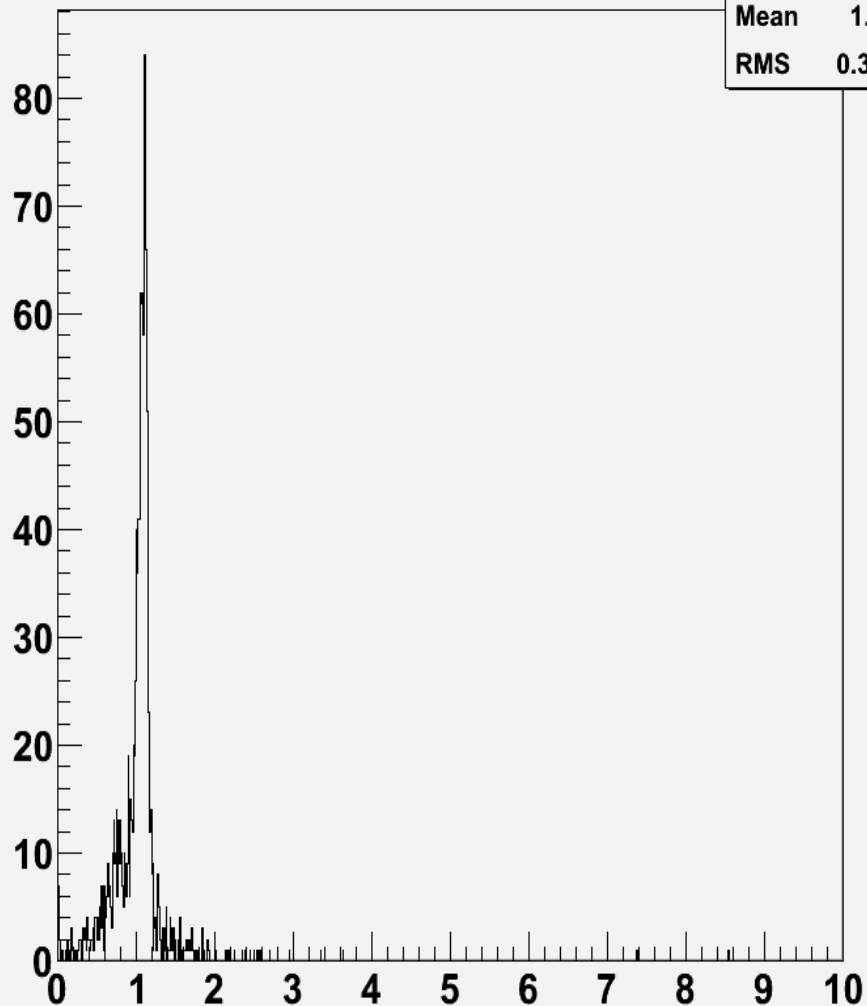
1. Guess track determined by using first, middle, and last hit in track to calculate equation of circle.
2. This circle is then converted in to track parameters (d_0 , ϕ , ω).
3. Guess track is then held fixed as PRF parameters are varied to minimize chi-square.
4. Minimized PRF parameters are then binned into a histogram
5. Mean values of histograms used as PRF parameters.

Example Histograms of Fixed PRF Parameters

Run# 2182 (20 cm drift, 400ns peaking time)

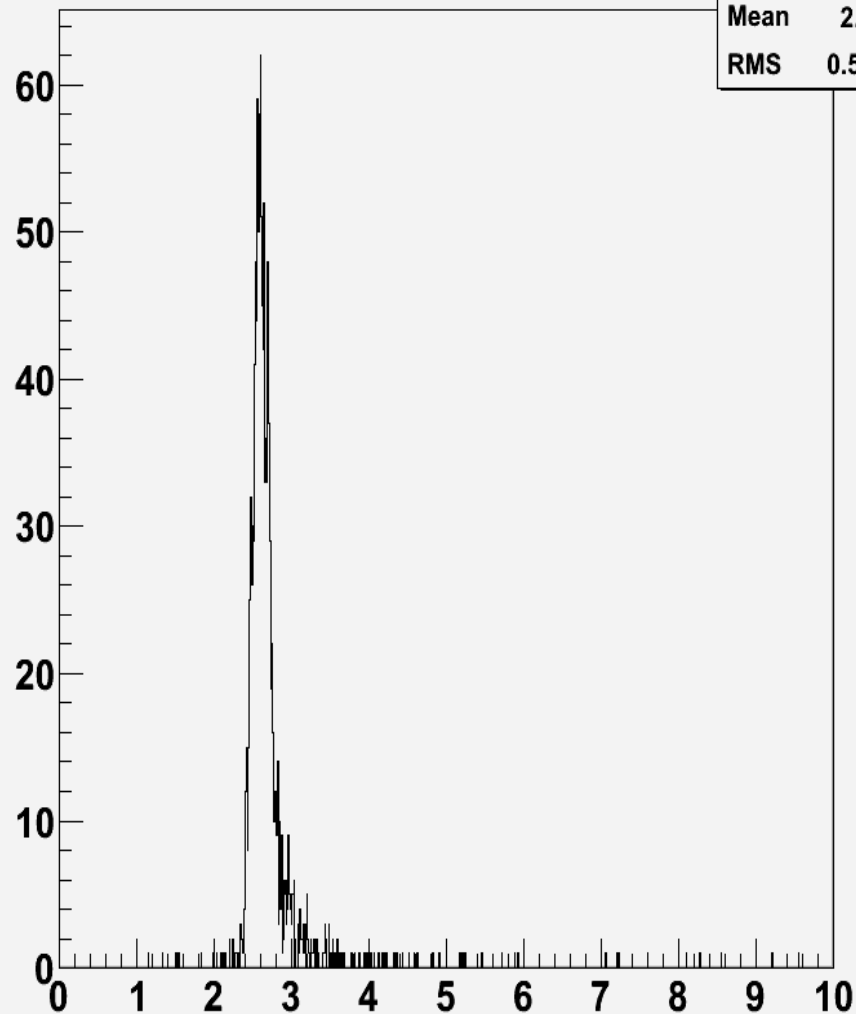
DistributionofPRFMixingParameter(Module#3)

DistributionofPRFMixingParameter(Module#3)	
Entries	1600
Mean	1.027
RMS	0.3875

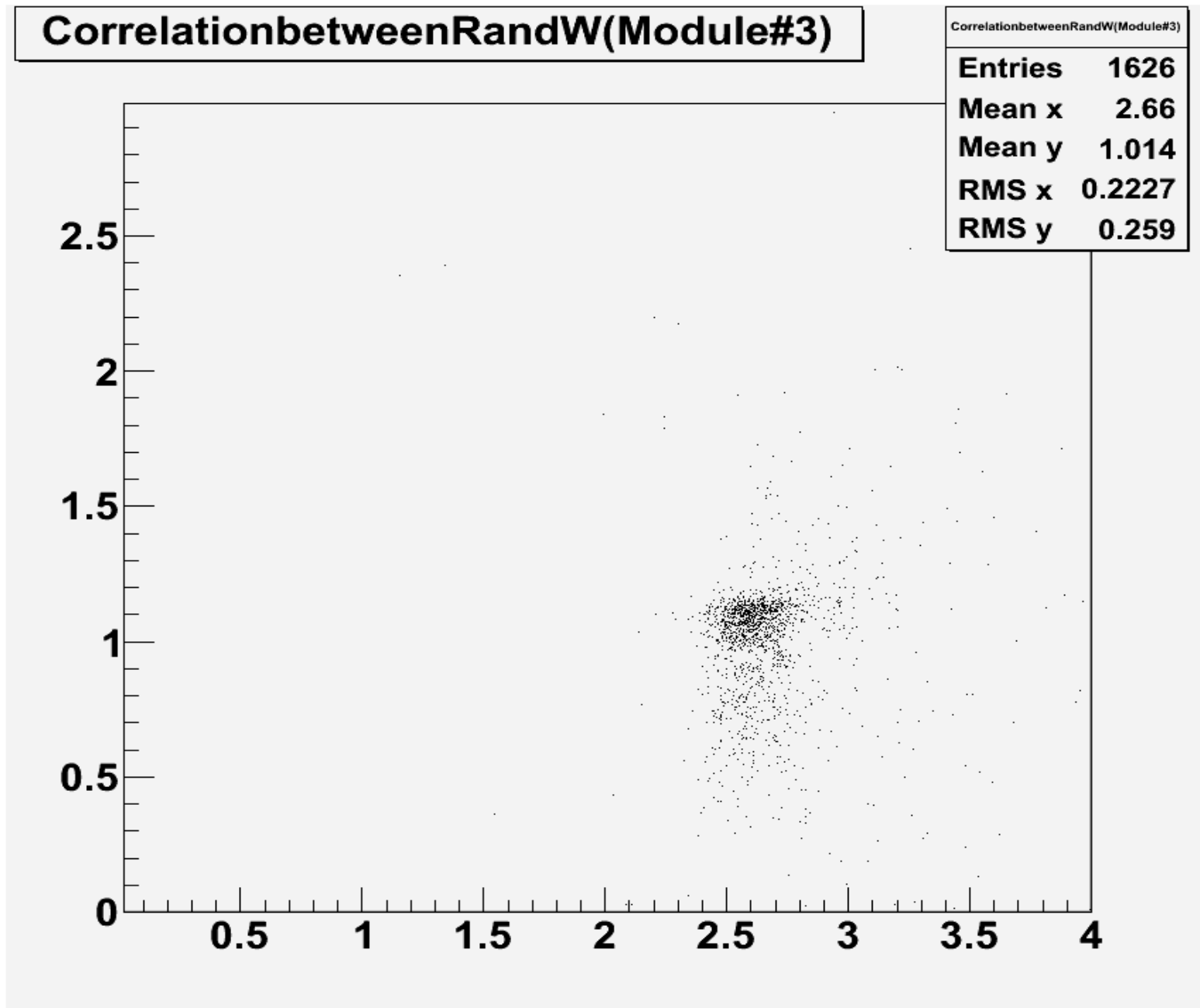


DistributionofPRFWidthParameter(Module#3)

DistributionofPRFWidthParameter(Module#3)	
Entries	1588
Mean	2.727
RMS	0.5553

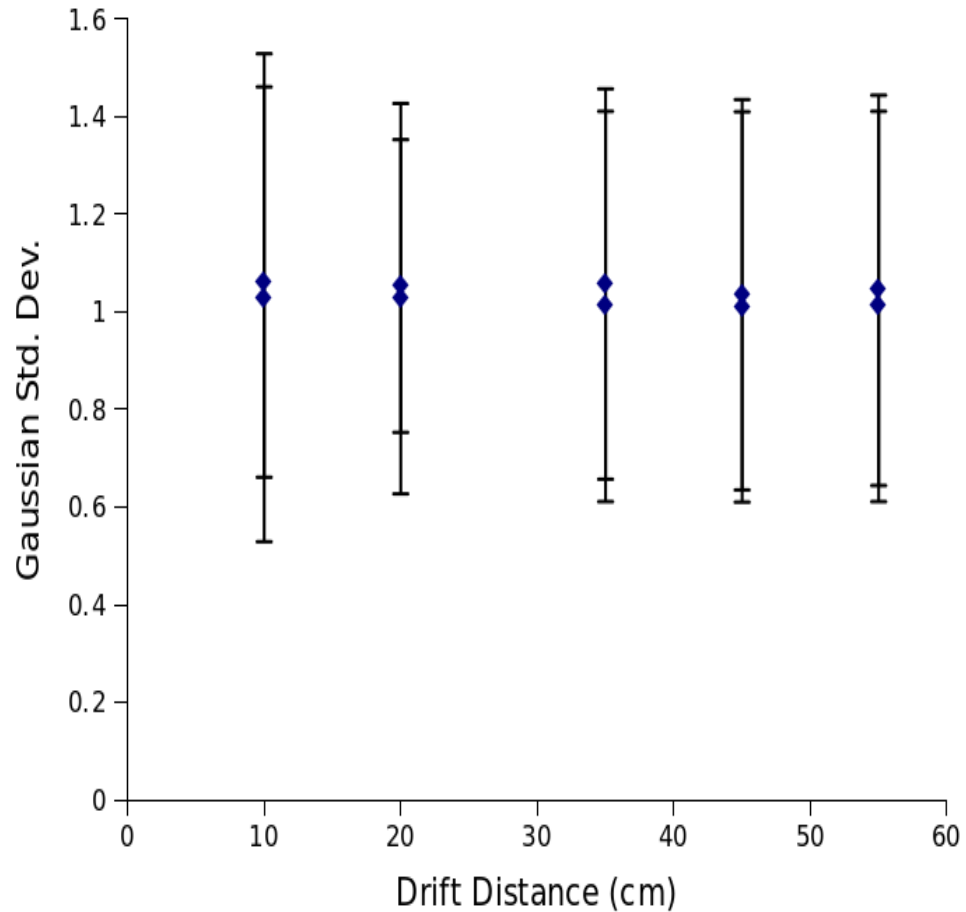


Example Correlation Plot of PRF Parameters

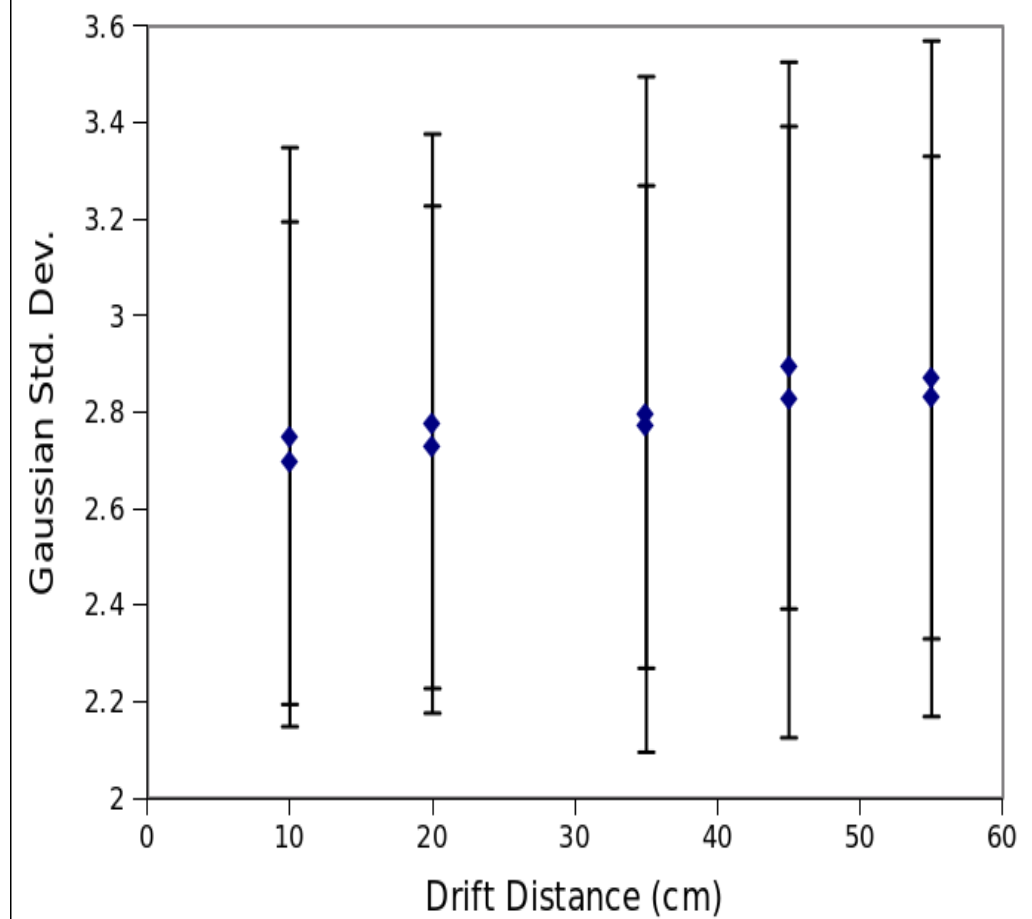


PRF Parameters as a Function of Drift Distance

Std. Dev of Thinner Gaussian



Std. Dev. of Wider Gaussian



Preparations for Beam Test:

- Created diagnostic plots
 - Beam profile (beam alignment)
 - # of Hits Per Row (good rows)
- Need to complete resolution calculation processor in MarlinTPC
- Need to ensure MarlinTPC installed on beam test computers

Preparations for Beam Test:

- Created diagnostic plots
 - Beam profile (beam alignment)
 - # of Hits Per Row (good rows)
- Need to complete two MarlinTPC processors;
 - Bias per row
 - resolution calculator
- Need to ensure MarlinTPC installed on beam test computers

Conclusion

- New PRF determination
- Improved PRF parameterization
 - no more truncation of PRF parameters
 - good correlation between parameters
 - parameters behave well with drift distance
- Beam test diagnostic plots ready
- Still need to:
 1. Complete resolution/bias calculation processor
 2. Make sure MarlinTPC runs on test beam computer