

# Raster calibration status

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Slow raster calibration steps:

1. slow raster size calibration (highest order)

---- calibrate raster size by using bpm information

2. slow raster shape reconstruction

---- use known raster function and frequency and recorded ADC signal to calculate the initial phase at the start of run, then rebuild the raster shape

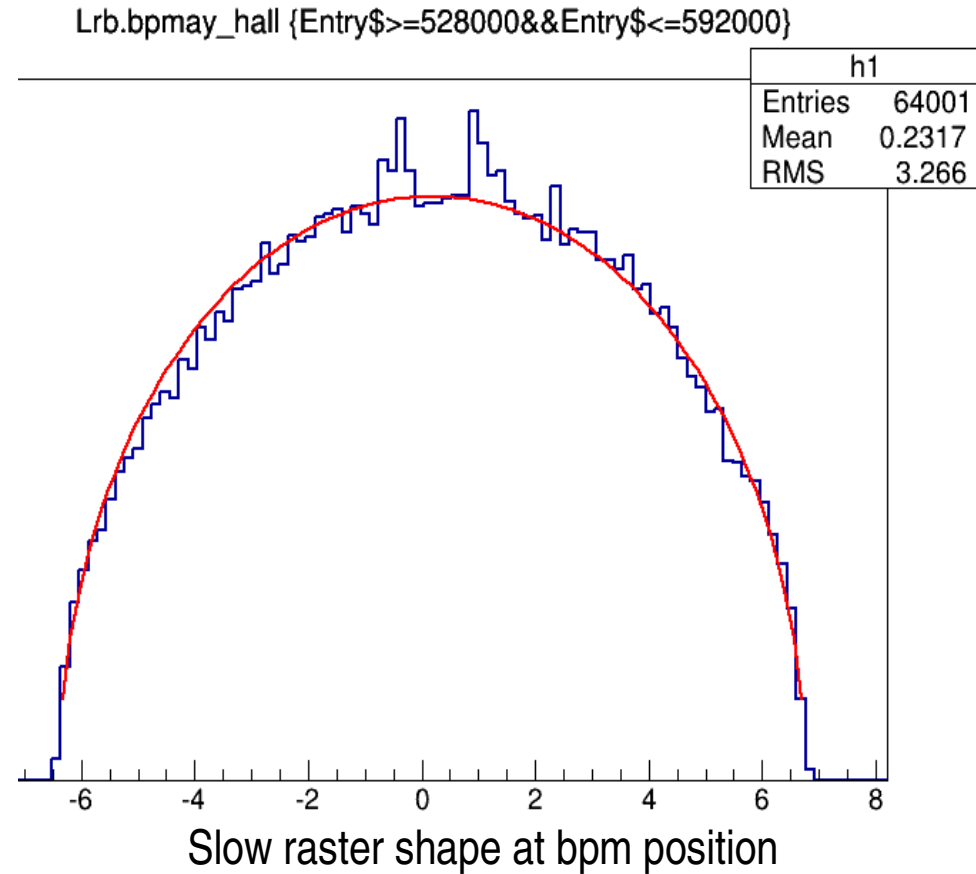
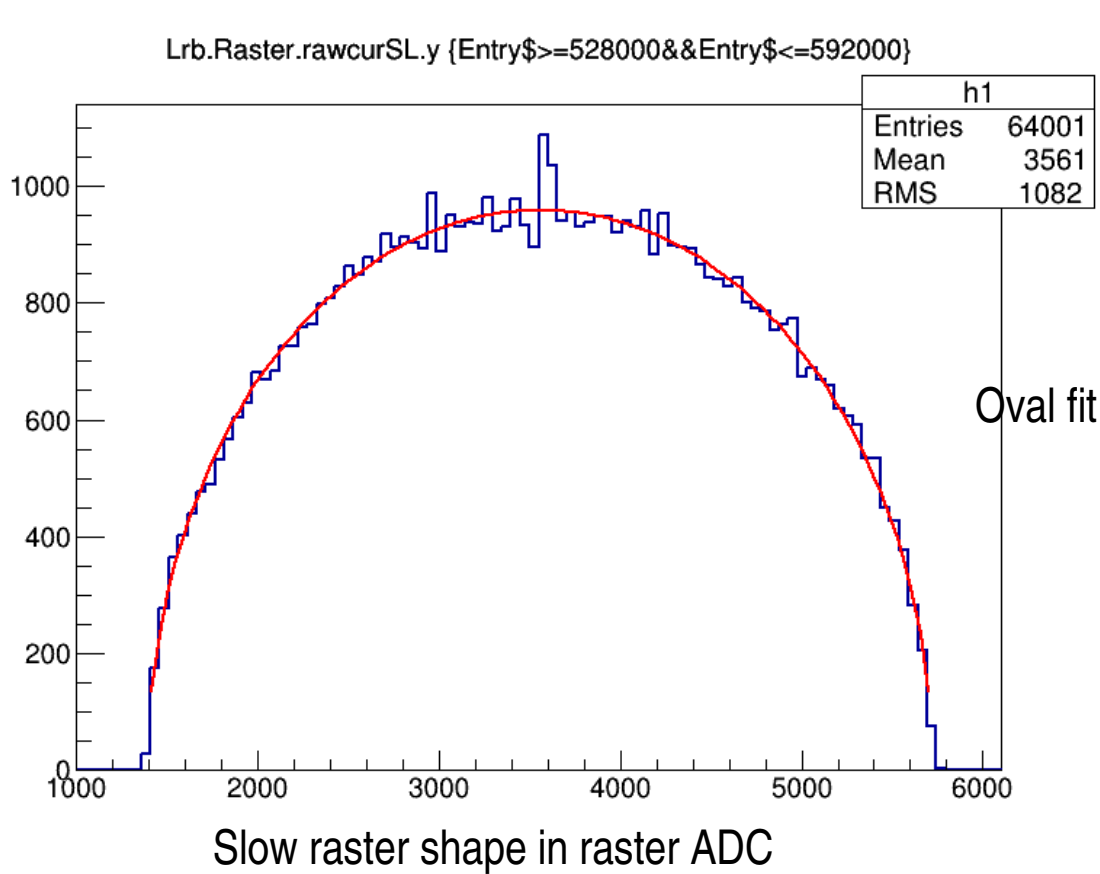
3. high precision fix

---- slow raster nonlinearity study

Fast raster calibration steps:

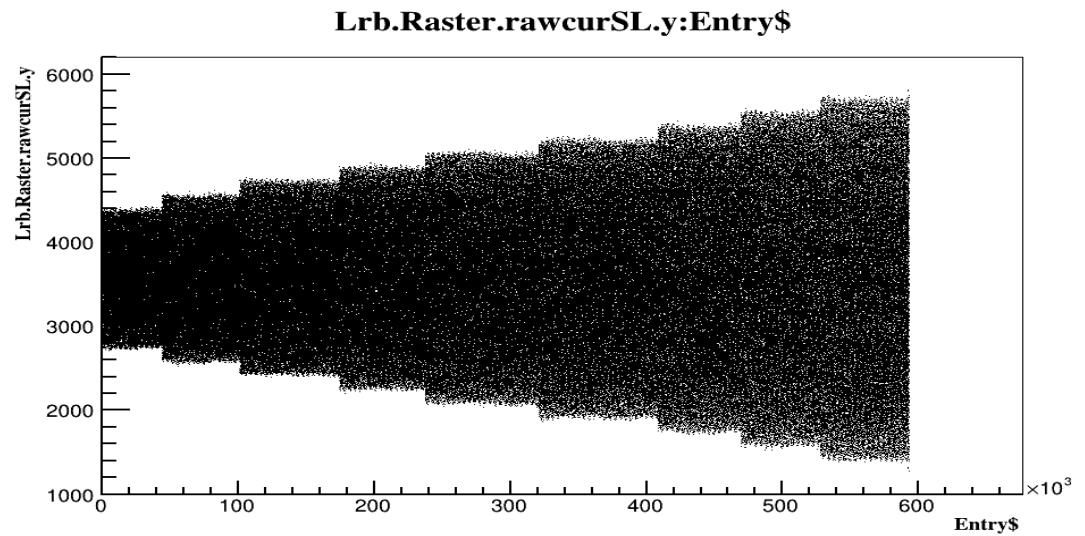
.... same as slow raster calibration

# Slow raster size calibration

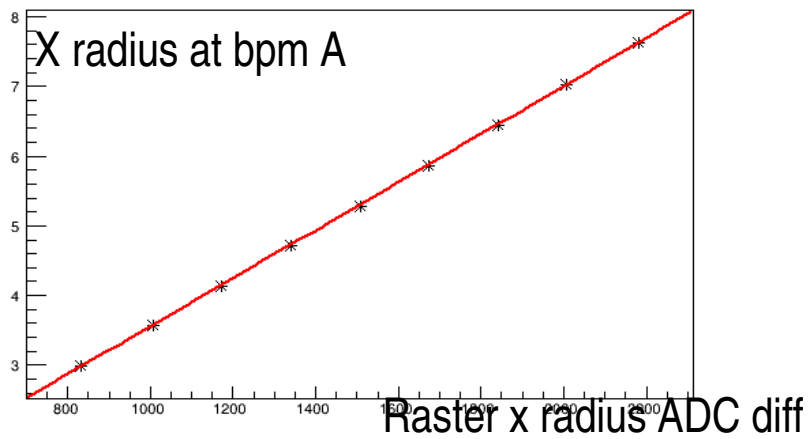


# Slow raster size calibration

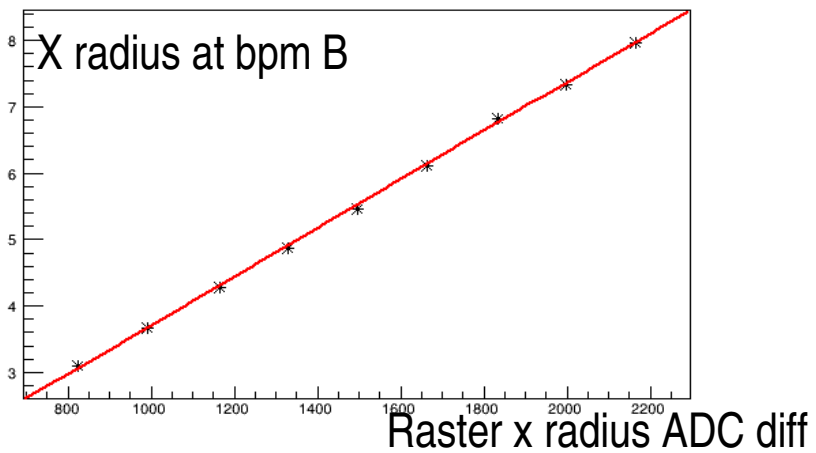
different size VS different ADC diff



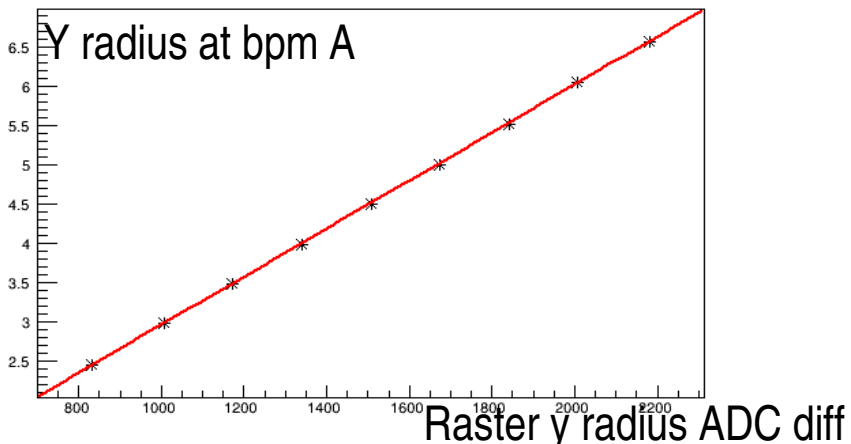
Graph



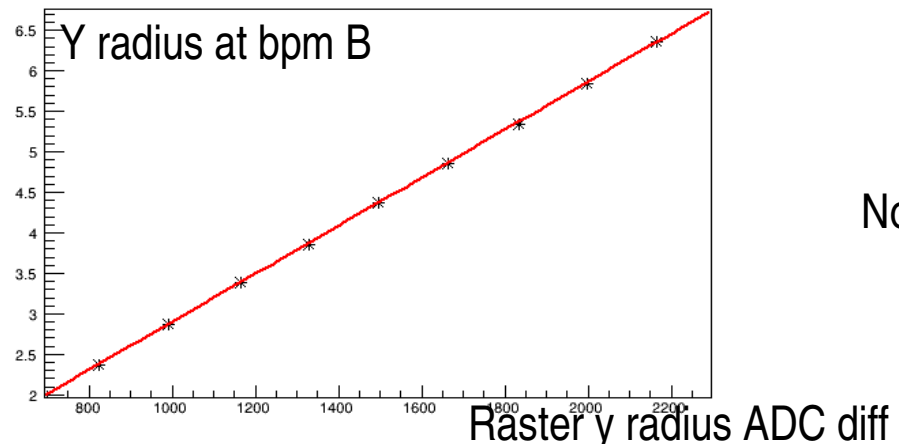
Graph



Graph

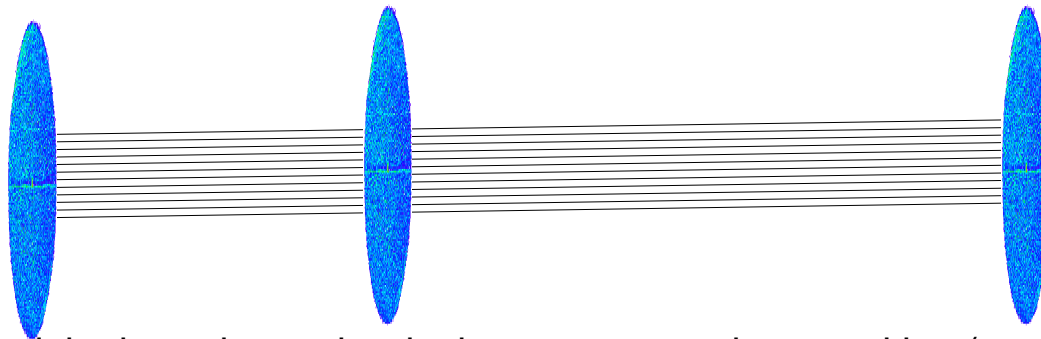


Graph



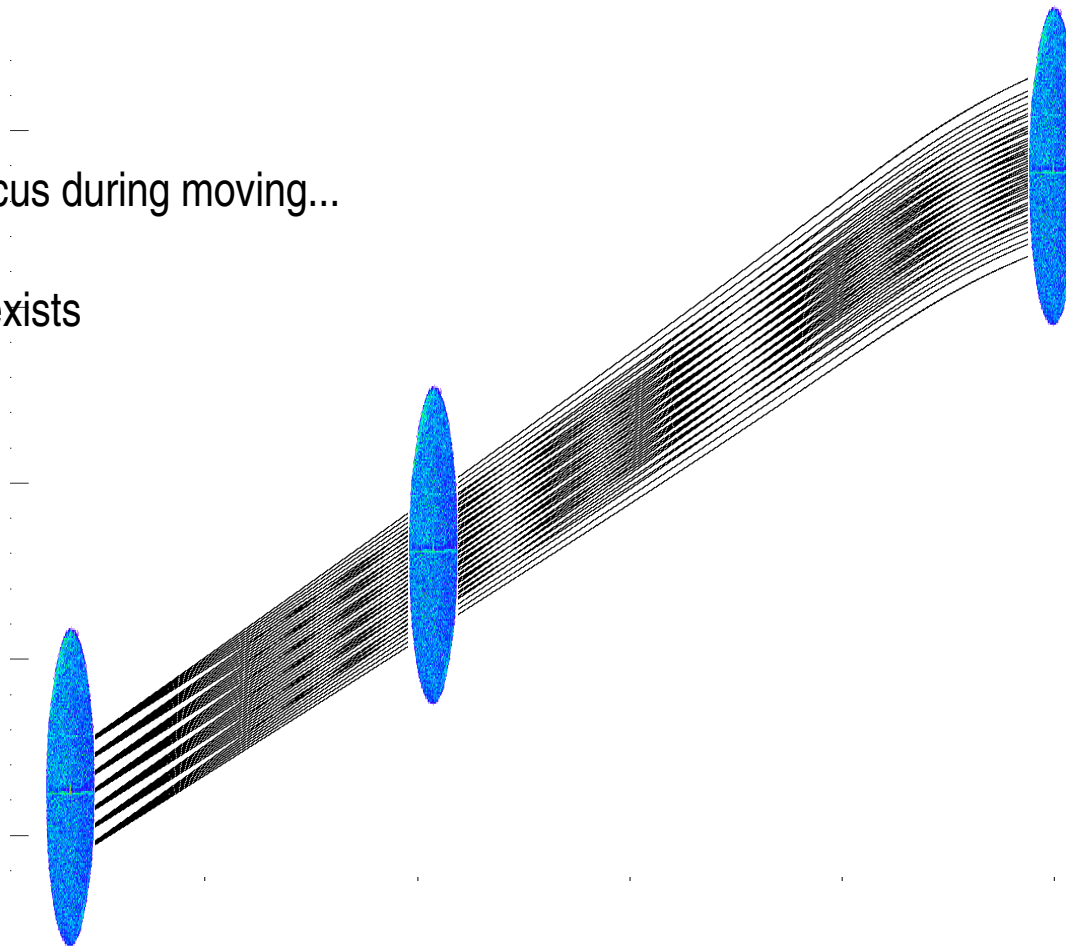
Not bad...

Calculate the size at target:



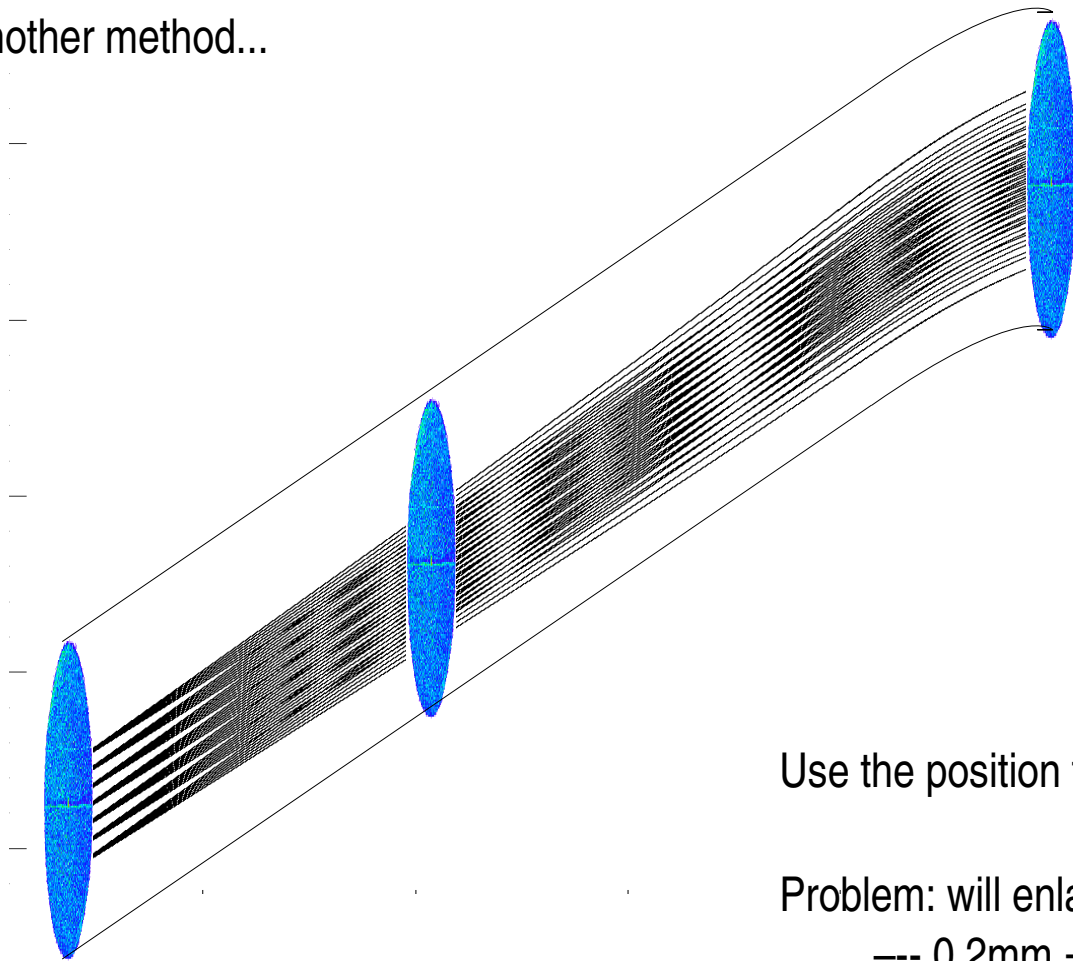
Straight through: can be deal as same as at bpm position (average two bpm's size)

If beam will not diverge or focus during moving...  
But that's not true...  
Because of quartet magnet exists



With field:use Drift in field program to calculate the relationship between the size at bpm and size at target

Another method...



Use the position transport function to calculate the size at target

Problem: will enlarge the uncertainty because of bpm

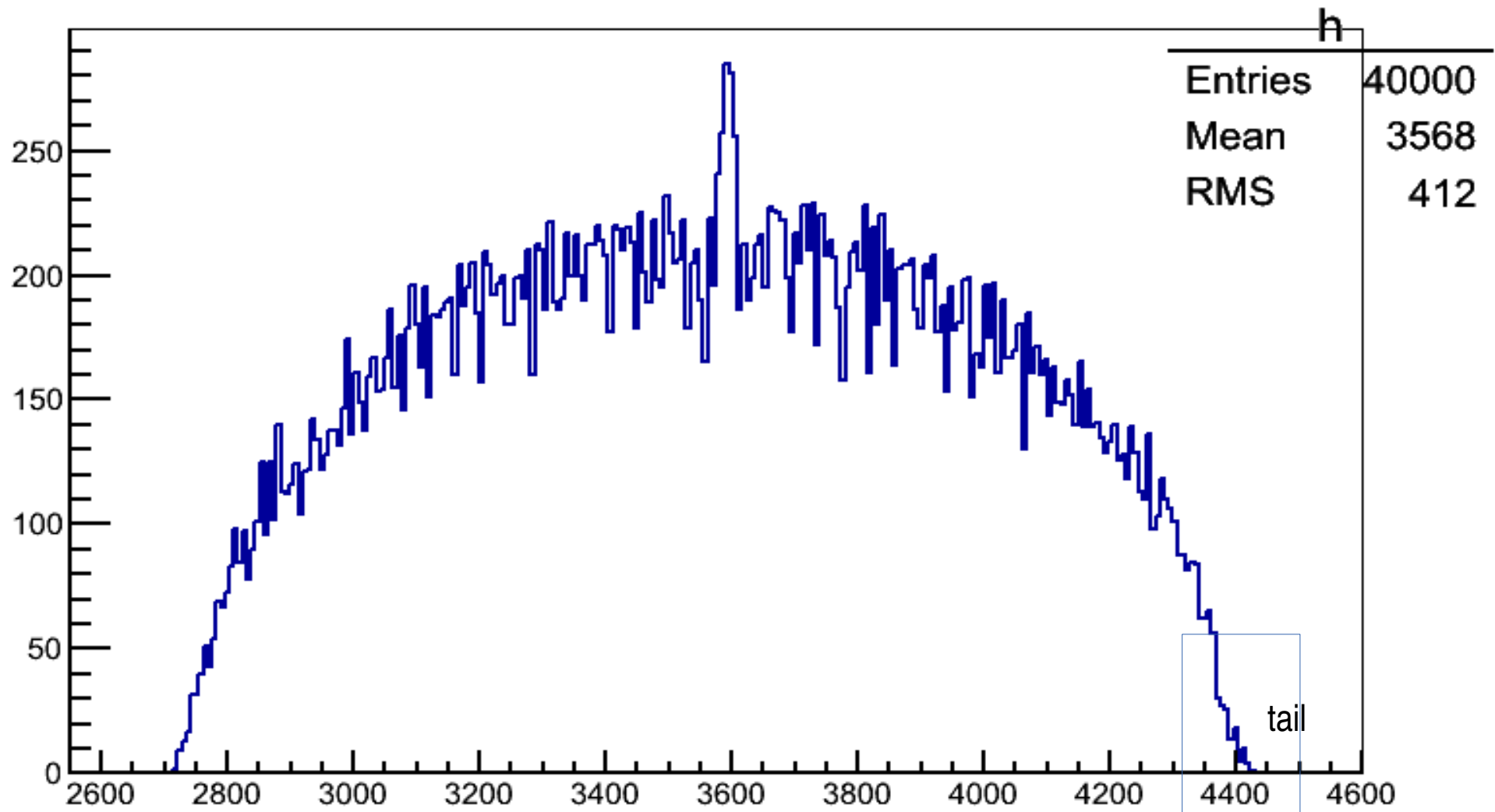
--- 0.2mm  $\rightarrow$  1mm

# Shape reconstruction

Purpose:

Get rid of uncertainty caused by ADC accuracy limit

**Lrb.Raster.rawcurSL.y {Entry\$<40000}**



phase

$$\sqrt{t+am} \sin(\omega t + \text{phase})$$

Fix amfrequency --- 30 Hz

Fix fast clock rate --- 103700Hz

Fix maximum amplitude—raster radius

Fix center value --- raster center

Known frequency – 99.412Hz

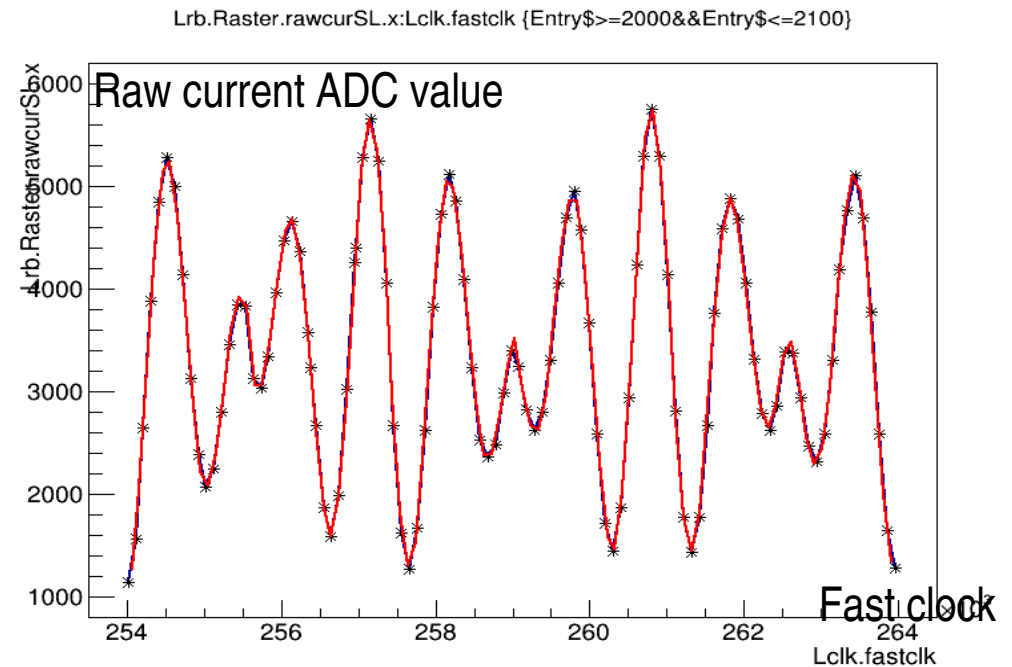
Fit:

Parameter variables:

Phase

AM phase

sine frequency



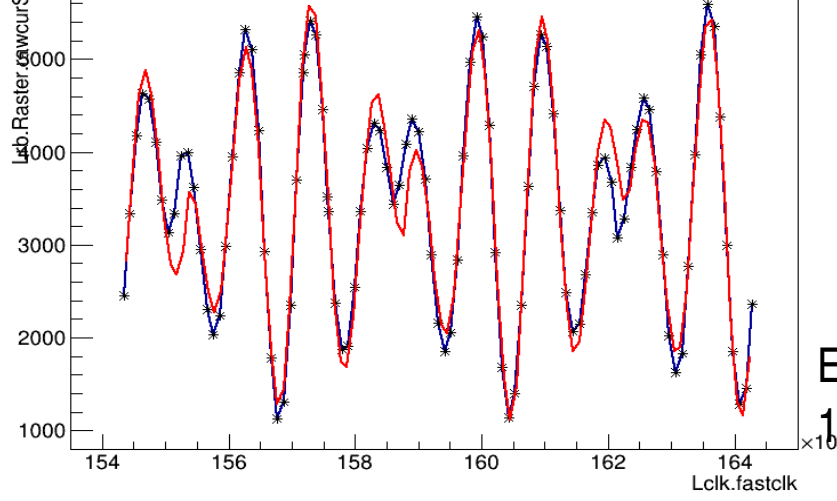
Blue: real data

Red: fit curve



Lrb.Raster.rawcurSL.x:Lclk.fastclk (Entry\$>=1000&&Entry\$<=1100)

### Raw current ADC value

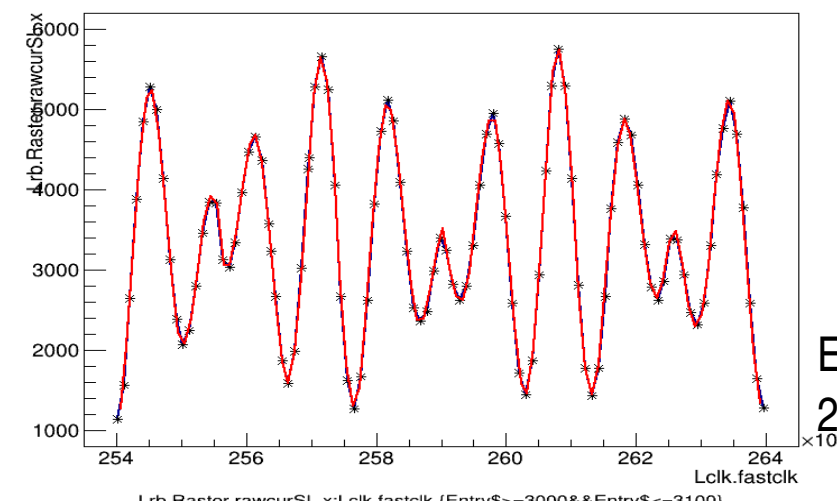


Entry  
1000-1100

Fit range: Entry 1000 – 3000  
(can not use more entries, otherwise it will fail)

Sine phase fit great  
But AM phase....

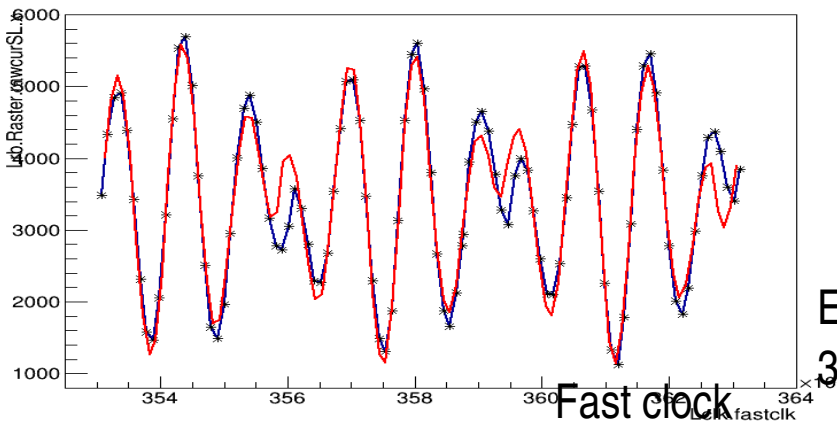
Lrb.Raster.rawcurSL.x:Lclk.fastclk (Entry\$>=2000&&Entry\$<=2100)



Entry  
2000-2100

Blue: real data  
Red: fit curve

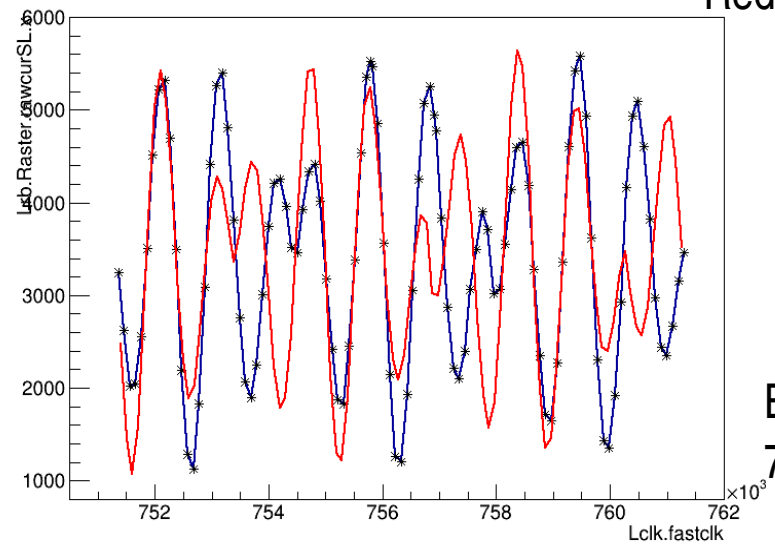
Lrb.Raster.rawcurSL.x:Lclk.fastclk (Entry\$>=3000&&Entry\$<=3100)



Entry  
3000-3100

Fast clock

Lrb.Raster.rawcurSL.x:Lclk.fastclk (Entry\$>=7000&&Entry\$<=7100)



Entry  
7000-7100

Second Problem:

Fit result: sine frequency = 99.202 Hz

Set value: sine frequency = 99.412 Hz

**Q: Does fast clock rate == 103,700Hz ?**

If not, it can explain bad AM phase fit result too

Will set fast clock rate as fit parameter to check later

Todo:

Will fix the problems and finish raster calibration soon

Have a good weekend!