

raster calibration status

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Steps(fast raster and slow raster)

- **Size Calibration**

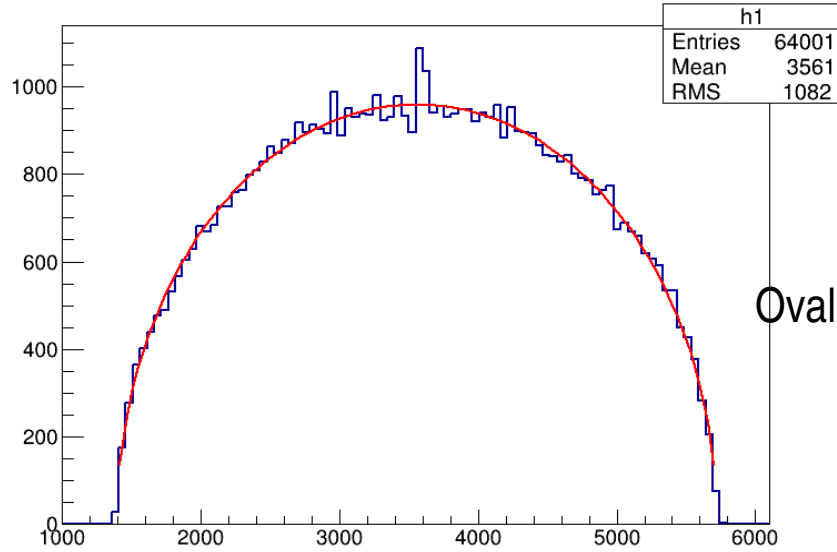
calibrate size by using bpm info

- **Shape Reconstruction**

reconstruct raster shape by using fast clock

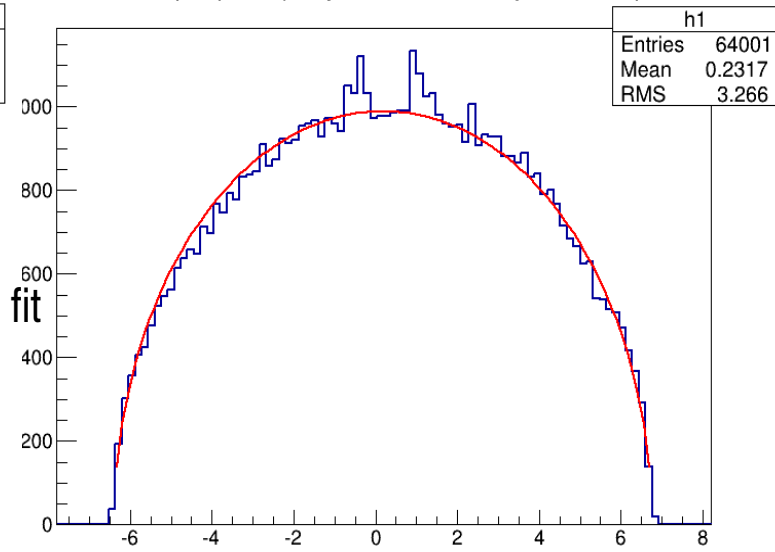
Slow raster size calibration — size at bpm

Lrb.Raster.rawcurSL.y (Entry\$>=528000&&Entry\$<=592000)



Slow raster shape in raster ADC

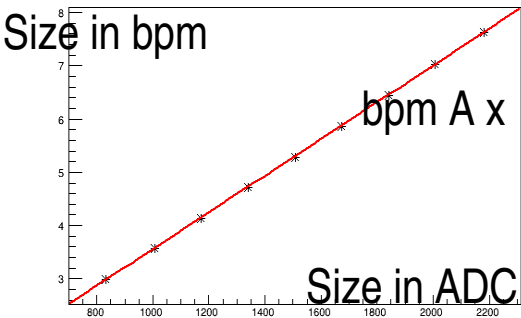
Lrb.bpmay_hall (Entry\$>=528000&&Entry\$<=592000)



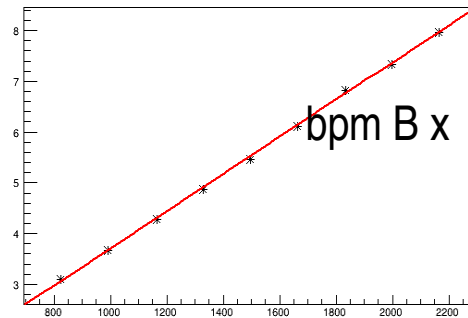
Slow raster shape at bpm position

Oval fit

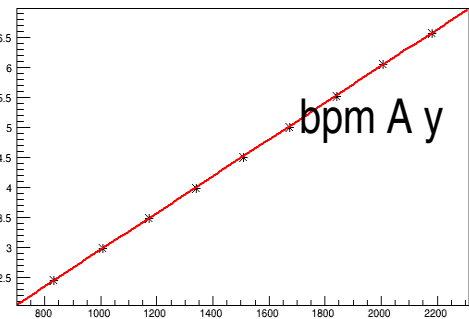
Graph



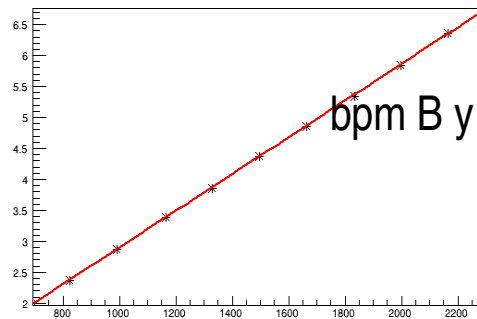
Graph



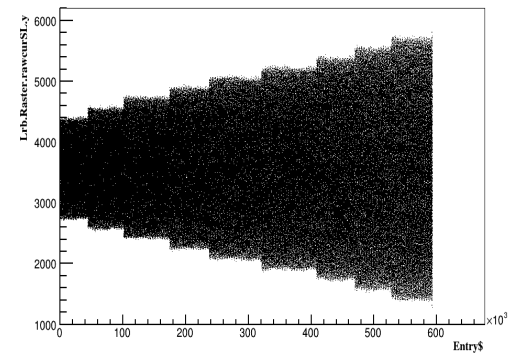
Graph



Graph

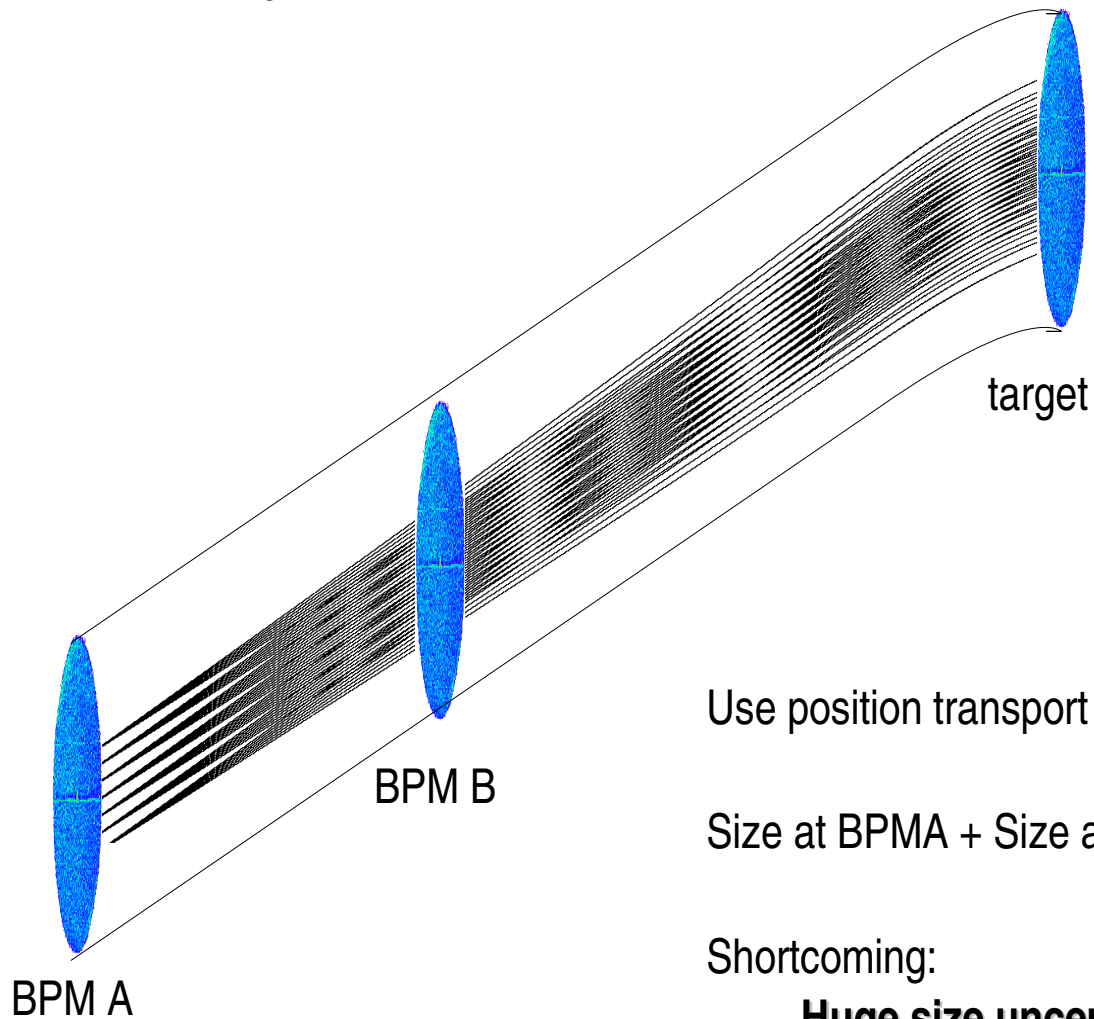


Lrb.Raster.rawcurSL.y:Entry\$



different size VS different ADC diff

raster size at target



Use position transport function to calculate the size at target

Size at BPMA + Size at BPMB -----> Size at target

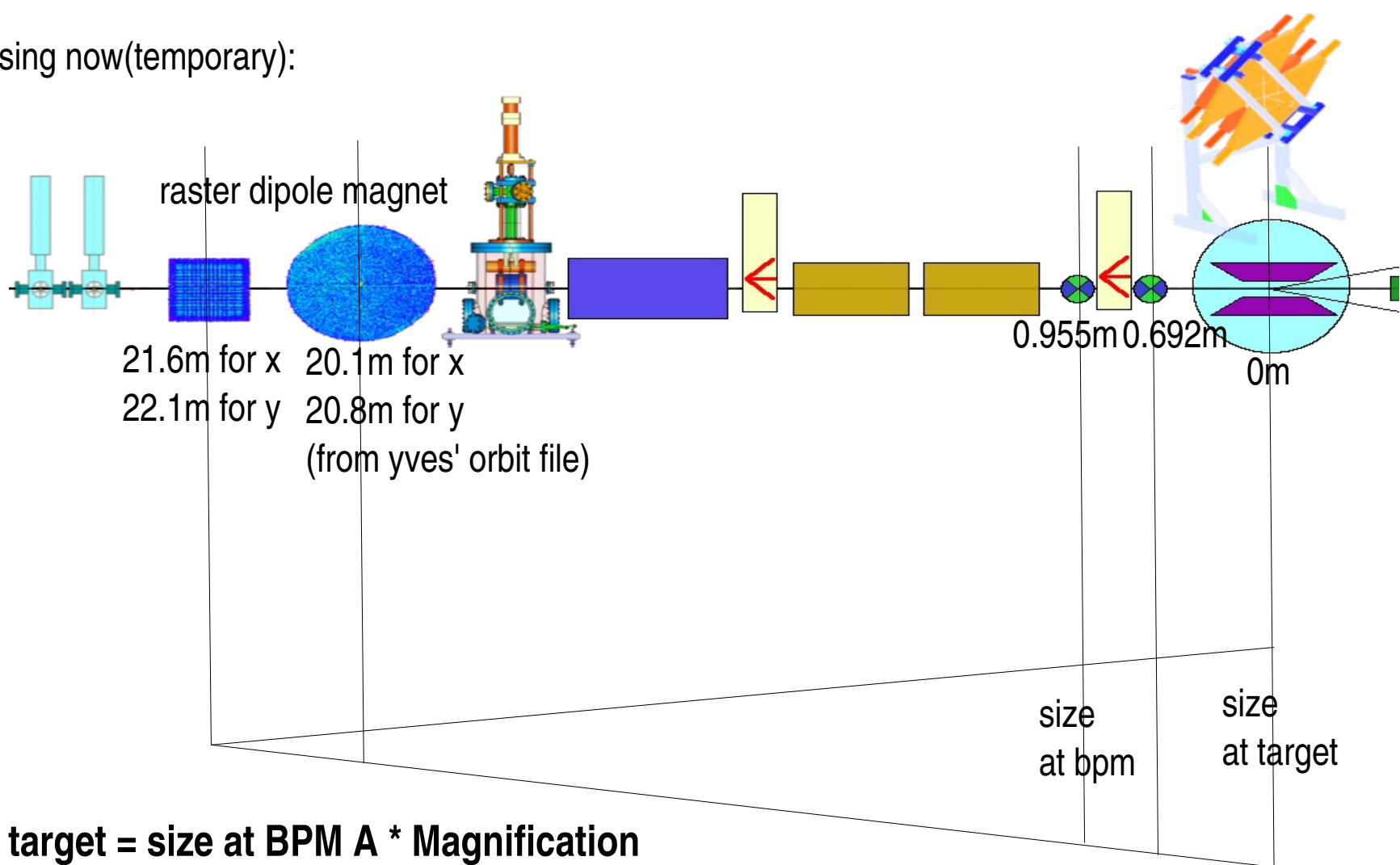
Shortcoming:

Huge size uncertainty at target due to the uncertainty of 2 bpm
--- 0.2mm at bpm → 1mm at target

Maybe will try it after improve bpm's resolution

Will not use this method right now

Method using now(temporary):



size at target = size at BPM A * Magnification

Since BPM A is more reliable

First order(ignore all of magnets effect):

Magnification=raster distance/(raster distance-bpm A distance) ~ 1.05

3cm raster size at bpm → 3.15cm raster size at target

Second order:

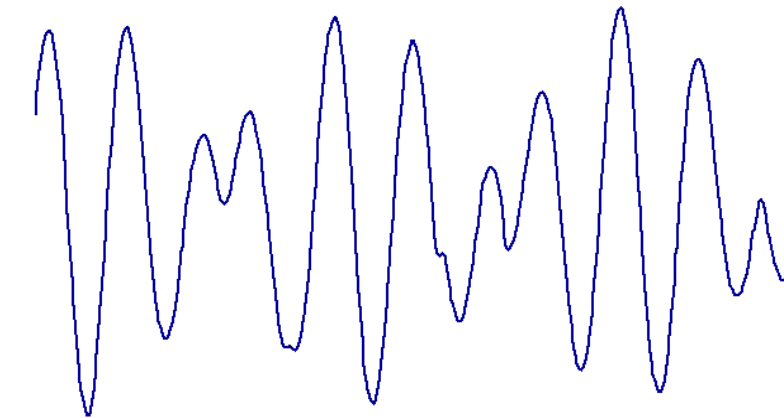
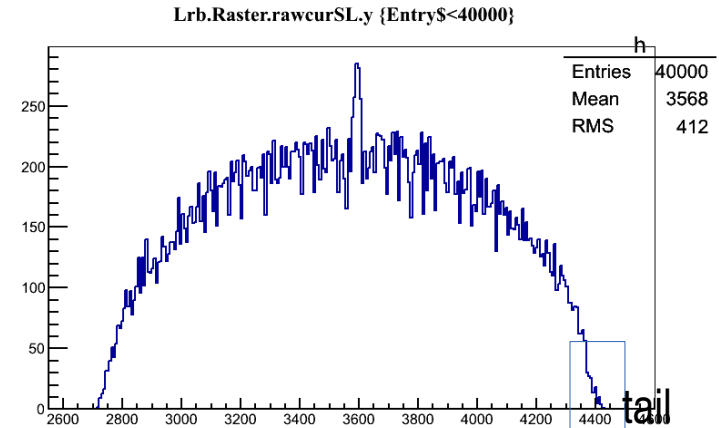
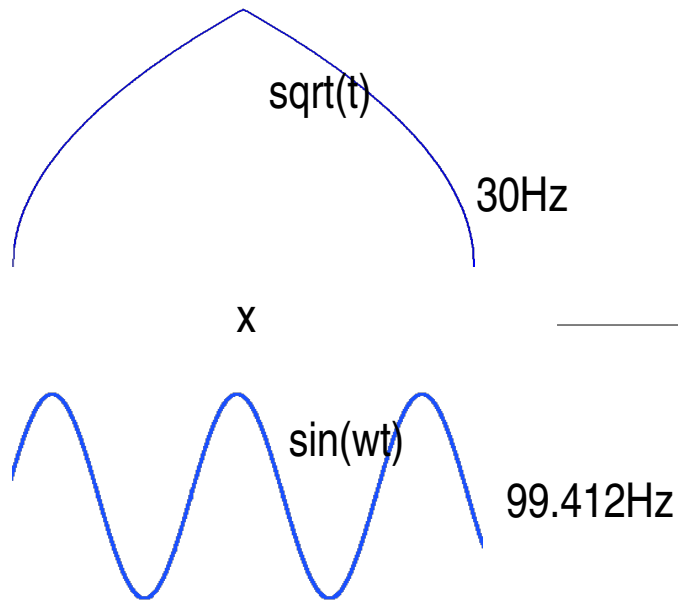
Add chicane&target magnet effect

Slow raster phase reconstruction

Purpose:

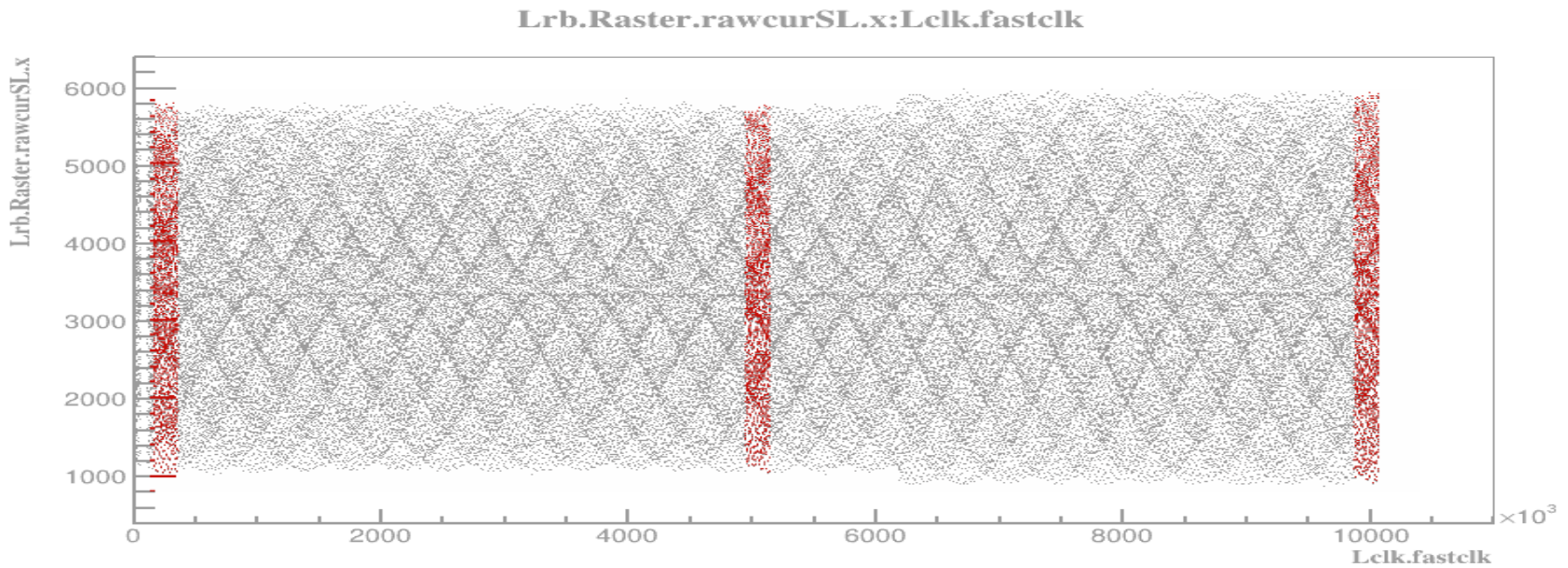
Get rid of uncertainty caused by ADC accuracy limit
(Get better resolution)

Slow raster function settings:



If we know the initial phase, we can reconstruct raster shape
2 phase need to know:
AM function phase

Get slow raster initial phase

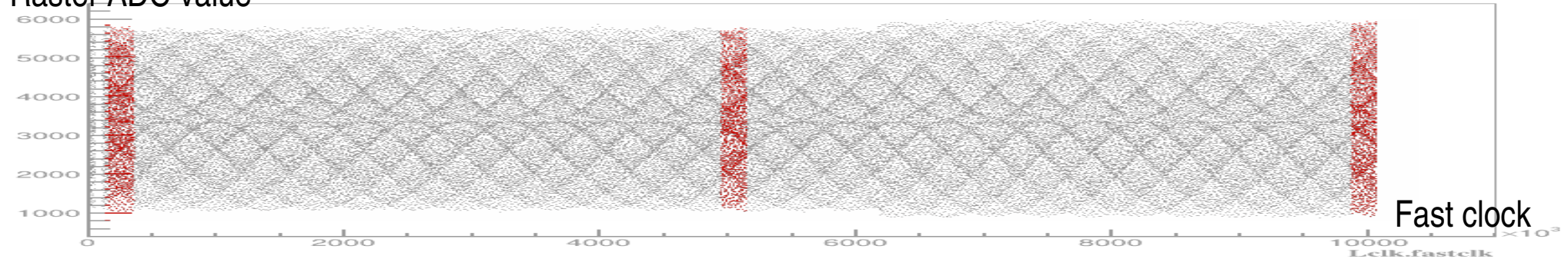


1. pickup three part events(begin, middle, end), 2000 events per part,totally 6000 events for fit
2. fit by using known function
-----> get AM phase and sin phase

Fit result

Raster ADC value

Lrb.Raster.raweurSL.x:Lelk.fastelk



Fast clock

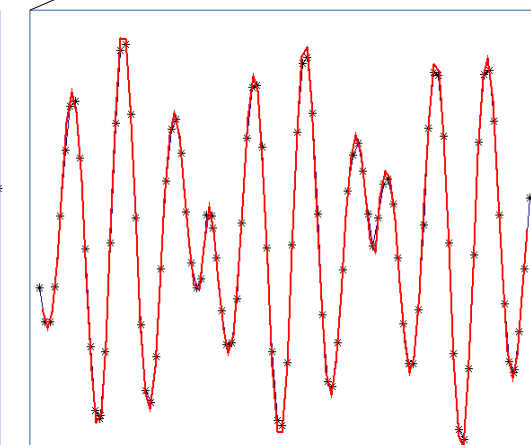
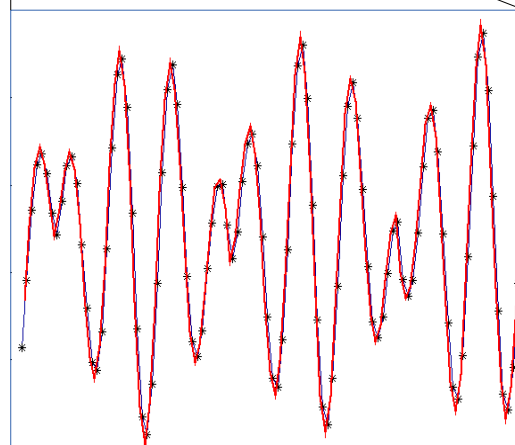
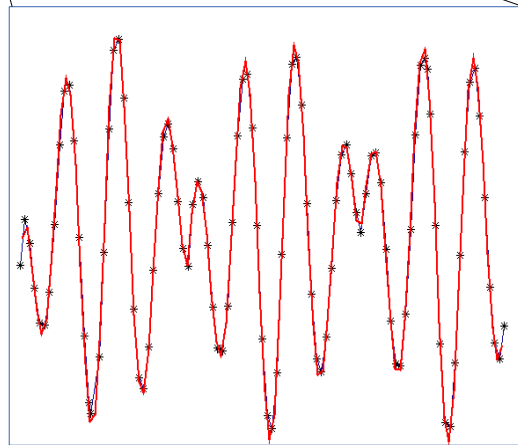
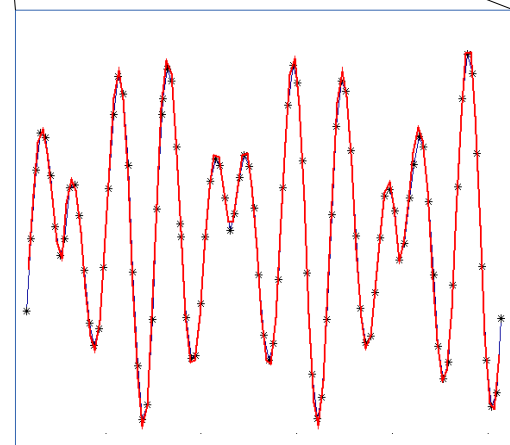
Entries

Entry
1000~1100

15000~15100

30000~30100

60000~60100



Works!

Red line: **Fit result**

Blue line and star asterisk: **real data**

Another byproduct for fit: get fast clock rate

Fast clock rate result from fit from run 5555: **103920Hz**

Fast clock rate result calculated by using sis3801 ring buffer(helicity trigger) from run 5345 : **103920.86Hz**

Slow clock rate calculated by using fast clock rate(from helicity):**1023.99Hz**

Problem:

Fast clock rate seems not stable:

Calculated by run 3486:

From helicity: 103710Hz

From Fit: 103787Hz

Need to check for each run

Calculated by run 4419:

From helicity: 103881Hz

From Fit: 103858Hz

Fast raster size calibration(same method as slow raster)

Harder than slow raster size calibration:

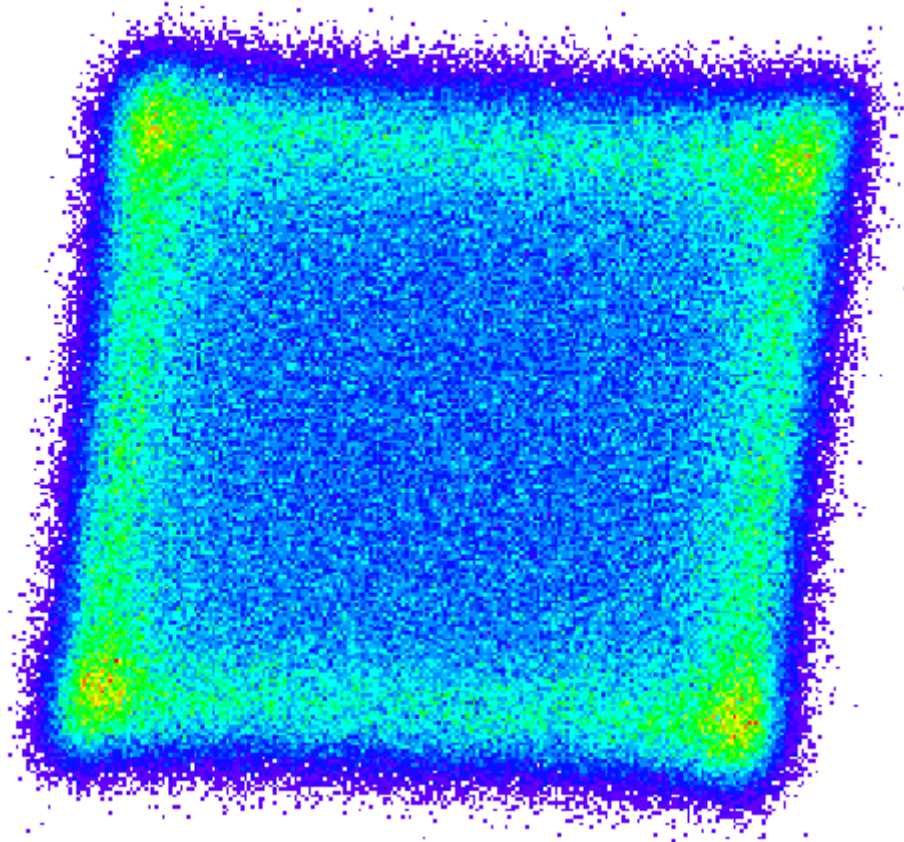
High current (>300nA)

Different gain, different filter as bpm calibration run(maybe need different bpm calibration constant)

Not all of the period have good calibration

Can be done by using exists bpm calibration constant temporary

Will do again after bpm noise study

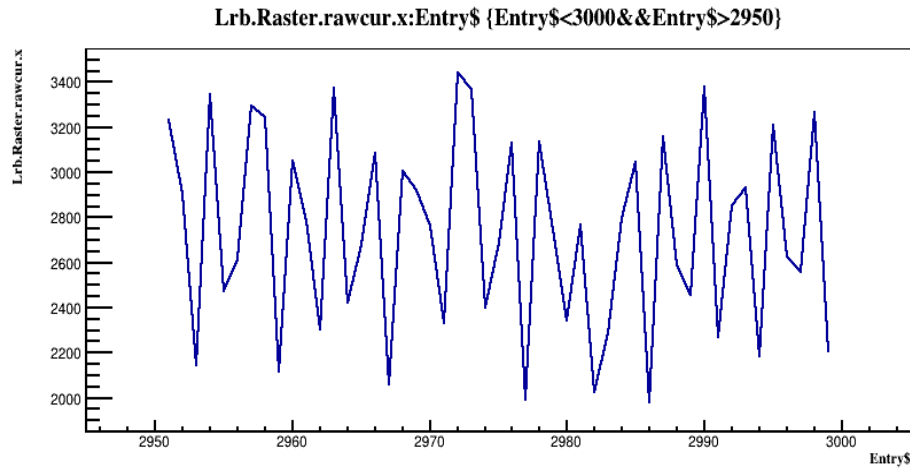


Fast raster shape in BPM

Fast raster phase reconstruction



Triangle wave, unknown frequency
Frequency > event rate

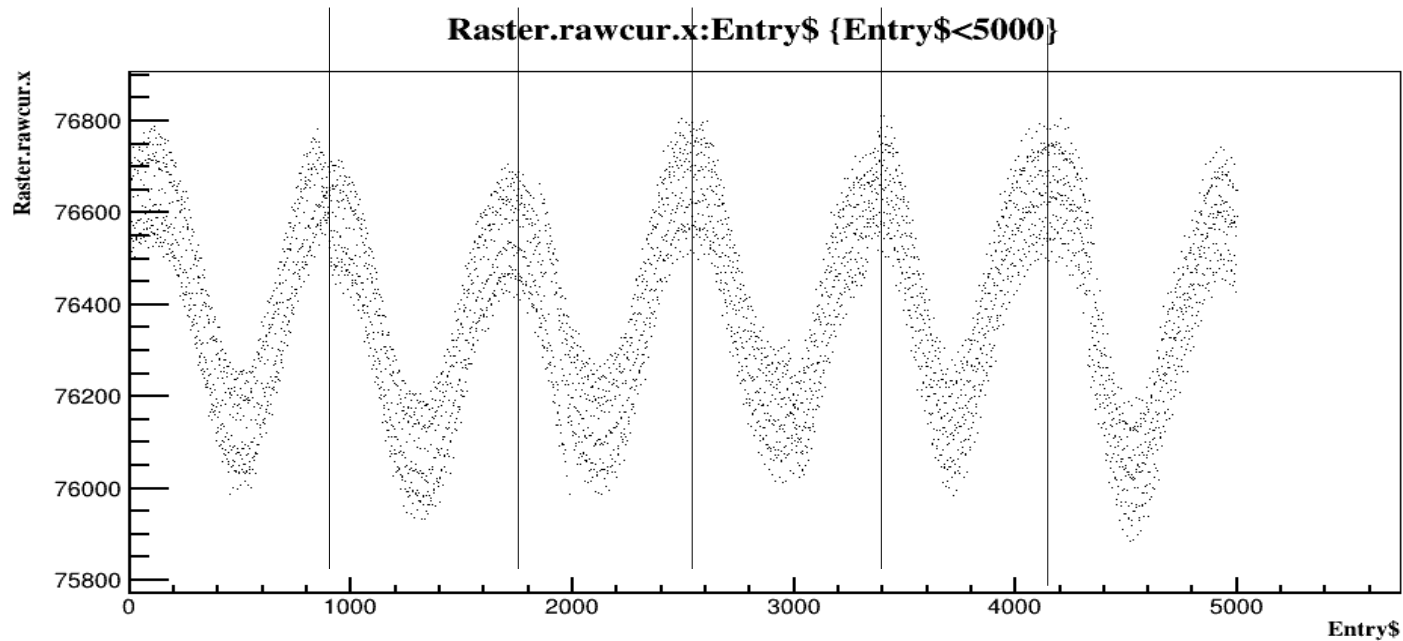


Fit: **Unsuccessful**

One method to get fast raster rate: use happex ADC

Happex: helicity trigger (fixed trigger rate)

$(\text{Helicity period} \% \text{ fast raster period}) * \text{period shown in ADC} = \text{fast raster period}$



Fast raster shape in happex ADC

For fast raster:
Use ADC value directly first

Raster calibration:

Finished for one period: 5/3 straight through

Plan to finish another after bpm noise study

Will do another if anyone ask

Next step:

BPM noise study && improve bpm resolution