Acceptance Study

1. Beam distribution study
2. Delta comparison improvement
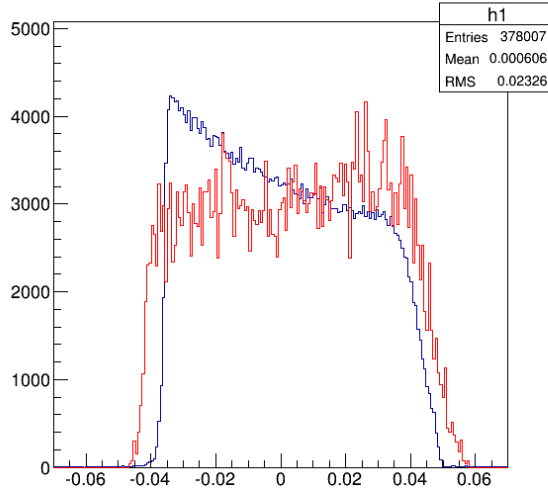
Min Huang

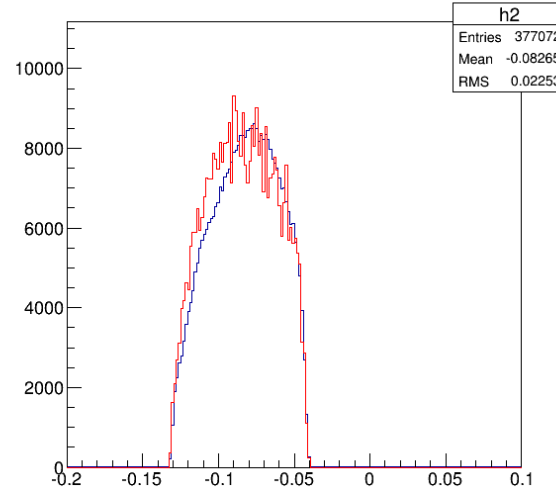08/06/2014

Acceptance
1.706 GeV, 2.5T, transverse, dilution empty
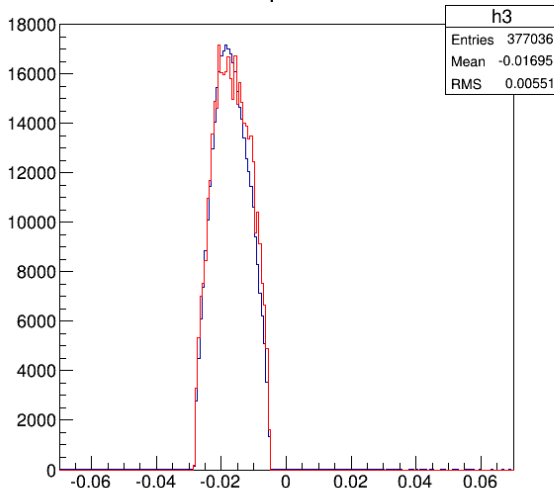

delta

theta

phi

In simulation events are generated uniformly, what about beam distribution with rasters in data?

Blue: data
Red: simulation
#4423 p0=1.0966 dilution run with empty target, rasters on
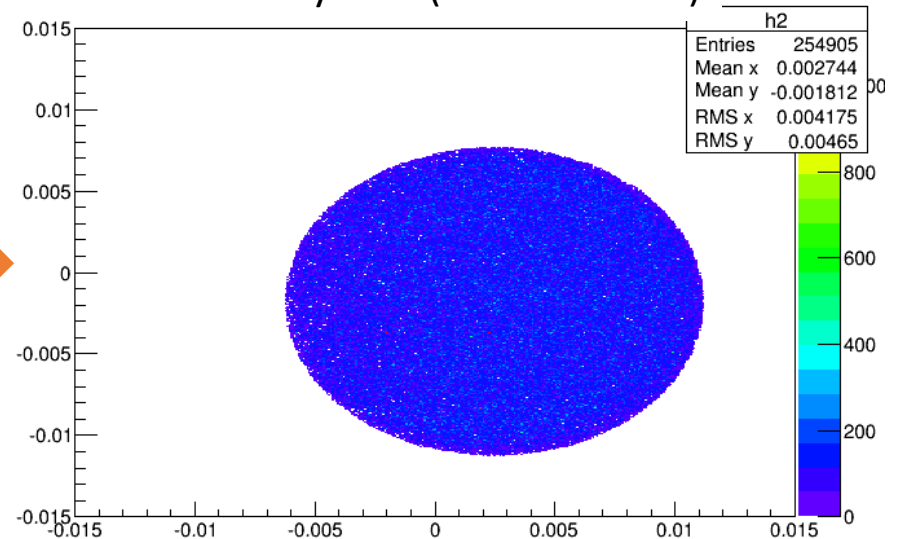
W ~ 1.4 GeV

Beam distribution with rasters

- Events divided by cross section (P. Bosted)
  - Beam x is horizontal to the left facing beam direction

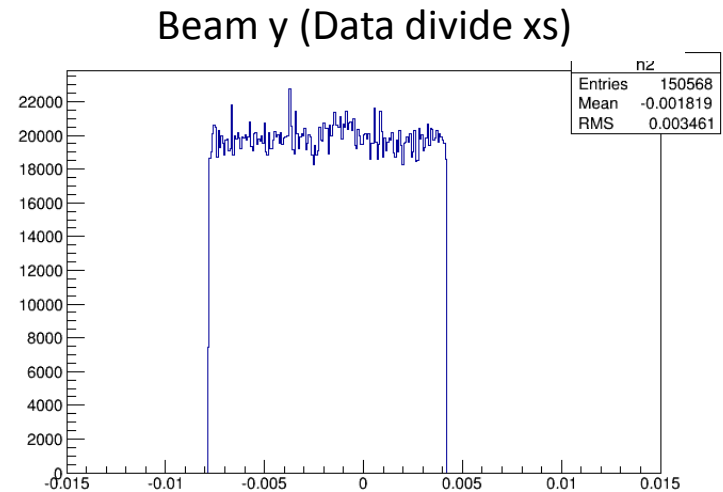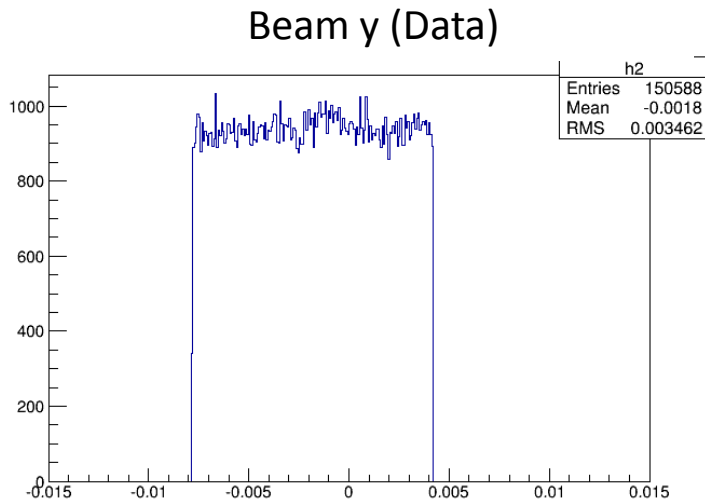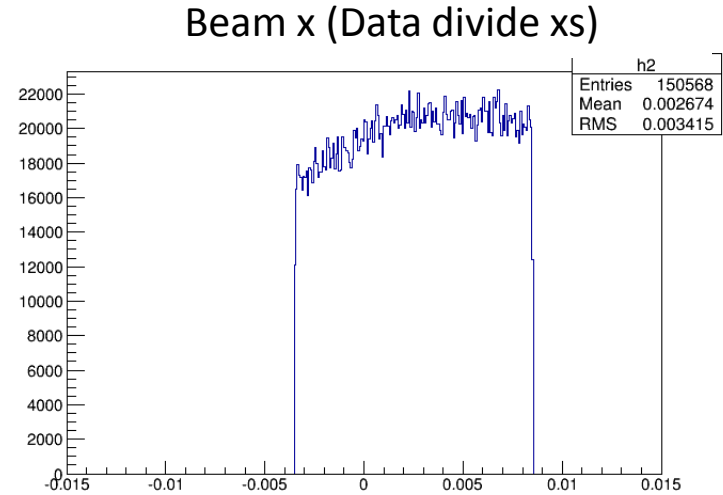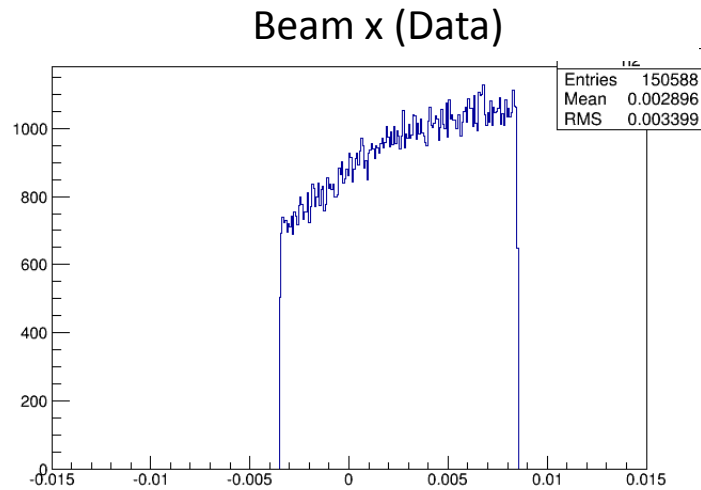   beam y is vertical up

Beam y vs. x (Data)
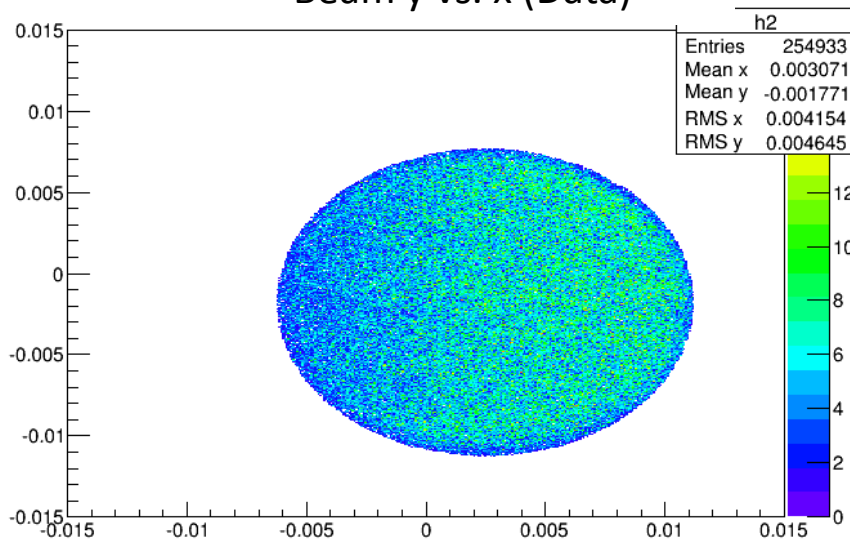
Beam y vs. x (Data divide xs)

Beam distribution with rasters

- Cut a square in the ellipse and plot 1D distribution of x and y

Beam x (Data)

Beam x (Data divide xs)

Beam y (Data)

Beam y (Data divide xs)

- Beam y distribution looks uniform with 10% fluctuation, while beam x has a slope on the left.

Beam distribution with rasters

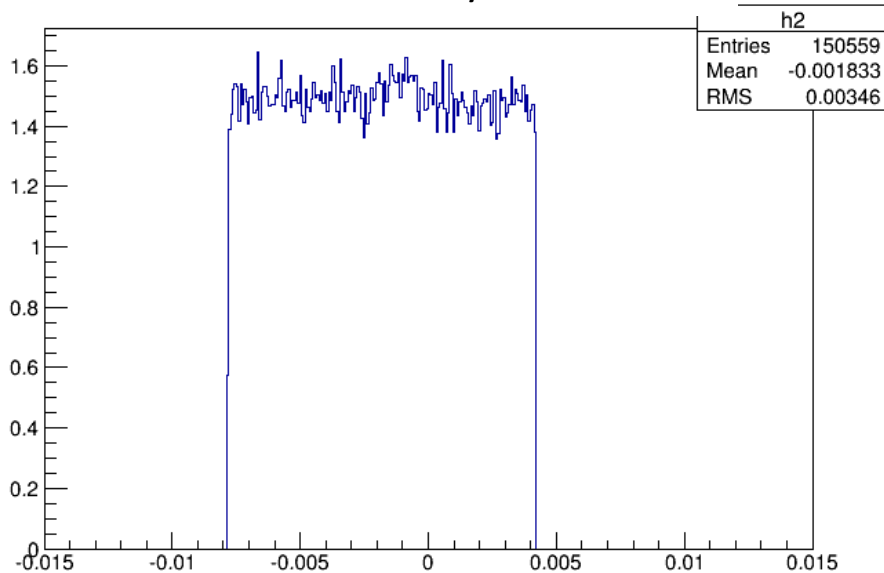- Events divided by cross section (Mott)
- Beam x is horizontal to the left facing beam direction
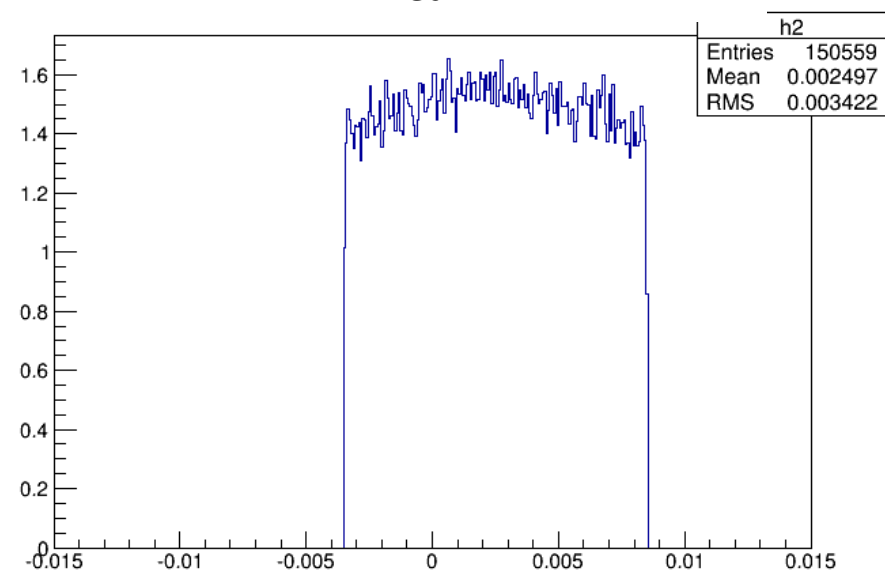 y is vertical up
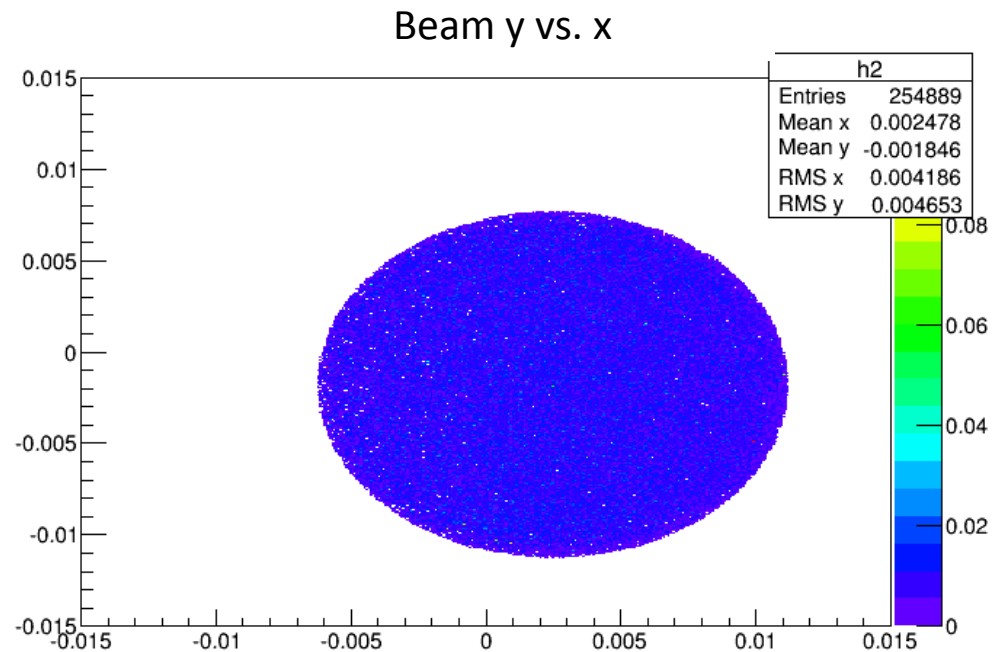
Beam y vs. x

Beam distribution with rasters

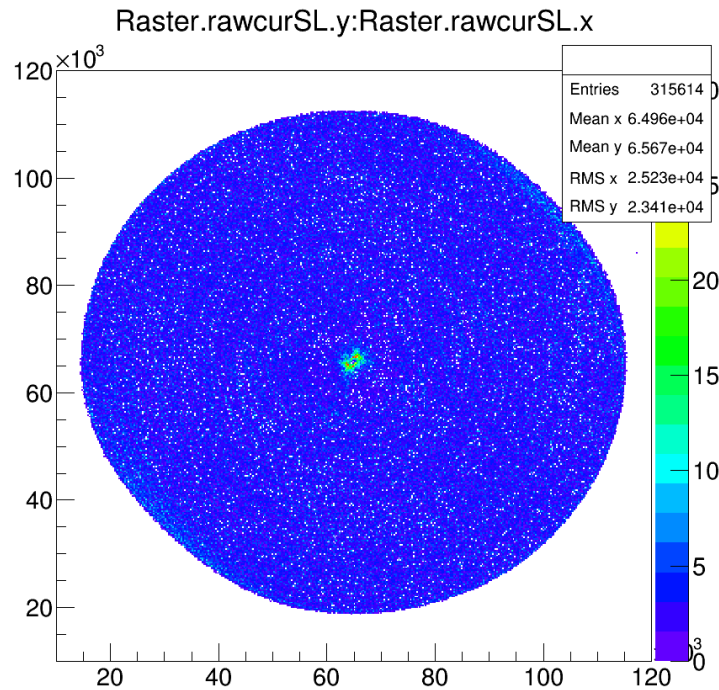- Cut a square in the ellipse and plot 1D distribution of x and y
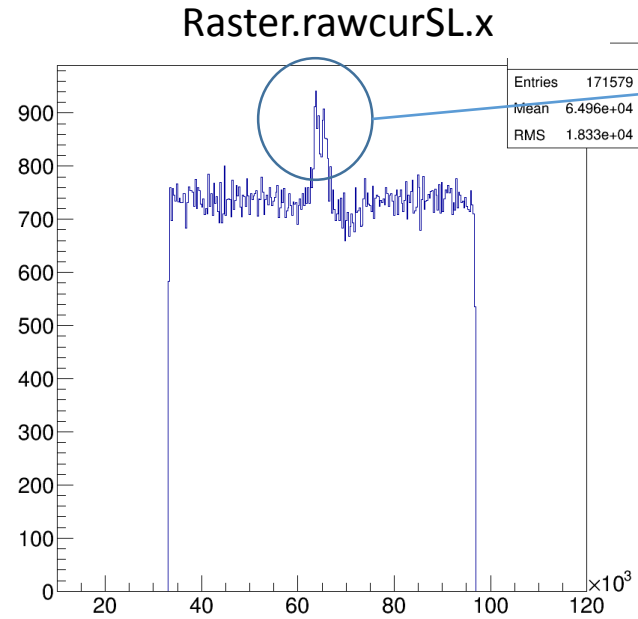

- Similar results

- x and y are spirally correlated!

Slow raster function

- $x = a \cdot Am \cdot \sin(2\pi(t+\phi_{am})/T+\phi)$

- $y = a \cdot Am \cdot \cos(2\pi(t+\phi_{am})/T+\phi)$

- $Am = \sqrt{t+\phi_{am}}$, $T = 1/99.412$

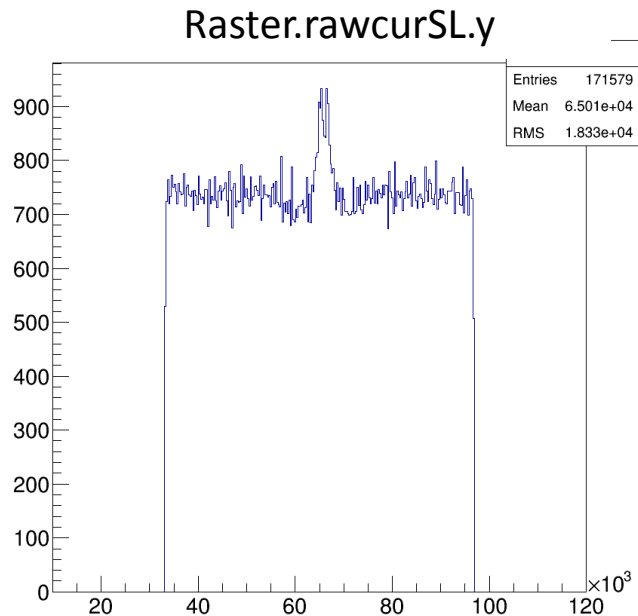- From the functions, if y is uniform, x should also be uniform if slow raster worked as set
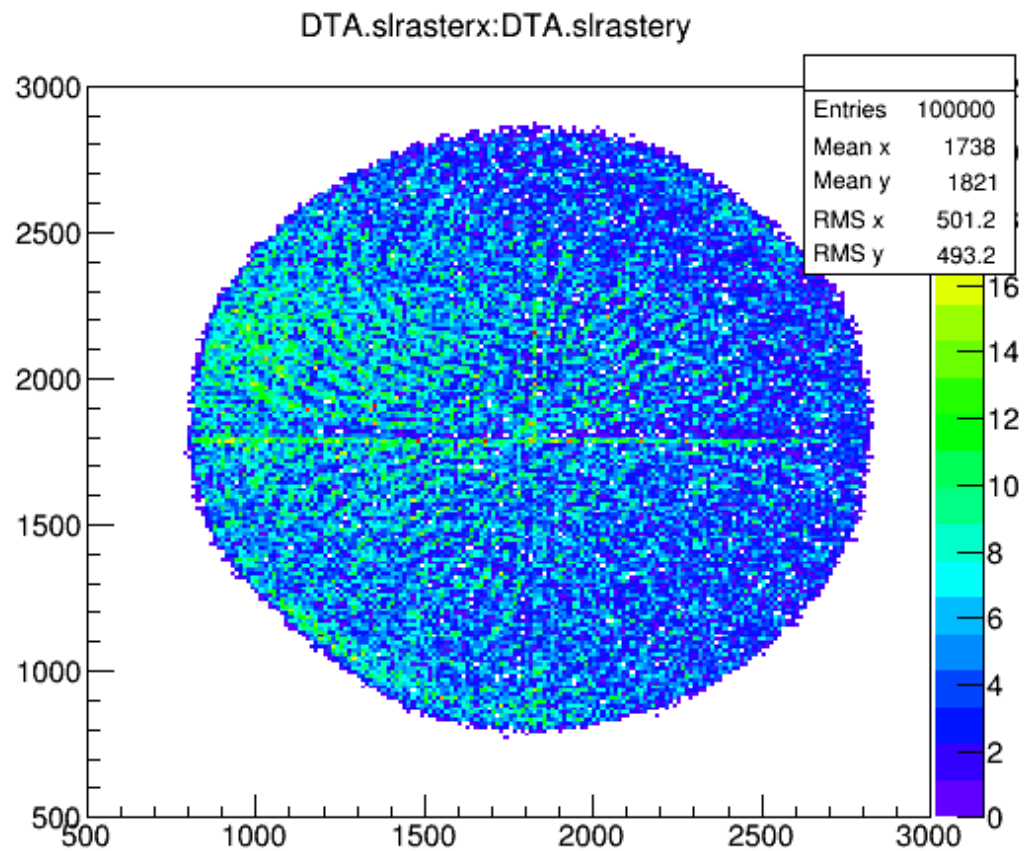
Slow Raster Raw Signal

Raster.rawcurSL.x

Happex trigger frequency and slow raster frequency effect, don't have it in data

Entries	171579
Mean	6.496e+04
RMS	1.833e+04

Raster.rawcurSL.y:Raster.rawcurSL.x

Entries	315614
Mean x	6.496e+04
Mean y	6.567e+04
RMS x	2.523e+04
RMS y	2.341e+04

Raster.rawcurSL.y

Entries	171579
Mean	6.501e+04
RMS	1.833e+04

Raw signal before reaction. This also shows that beam distribution is uniform.

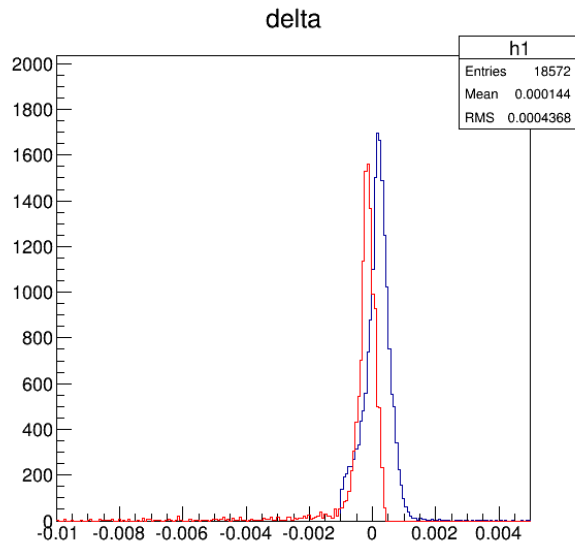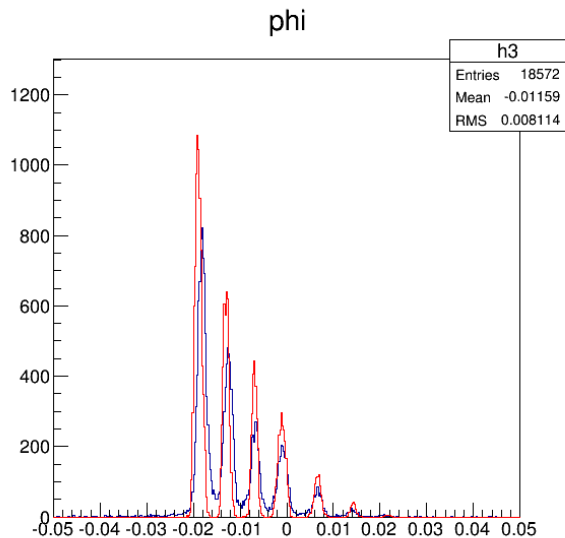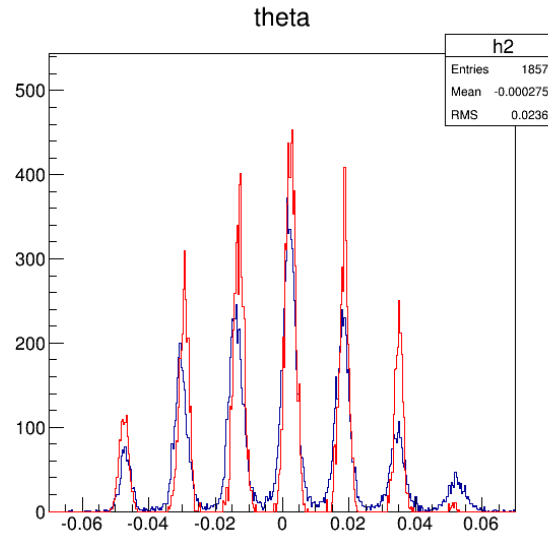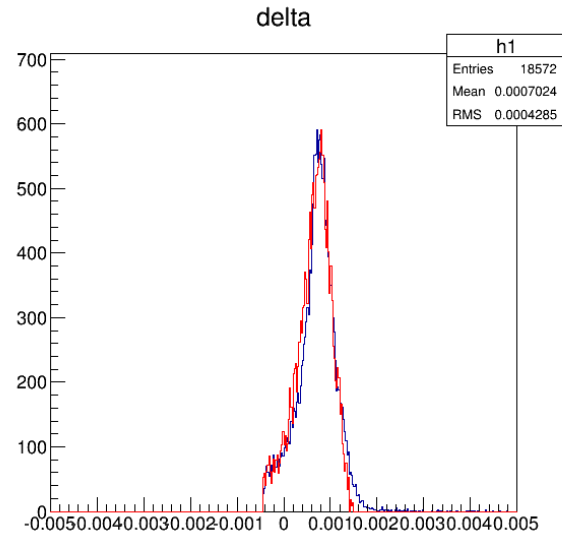# 3rd Arm

Acceptance

2.254GeV. 0T. optics
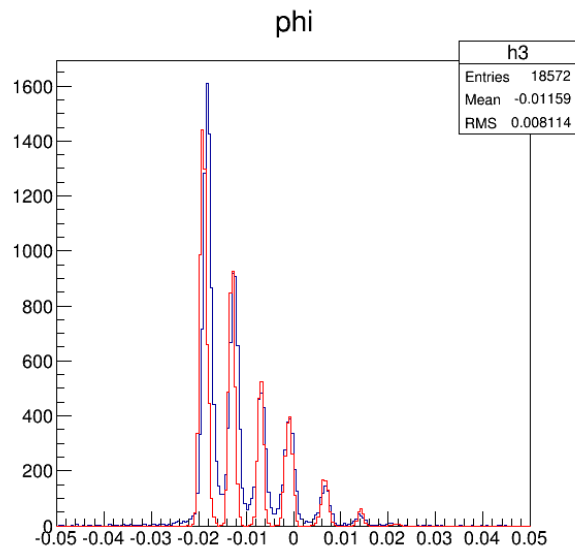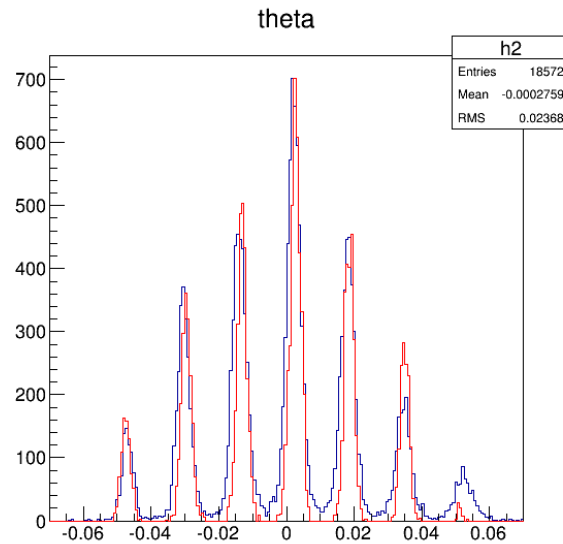
Blue: data
Red: simulation
#3185 delta=0% optics run

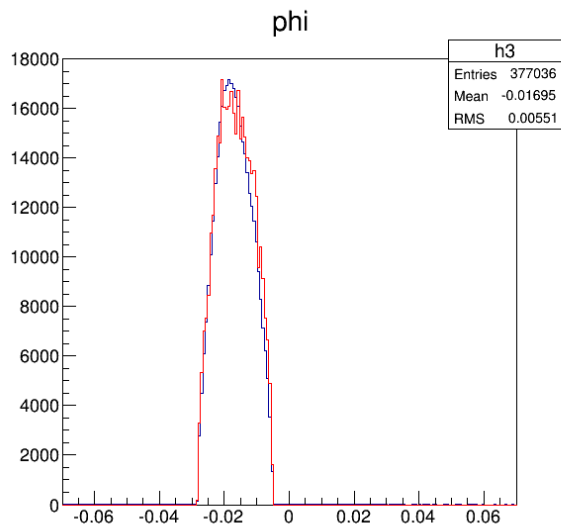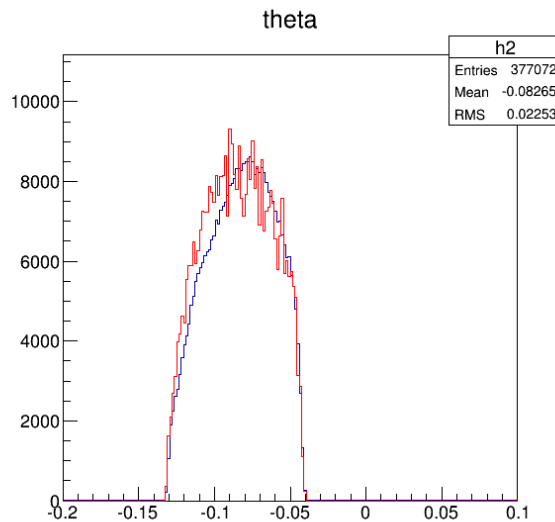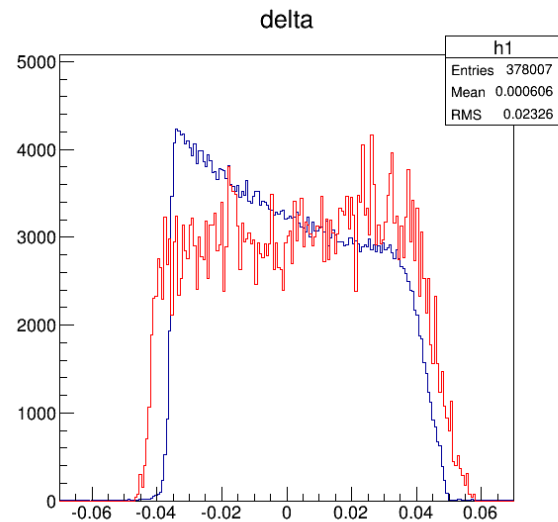# Acceptance
2.254GeV, 0T, optics

Blue: data
Red: simulation
#3185 delta=0% optics run

Used a different ionization model, and corrected the different energy loss used in optics calibration

Acceptance

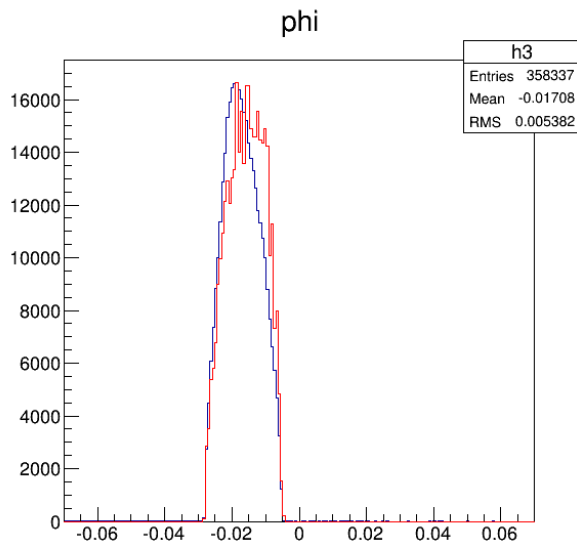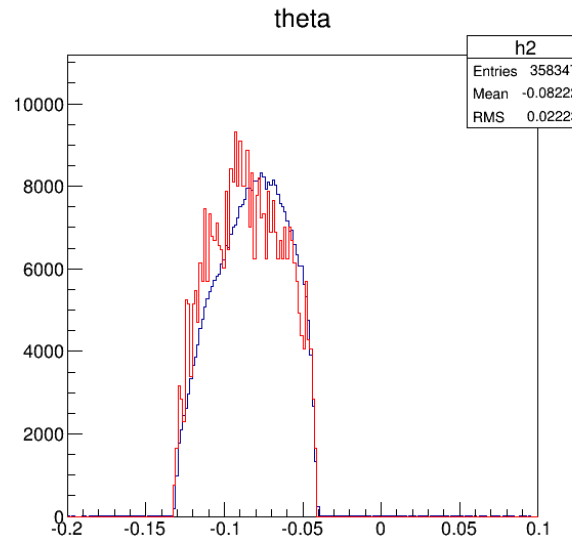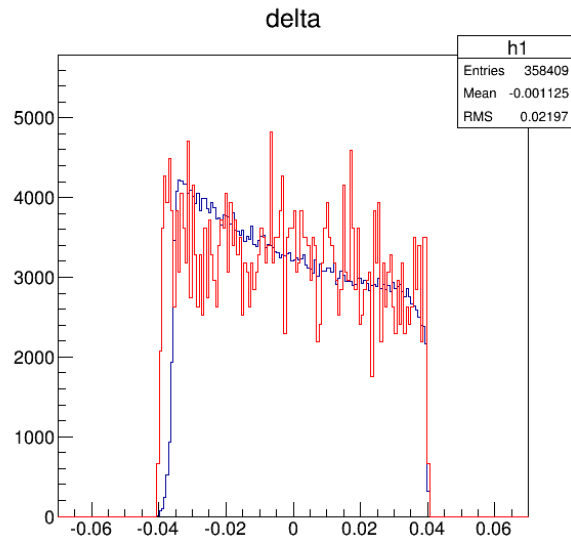## 1.706 GeV, 2.5T, transverse, dilution empty

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W ~ 1.4 GeV

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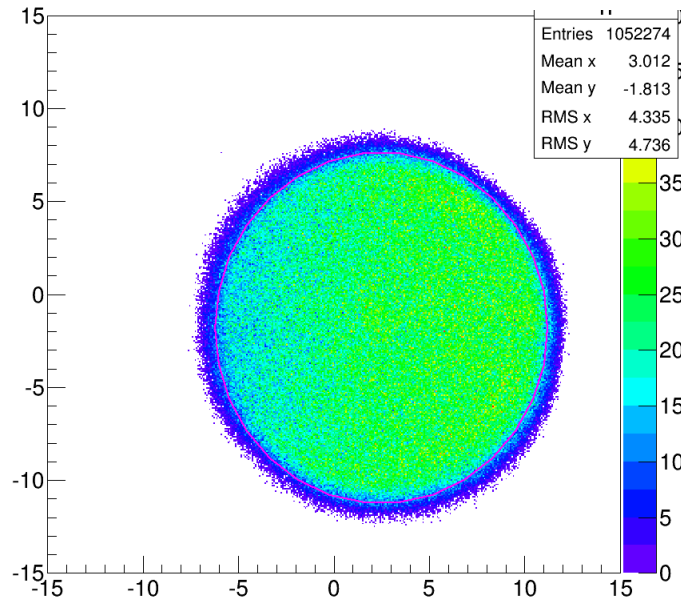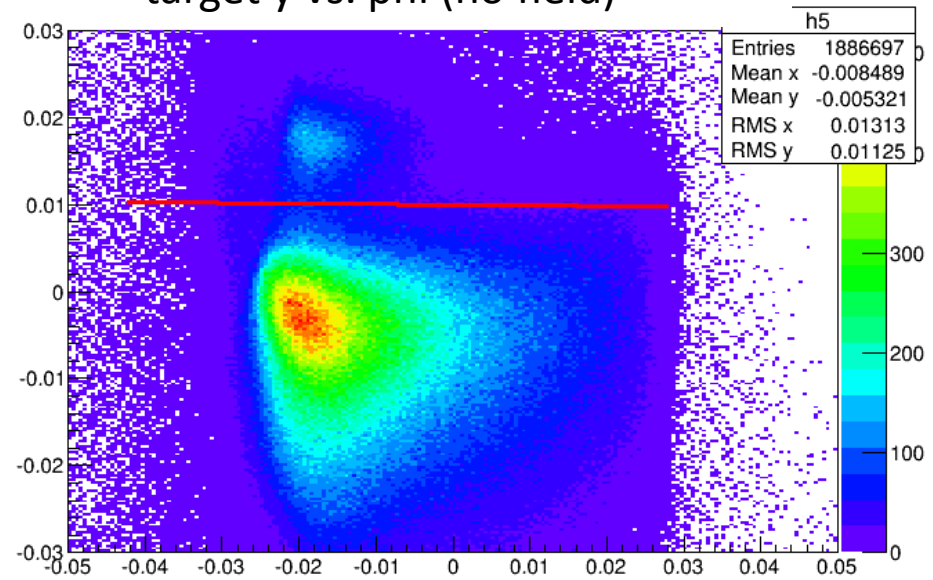with empty target, rasters on

W ~ 1.4 GeV

Next

- Improve theta, phi shape comparison
- Suggestions from this meeting

Backup

Beam y vs. x

target y vs. phi (no field)

+ Good electron cut