Acceptance Study

(1st & 3rd septum)

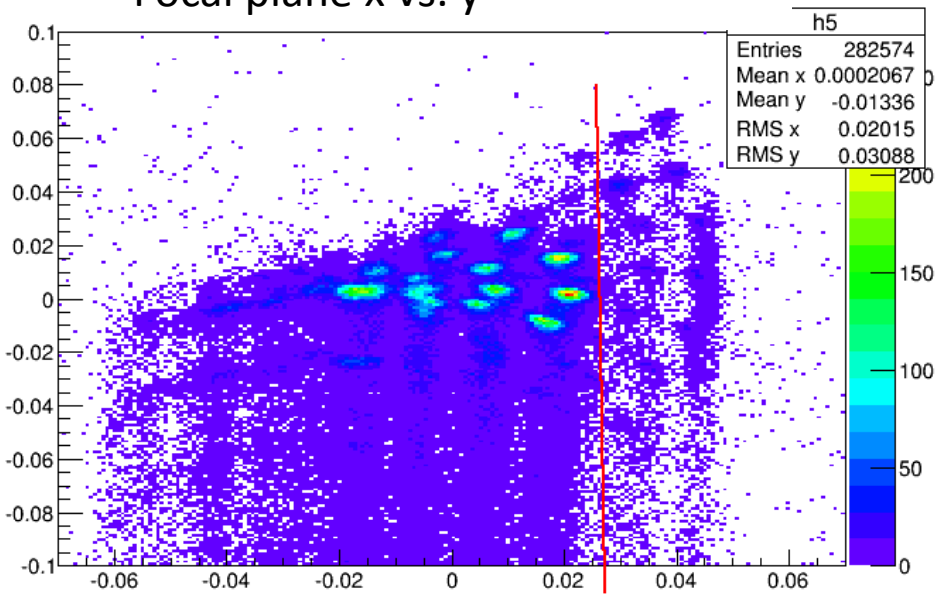
Min Huang

07/16/2014

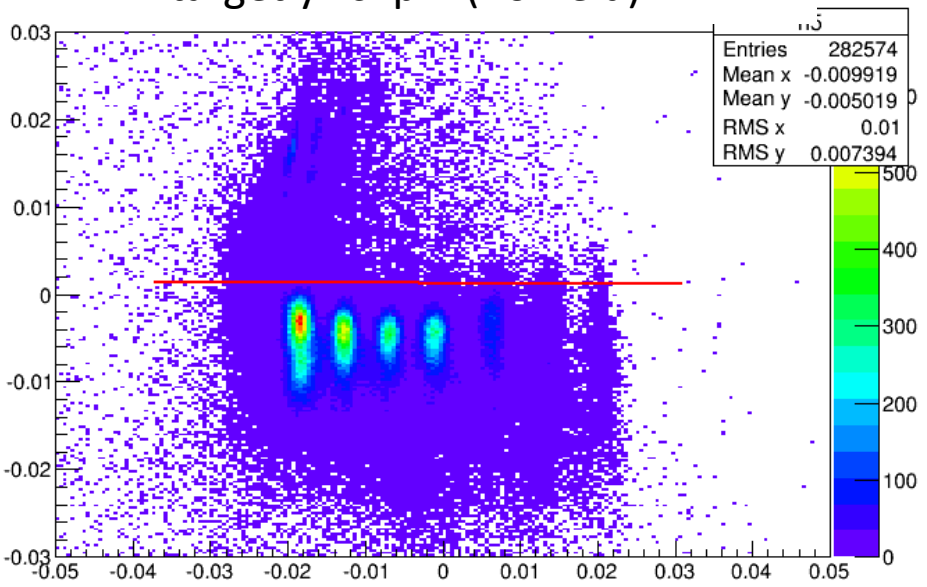
Optics run

- Data
  - Focal plane and target plane cuts to throw away junk events and select elastic events
  - New: use the beam cut Chao used in the optics calibration
- Simulation
  - Event also generate according to the beam position in the cut
  - Elastic events

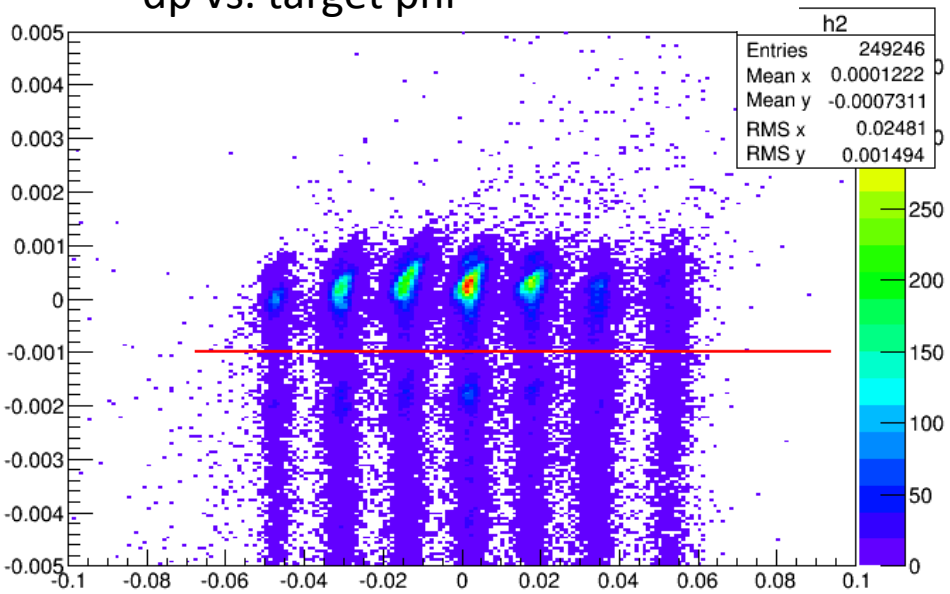
Focal plane x vs. y

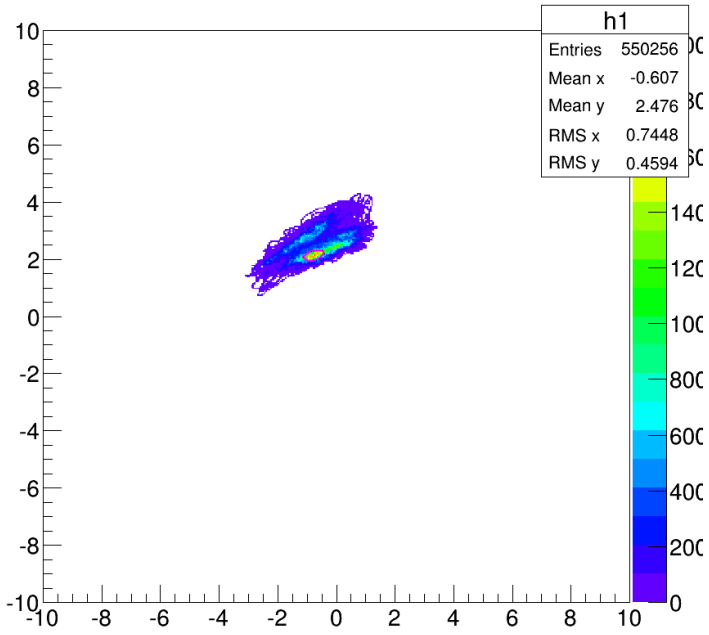


target y vs. phi (no field)



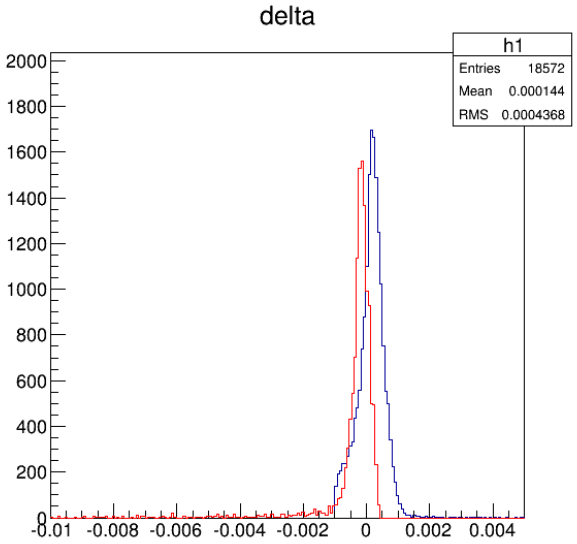
dp vs. target phi

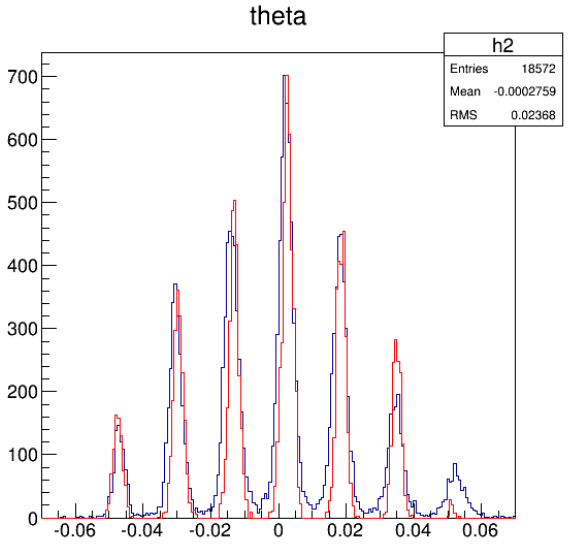


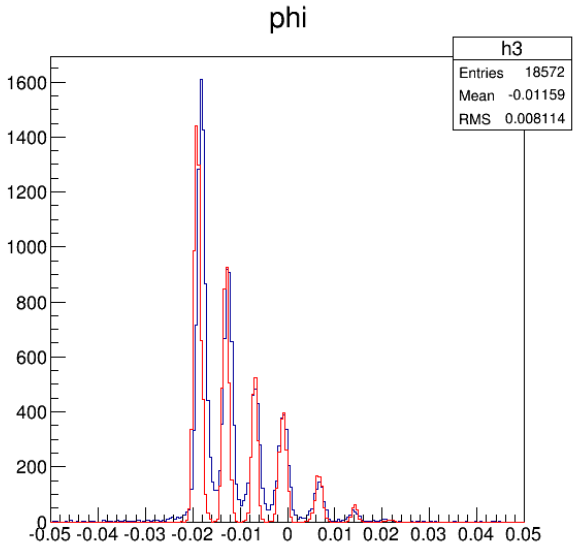


Acceptance

2.254GeV. 0T. optics







Blue: data

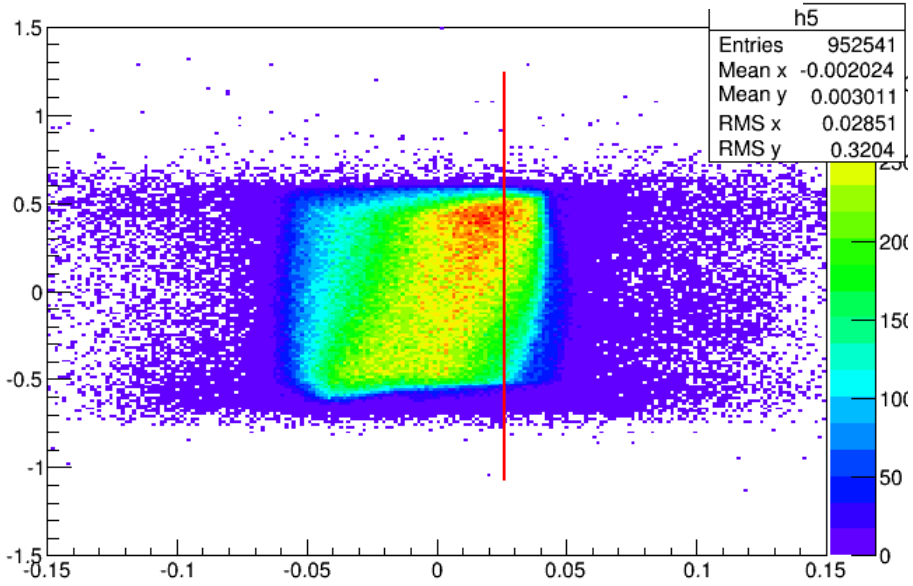
Red: simulation

#3185 delta=0% optics run

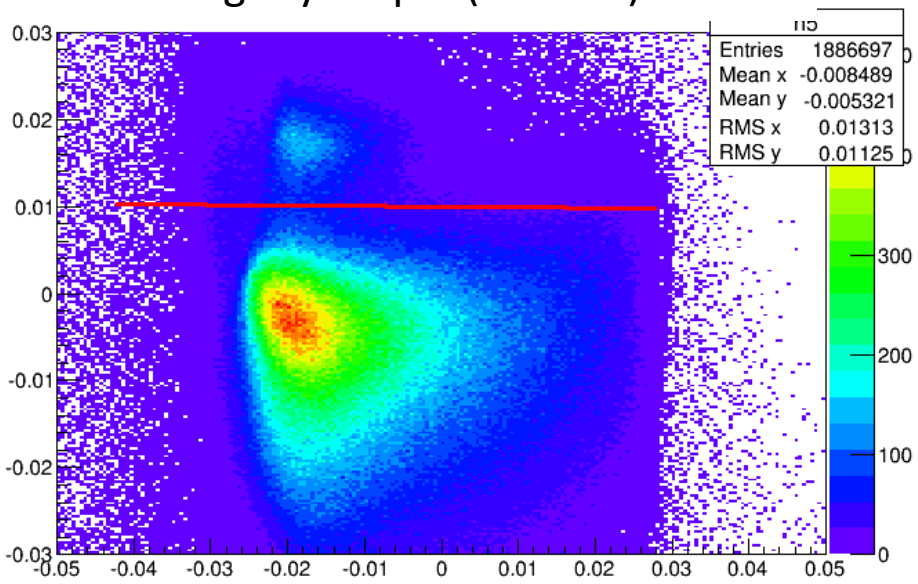
Dilution Run

- Data
  - Use same focal plane cut on dilution run as used in optics calibration
  - Cut on beam position
  - Use target plane graphic cut instead of focal plane
- Simulation
  - Empty target, use nose diameter instead of cell length
  - Generate events in ellipse as cut in data
  - Use target plane cut same as in data

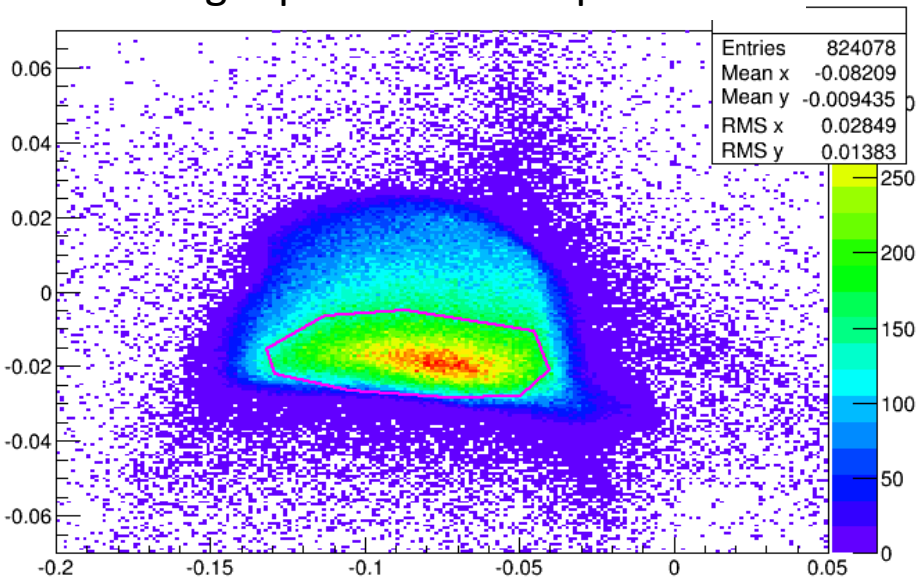
Focal plane x vs. y



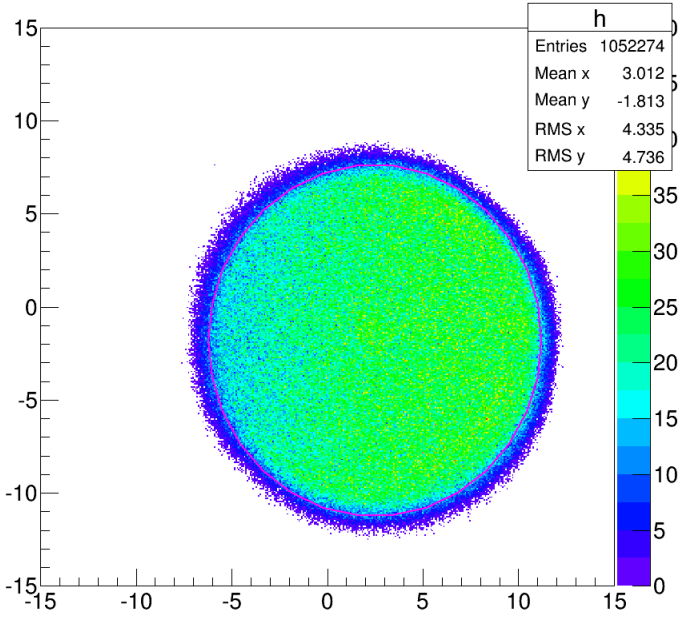
target y vs. phi (no field)



Target plane theta vs. phi

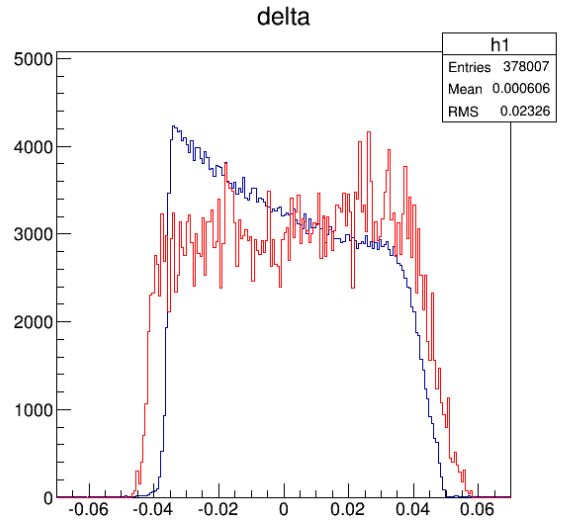


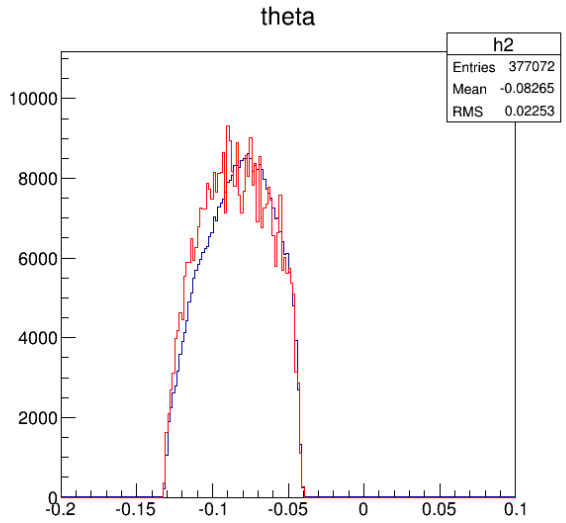
Lrb.tgt_0_y:Lrb.tgt_0_x

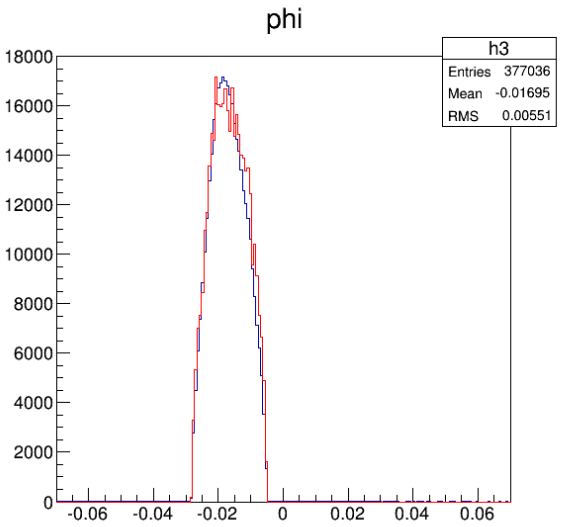


Acceptance

1.706 GeV, 2.5T, transverse, dilution empty







Blue: data

Red: simulation

#4423 p0=1.0966 dilution run with empty target, rasters on

W ~ 1.4 GeV

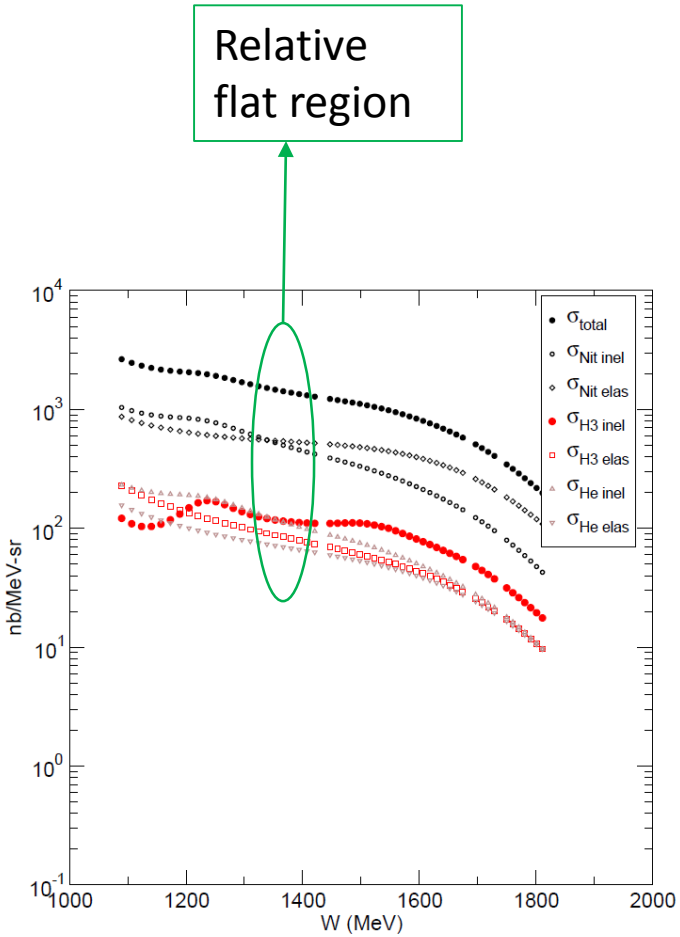


Figure 18: 1.7 GeV (2.5T) Cross section.

Next

- Look into the dp discrepancy
  - Energy loss? Radiative correction?
- Go through other settings
- Suggestions from meeting

Septum	Ebeam	Target Field	Kinematics
484816	2.3	0T	Optics elastic
		2.5T Trans.	Optics elastic
403216		2.5T Trans.	Dilution resonance
400016	2.3	5T Long.	Optics elastic
	1.7	2.5T Trans.	Optics elastic
		2.5T Trans.	Dilution resonance
	1.2	2.5T Trans.	Optics elastic
		2.5T Trans.	Dilution resonance
	2.3	5T Trans.	Optics elastic
			Dilution resonance
	3.4	5T Trans.	Dilution resonance

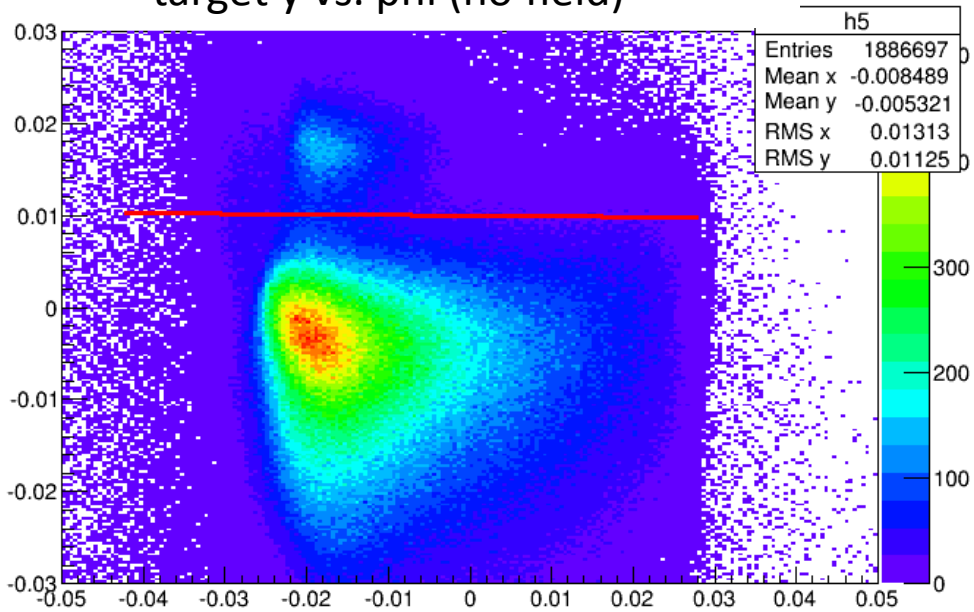
Backup

Acceptance

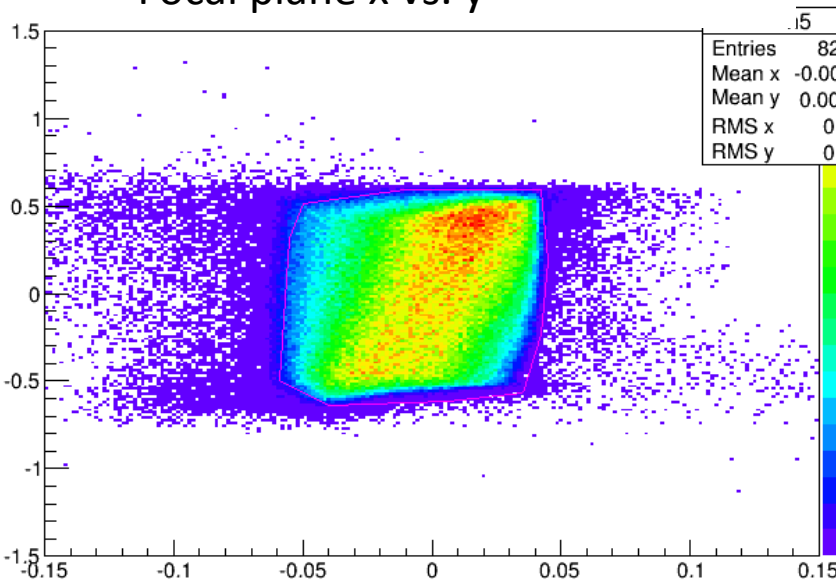
- Unpolarized cross section
- $\frac{d\sigma^{raw}}{d\Omega d\mathrm{E}'} = \frac{N \cdot ps \cdot RC}{Q/q \cdot N_{tg} LT \cdot \epsilon_{det}} \frac{Acc}{\Delta\Omega \Delta \mathrm{E}'}$
- Use Monte-Carlo simulation to study Acc
- $\frac{Acc}{\Delta\Omega \Delta \mathrm{E}'} = \frac{1}{\Delta\Omega^{MC} \Delta \mathrm{E}'^{MC}} \frac{N_{simu}^{MC}}{N_{acc}^{MC}}$

- Start from optics & dilution runs with simple target

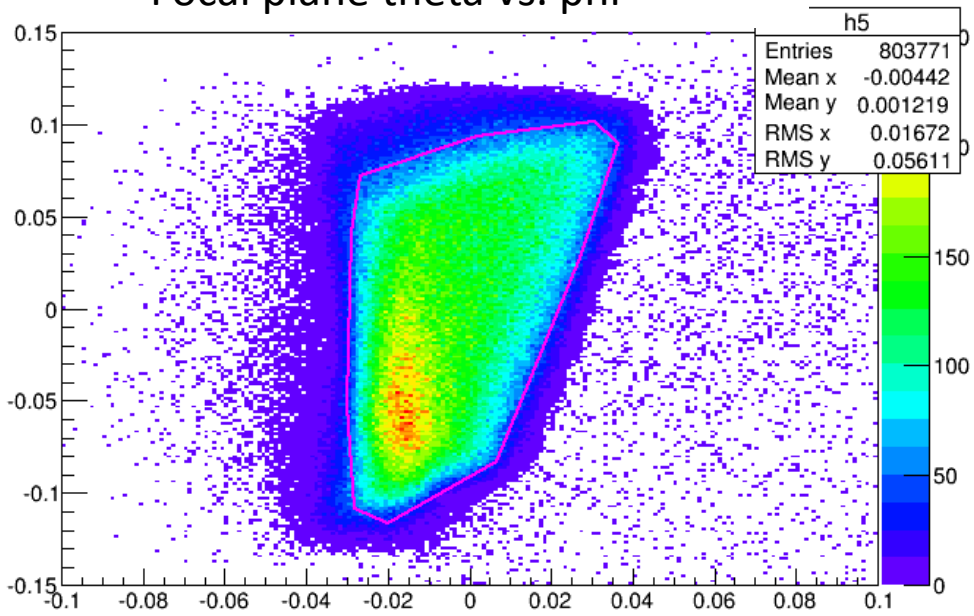
target y vs. phi (no field)



Focal plane x vs. y



Focal plane theta vs. phi



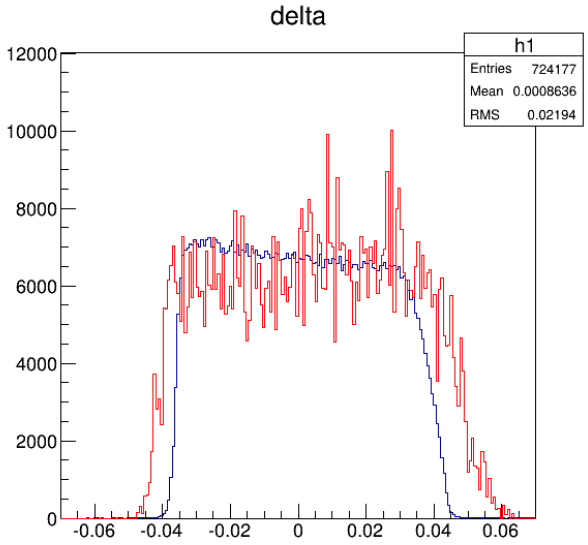
Cuts used on data

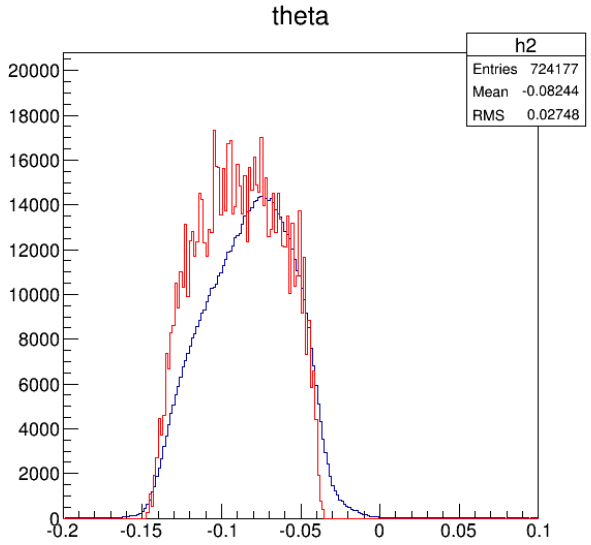
L.tr.tg_y <0.01

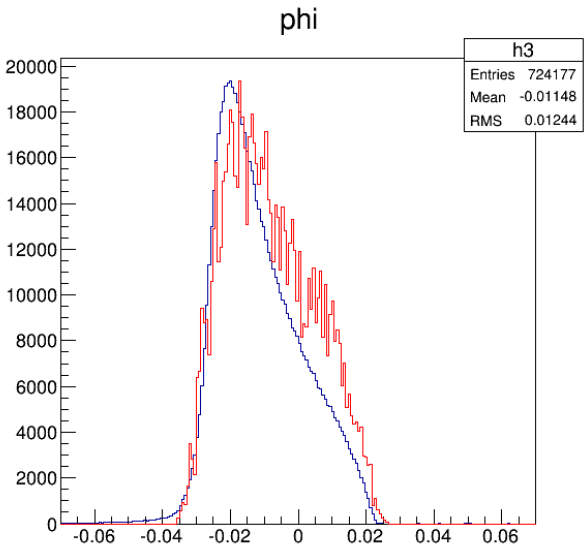
Two graphic cuts

Acceptance

1.706 GeV, 2.5T, transverse, dilution empty







Blue: data

Red: simulation

#4423 p0=1.0966 dilution run with empty target, rasters on

W ~ 1.4 GeV

Relative flat region

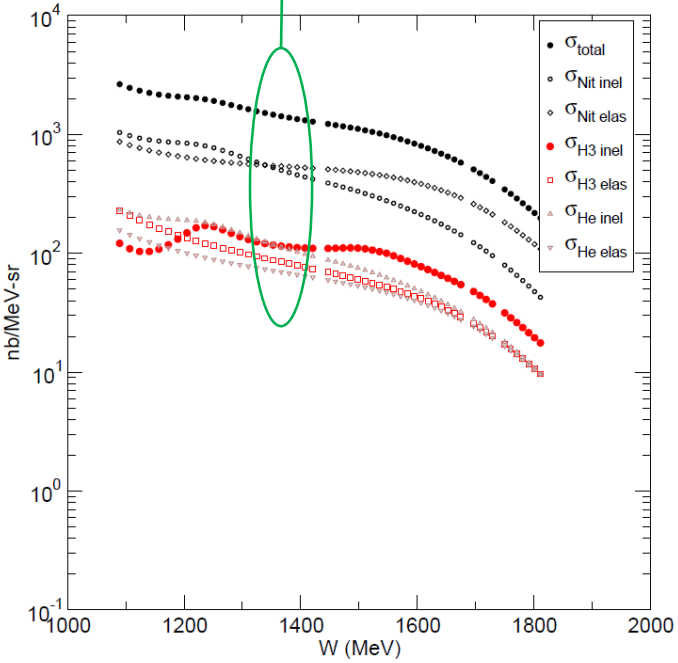


Figure 18: 1.7 GeV (2.5T) Cross section.