

simulation update

acceptance & yields

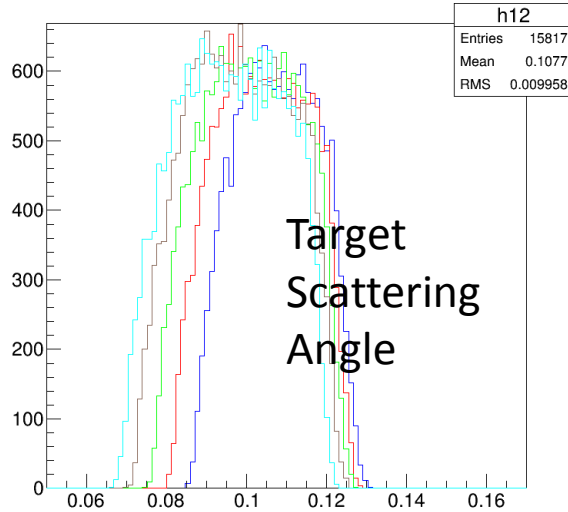
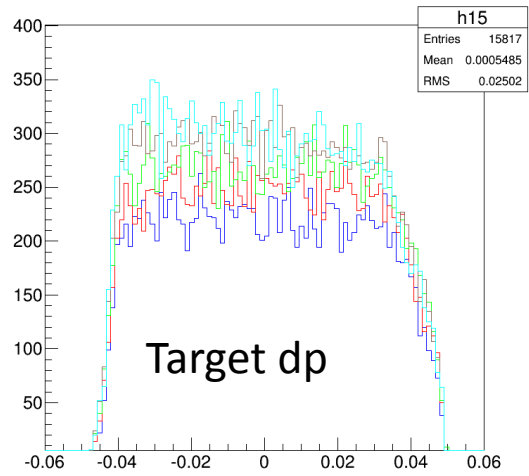
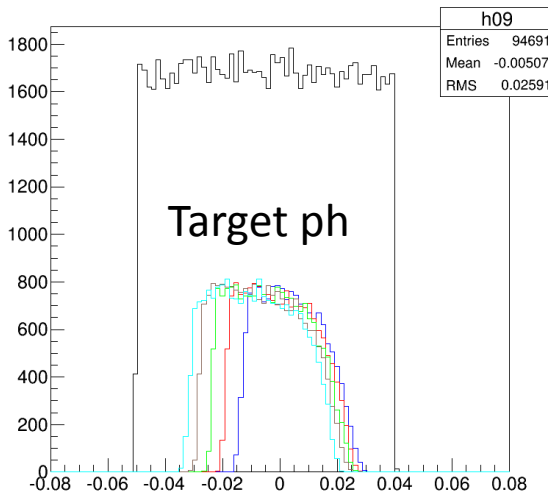
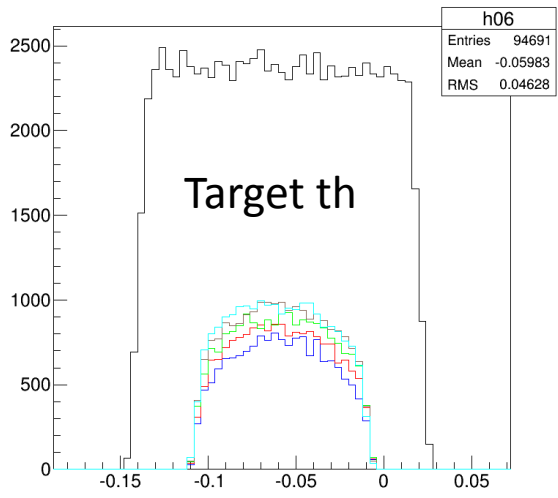
Jie Liu

06/10/2015

Last time

Acceptance & yields

➤ point beam in simulation: Along bpm x



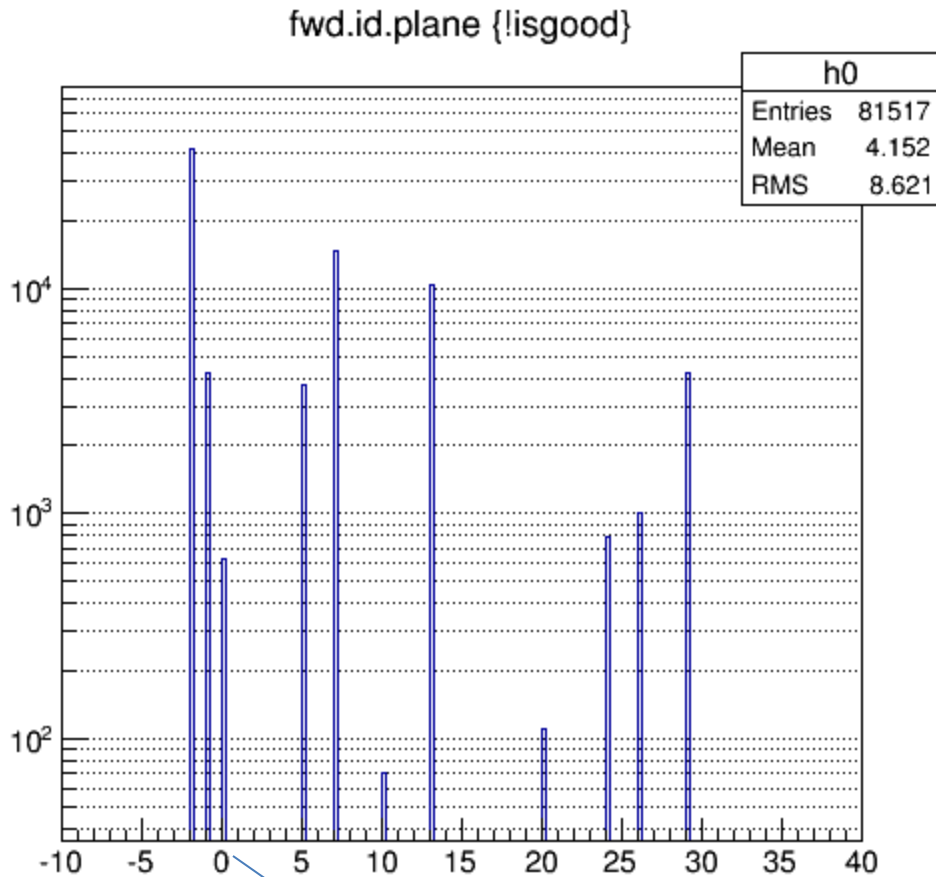
Settings:
Beam 2.2GeV
HRS 1.7GeV
Good septum
2.5T Trans
Production target

Point beam :
(-10, 0): Blue
(-5, 0): Red
(0, 0): Green
(5, 0): Brown
(10, 0): Cyan

Angle unit: Rad

Acceptance

- point beam (0, 0) in simulation: block by each endplane

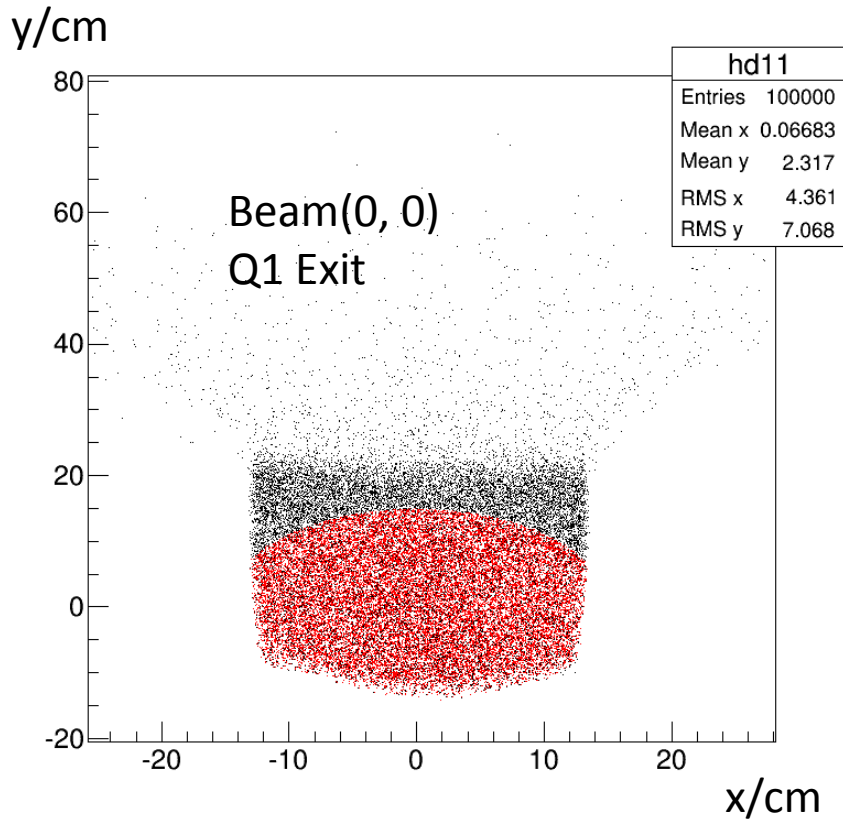


EndPlane	EndPlane ID
Collimator Entrance Face	-2
Collimator Exit Face	-1
Septum Entrance Plane	5
Septum Exit Plane	7
Q1 Entrance Plane	10
Q1 Exit Plane	13
Q2 Exit Plane	20
Dipole Exit Plane	24
Q3 Entrance Plane	26
Q3 Exit Plane	29

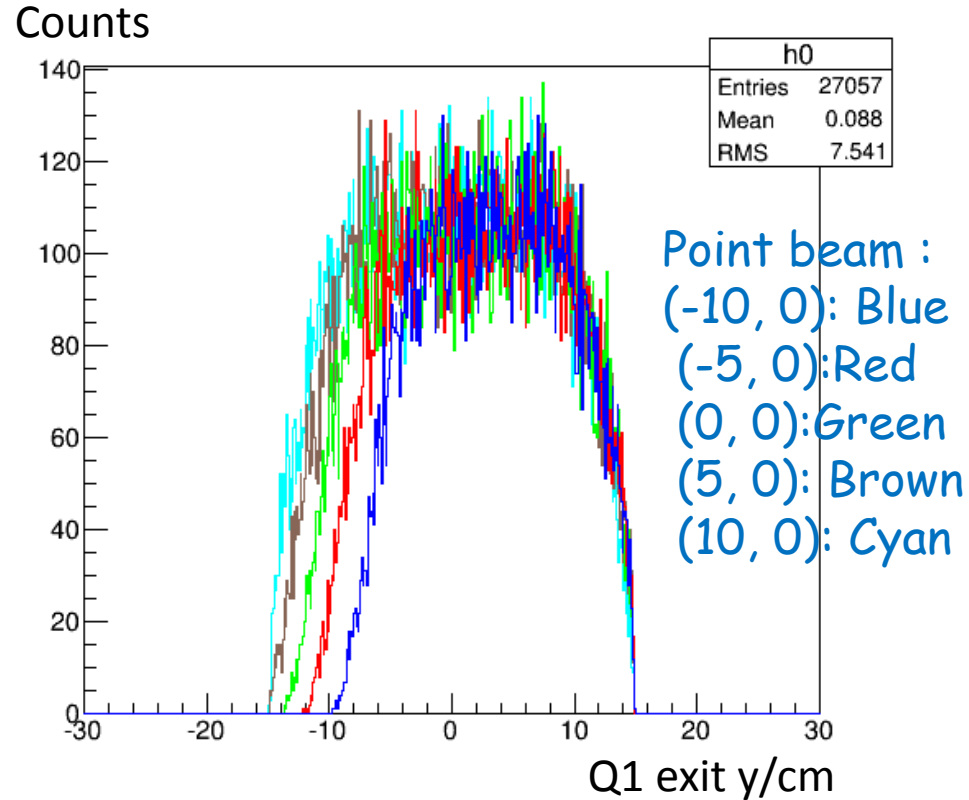
Id =0 (dp out of detector range because of radiation)

Acceptance

- Events Accepted by Q1 exit endplane



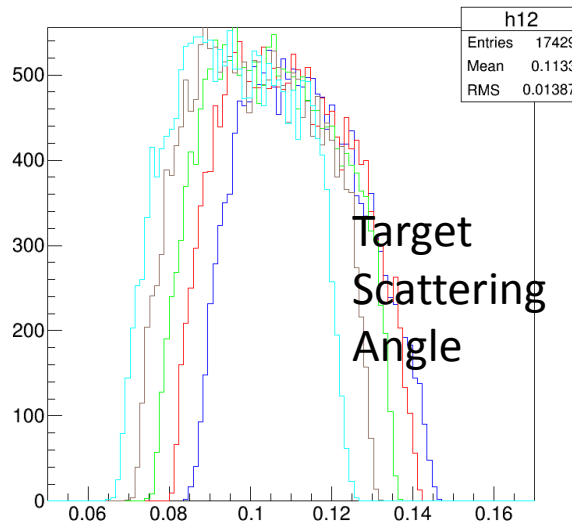
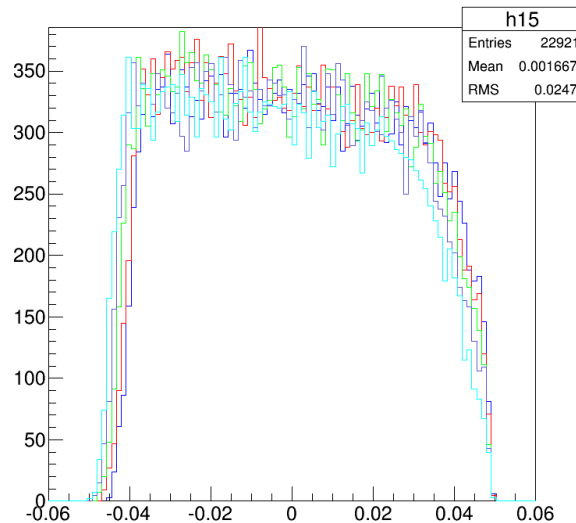
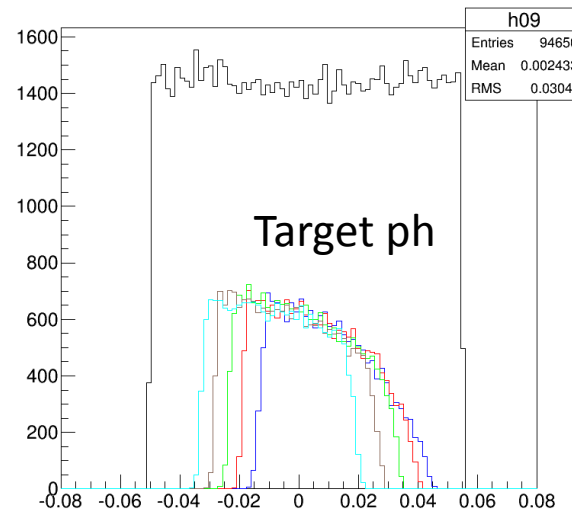
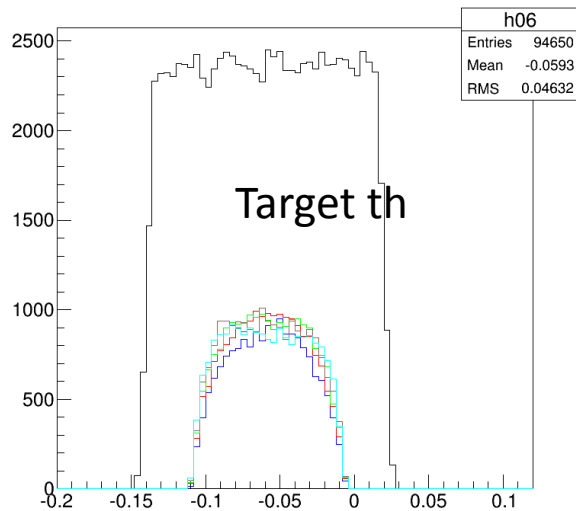
Black: arrived in Q1 entrance
Red: pass through this plane



Distribution of events at Q1 exit endplane
These events pass through Q1 exit aperture

Acceptance – remove Q1 exit aperture

➤ point beam in simulation: Along bpm x



Settings:
Beam 2.2GeV
HRS 1.7GeV
Good septum
2.5T Trans
Production target

Point beam :
(-10, 0): Blue
(-5, 0): Red
(0, 0): Green
(5, 0): Brown
(10, 0): Cyan

Angle unit: Rad

Acceptance & yields--along bpm y

Along x: bpm(x, y)/mm	(-10, 0)	(-5, 0)	(0, 0)	(5, 0)	(10, 0)
Acceptance Ratio (not weighted xs)	0.98	1.00	1.00	0.98	0.94
Yields Ratio (weighted xs)	0.99	0.96	1.00	0.94	0.94

Remove Q1 EXIT plane Aperture Cuts



Along x: bpm(x, y)/mm	(-10, 0)	(-5, 0)	(0, 0)	(5, 0)	(10, 0)
Acceptance Ratio (not weighted xs)	0.99	0.99	1.00	0.99	0.95
Yields Ratio (weighted xs)	1.00	0.98	1.00	1.00	1.00

Acceptance & yields--along bpm x

Along x: bpm(x, y)/mm	(-10, 0)	(-5, 0)	(0, 0)	(5, 0)	(10, 0)
Acceptance Ratio (not weighted xs)	0.82	0.92	1.00	1.07	1.09
Yields Ratio (weighted xs)	0.66	0.82	1.00	1.16	1.30

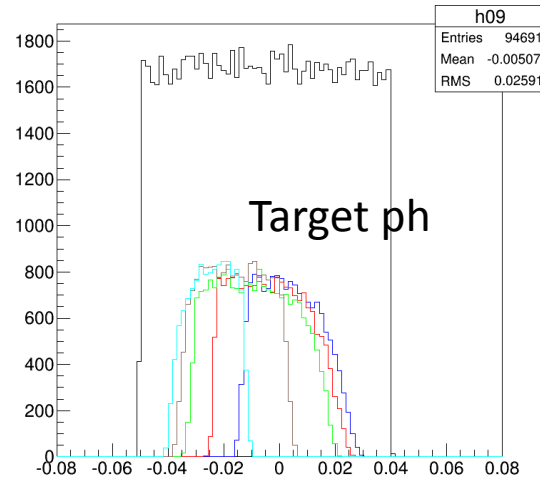
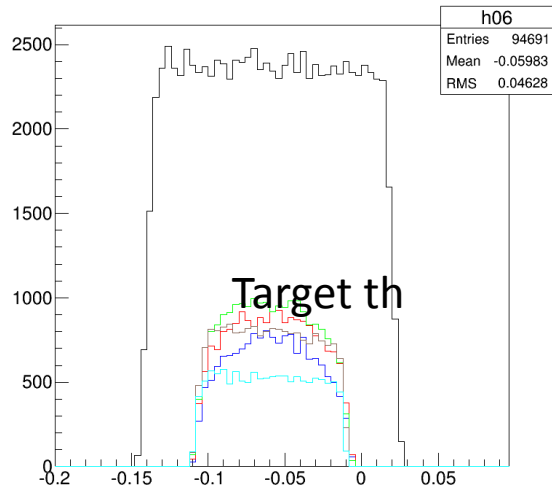
Remove Q1 EXIT plane Aperture Cuts



Along x: bpm(x, y)/mm	(-10, 0)	(-5, 0)	(0, 0)	(5, 0)	(10, 0)
Acceptance Ratio (not weighted xs)	0.87	0.97	1.00	1.00	0.98
Yields Ratio (weighted xs)	0.66	0.89	1.00	1.10	1.41

Acceptance – extended to x=30mm

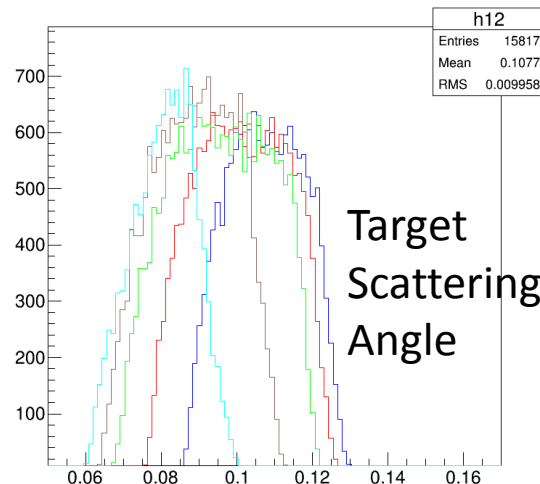
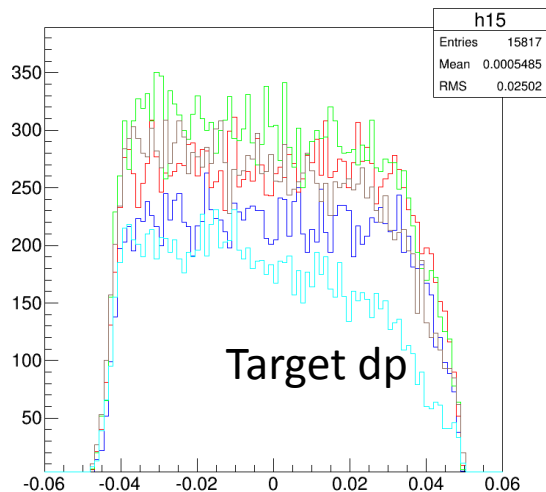
➤ point beam in simulation: Along bpm x



Settings:
 Beam 2.2GeV
 HRS 1.7GeV
 Good septum
 2.5T Trans
 Production target

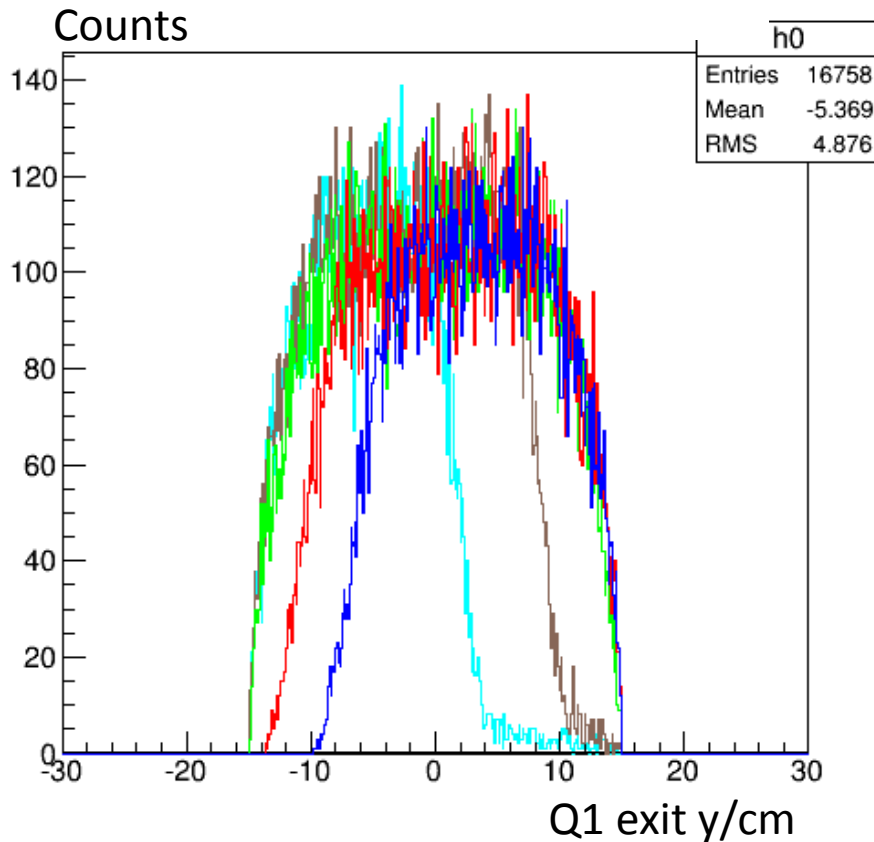
Point beam :
 (-10, 0): Blue
 (0, 0): Red
 (10, 0): Green
 (20, 0): Brown
 (30, 0): Cyan

Angle unit: Rad

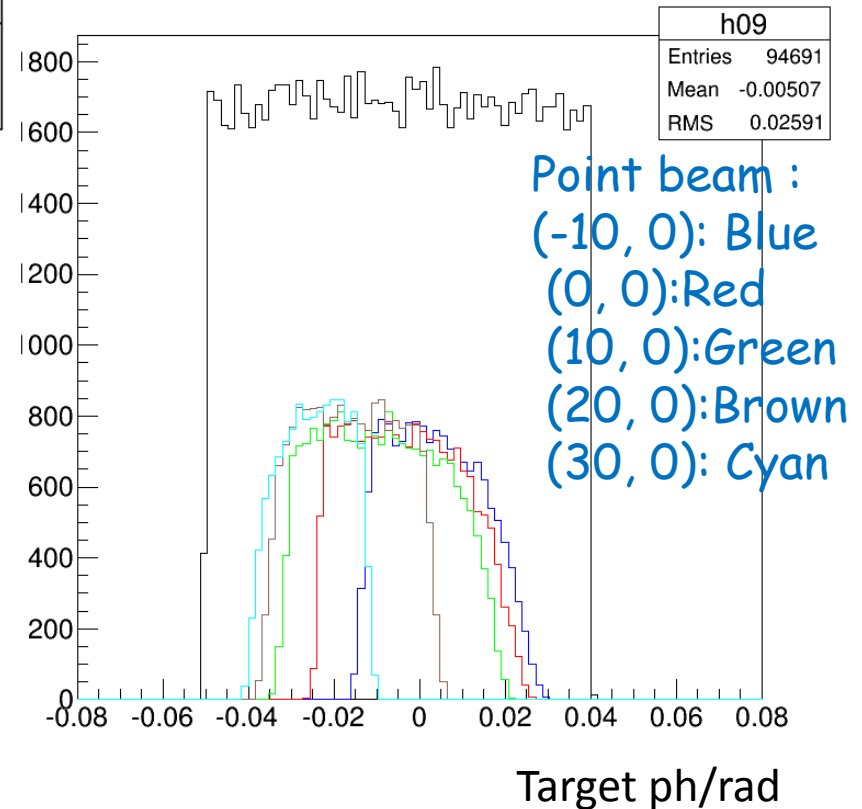


Acceptance

- Accepted by Q1 exit---extended to $x=30\text{mm}$



Distribution of events at Q1 exit plane
These events pass through Q1 exit aperture



Target plane ph distribution

Acceptance & yields--along bpm x

Along x: bpm(x, y)/mm	(-10, 0)	(0, 0)	(10, 0)	(20, 0)	(30, 0)
Acceptance Ratio (not weighted xs)	0.75	0.92	1.00	0.89	0.60
Yields Ratio (weighted xs)	0.50	0.77	1.00	1.03	0.75

Remove Q1 EXIT plane Aperture Cuts



Along x: bpm(x, y)/mm	(-10, 0)	(0, 0)	(10, 0)	(20, 0)	(30, 0)
Acceptance Ratio (not weighted xs)	0.88	1.02	1.00	0.95	0.86
Yields Ratio (weighted xs)	0.47	0.71	1.00	1.12	1.19

Summary

- The target move $\sim 10\text{mm}$ to have larger acceptance at Q1 exit endplane
- Any other suggestions?

Current Endplane & Aperture cut

EndPlane	Aperture Cut
Collimator (local dump) Entrance Face	$46 < \text{abs}(x) < 87\text{mm}; -43 < y < 50\text{mm}$
Collimator (local dump) Exit Face	$58 < \text{abs}(x) < 106\text{mm}; -53 < y < 58\text{mm}$
Septum Entrance Plane	$8.4 < x < 38.8\text{cm}; \text{abs}(y) < 9.7\text{cm}$
Septum Exit Plane	$8.4 < x < 38.8\text{cm}; \text{abs}(y) < 9.7\text{cm}$
Q1 Entrance Plane	$R < 14.92\text{cm}$
Q1 Exit Plane	$R < 14.92\text{cm}$
Q2 Exit Plane	Elliptical: $\frac{(x - 1316.53)/259.81/\cos(30)}{2} + \frac{(y/300)}{2} < 1$
Dipole Exit Plane	$-46.19\text{cm} < x < 46.19\text{cm}, y < -0.0161 * x + 12.5$
Q3 Entrance Plane	$R < 30\text{cm}$
Q3 Exit Plane	$R < 30\text{cm}$