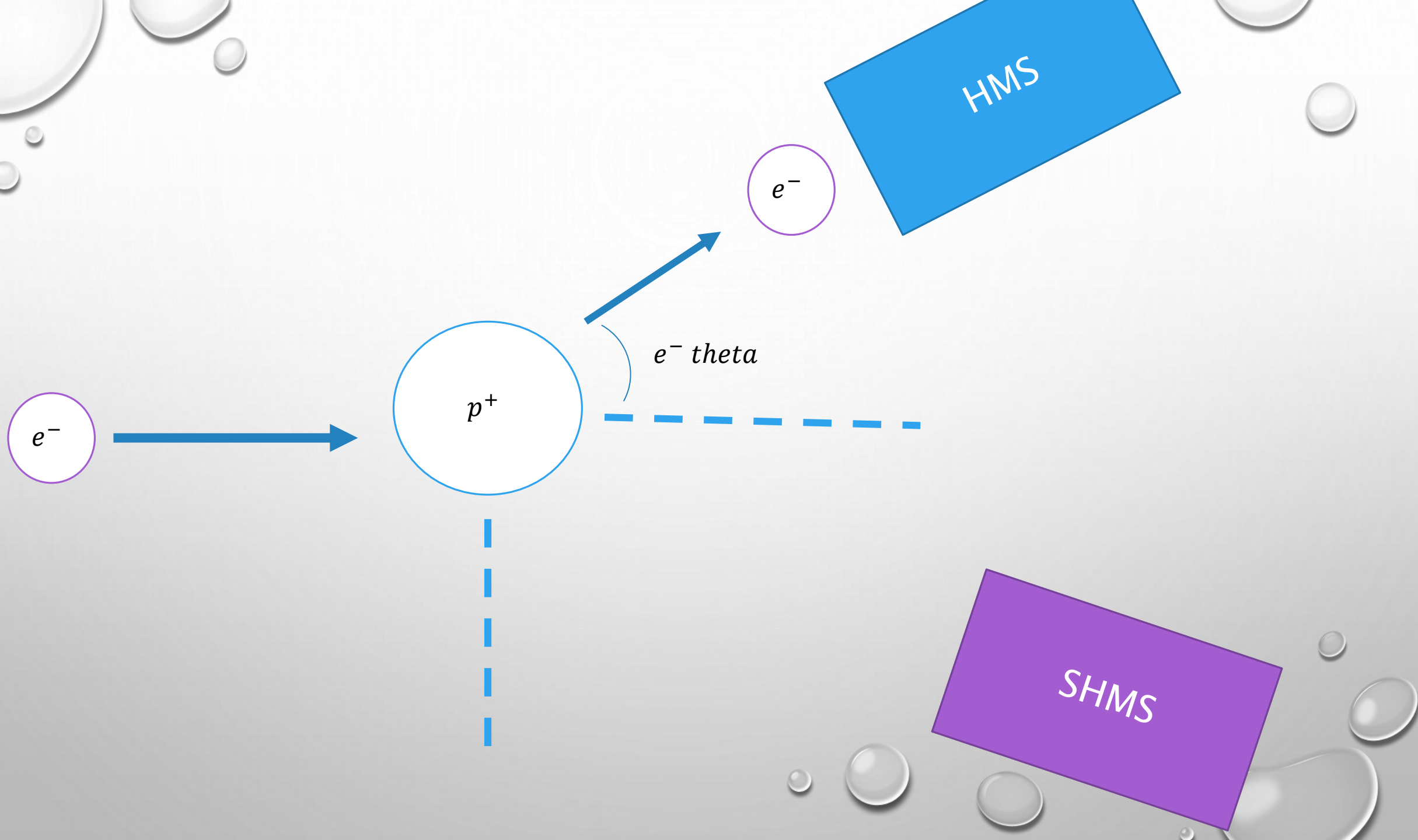
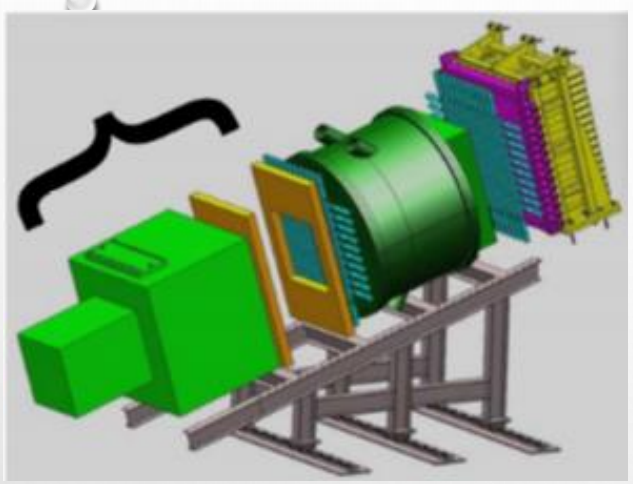
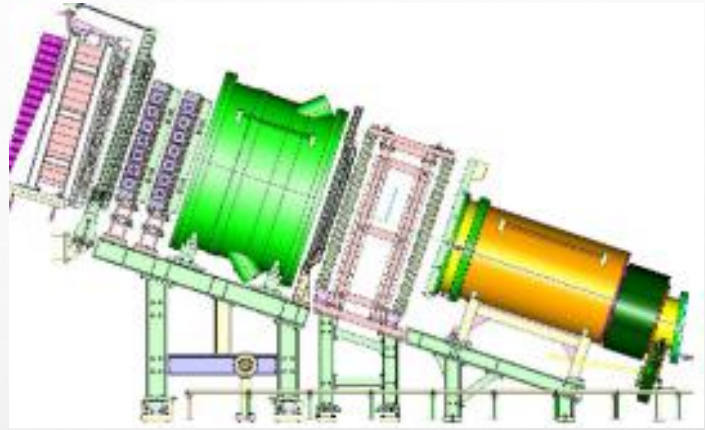
PRESENTATION

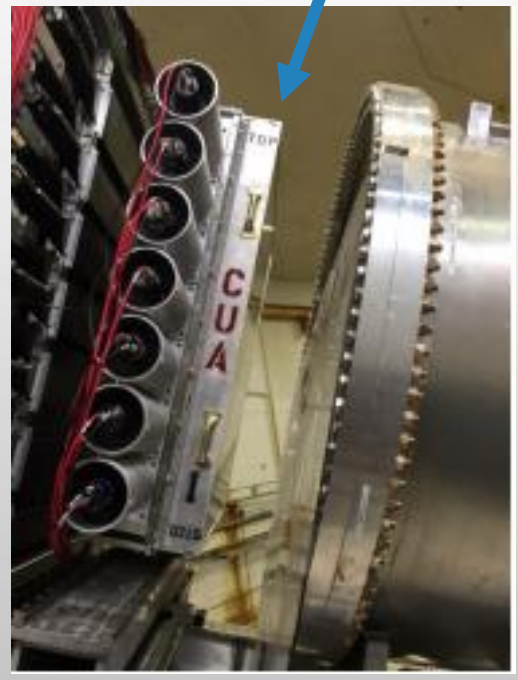

HMS
e^-
e^- theta
p^+
e^-
SHMS

GAS CHERKONOV DETECTOR

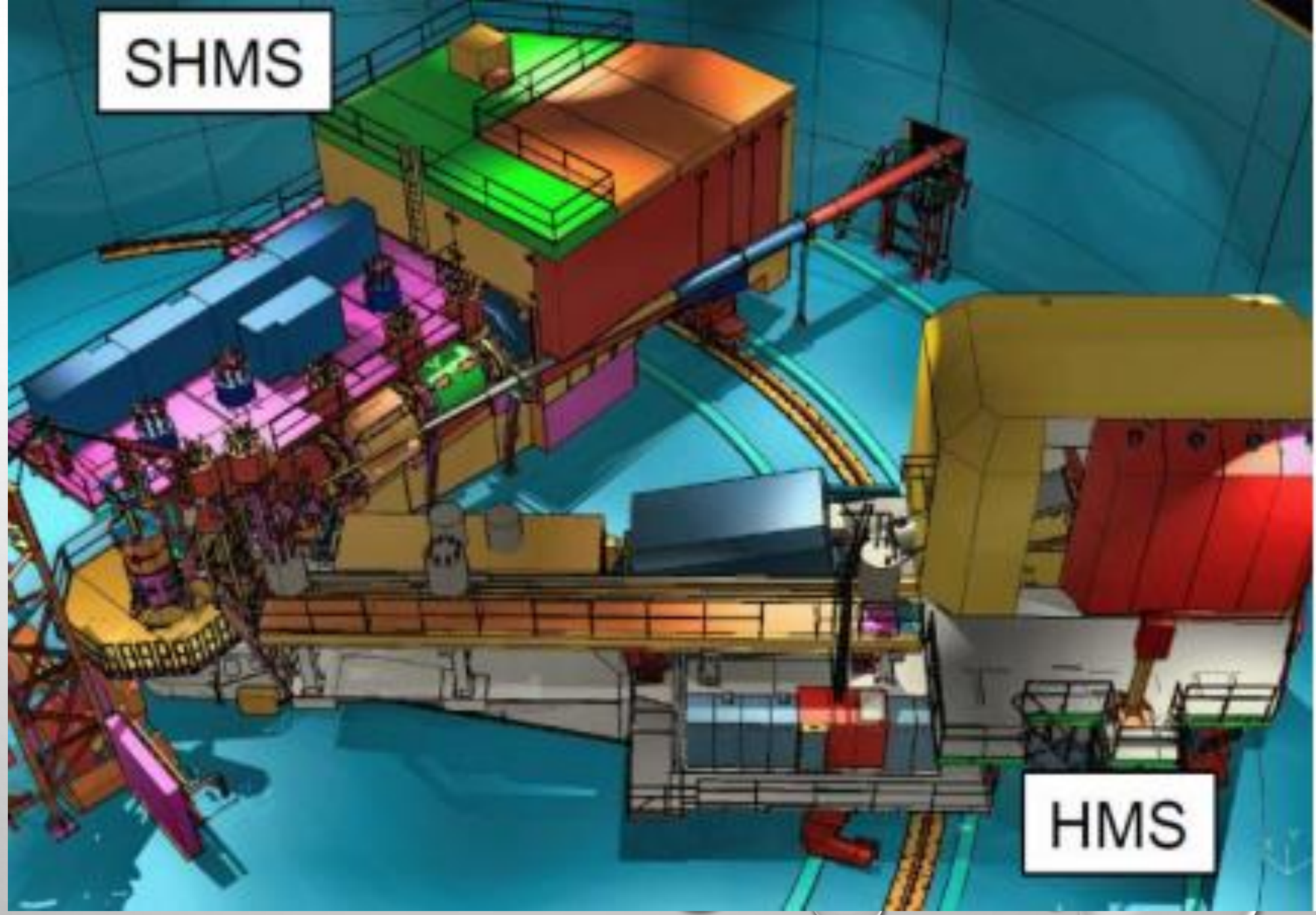


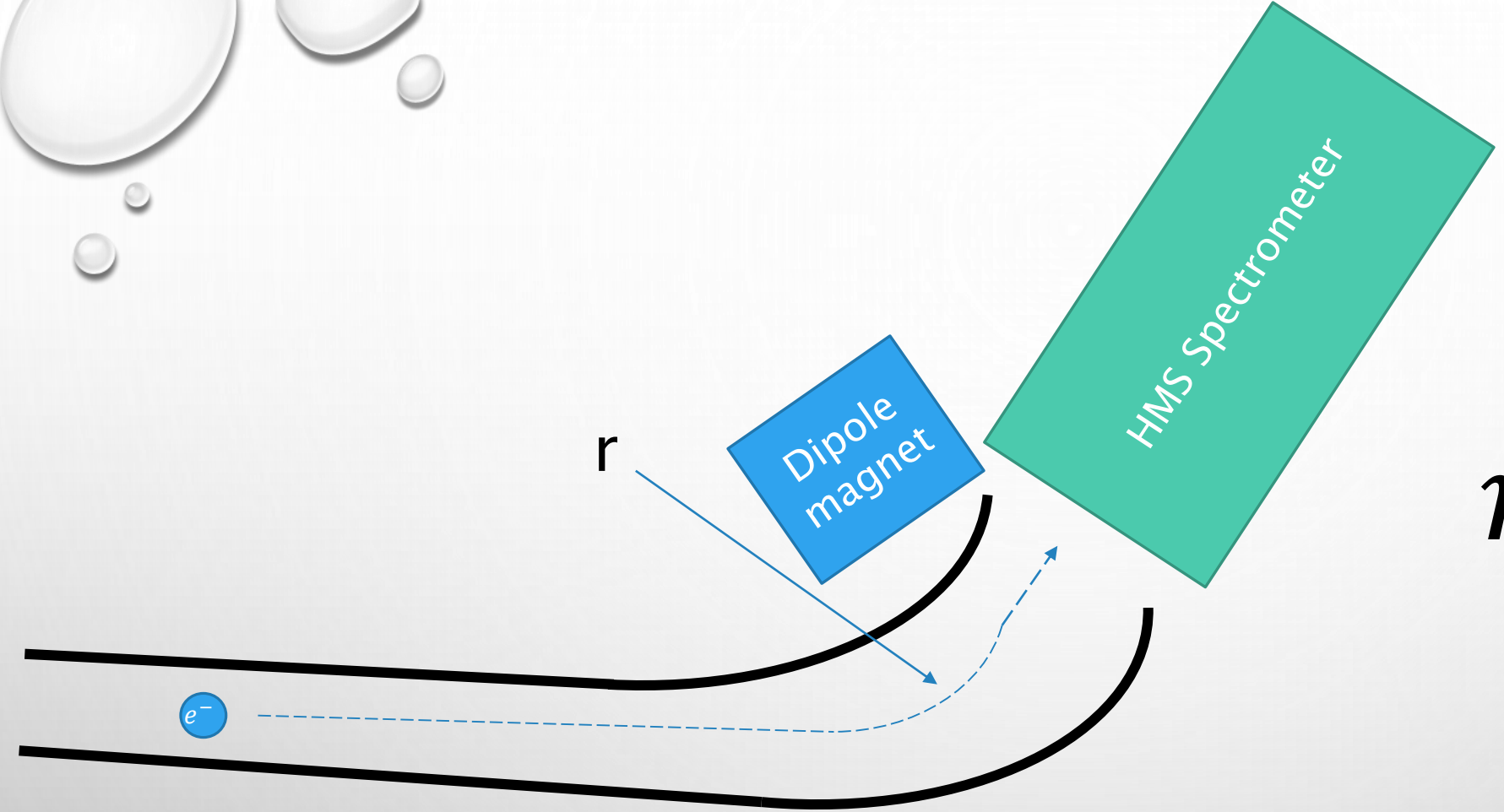


Aerogel tray



Hall C

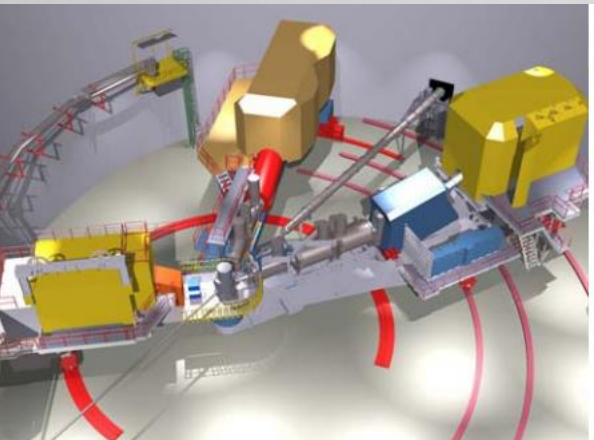




$$r = \frac{mv}{qB}$$

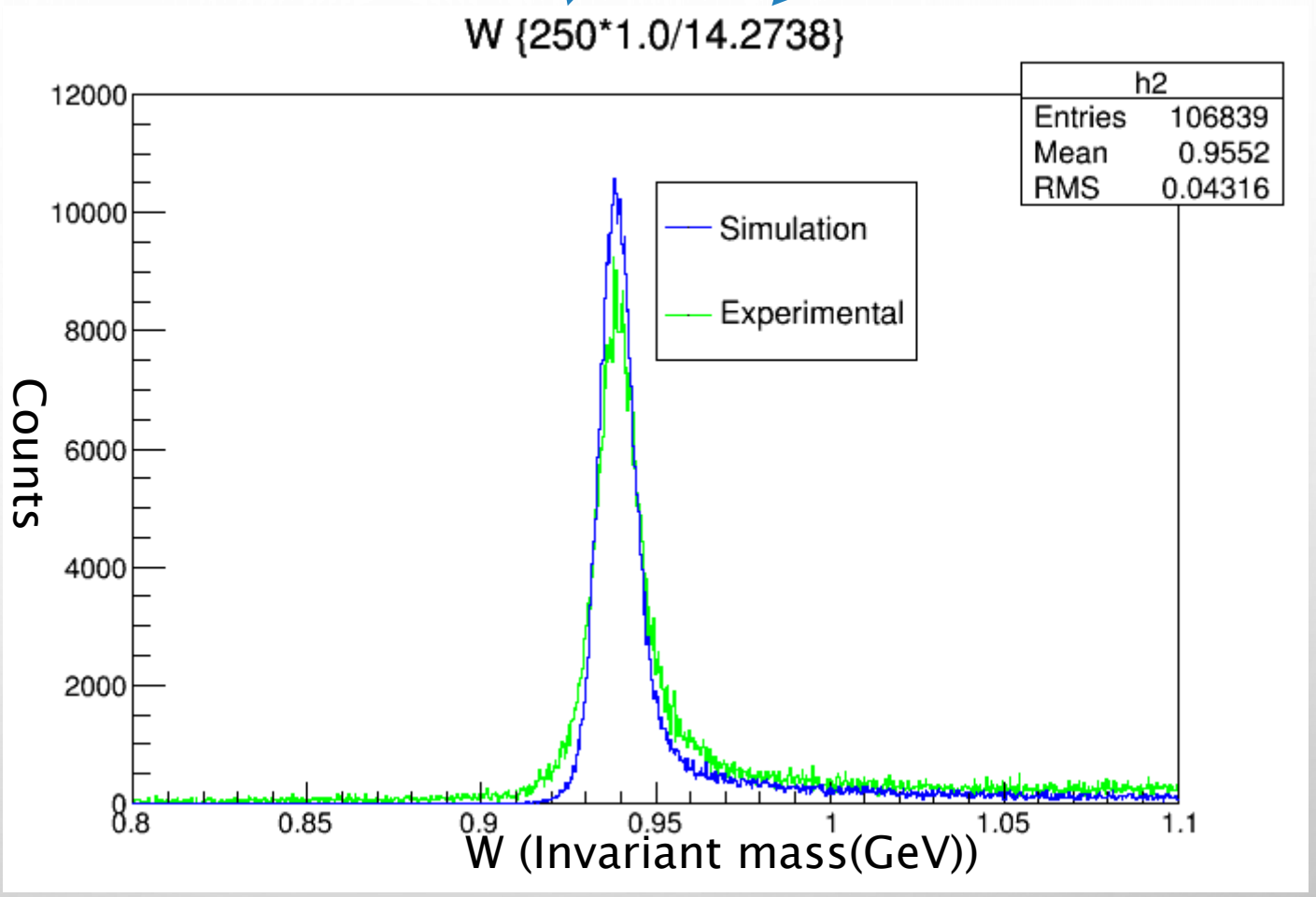
Electric Charge

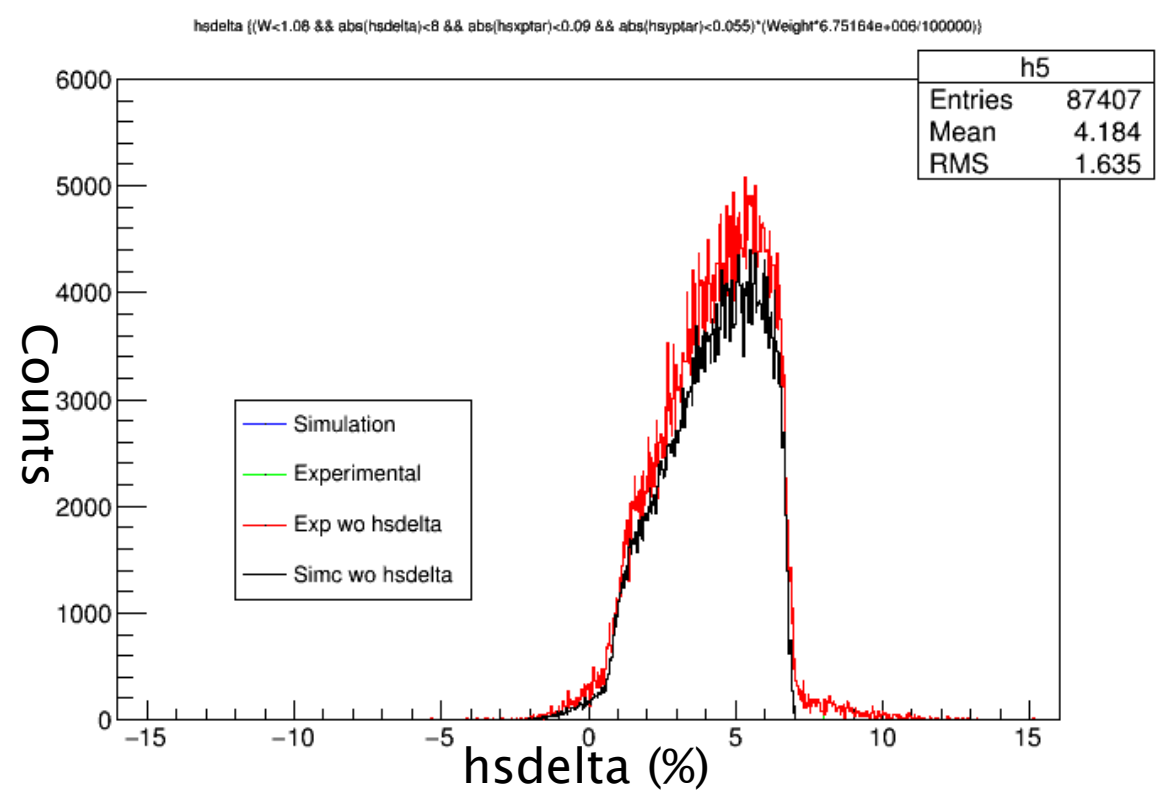
Electric Field

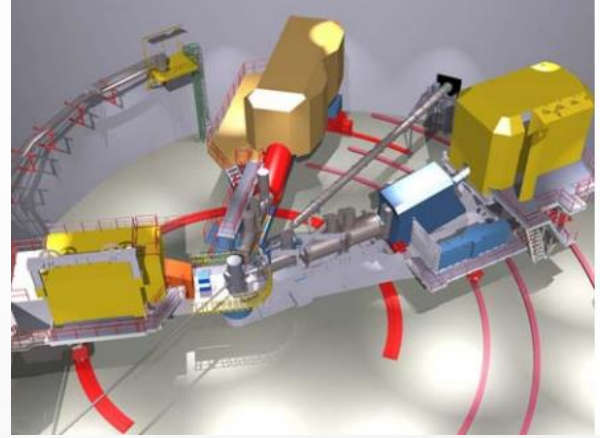


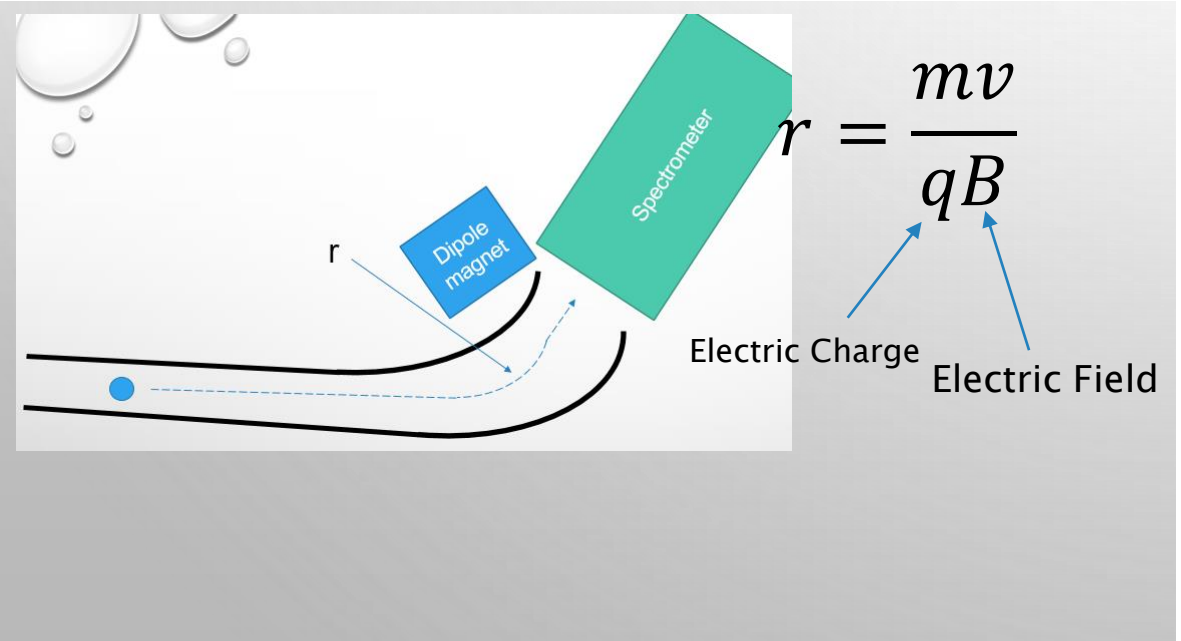
47339

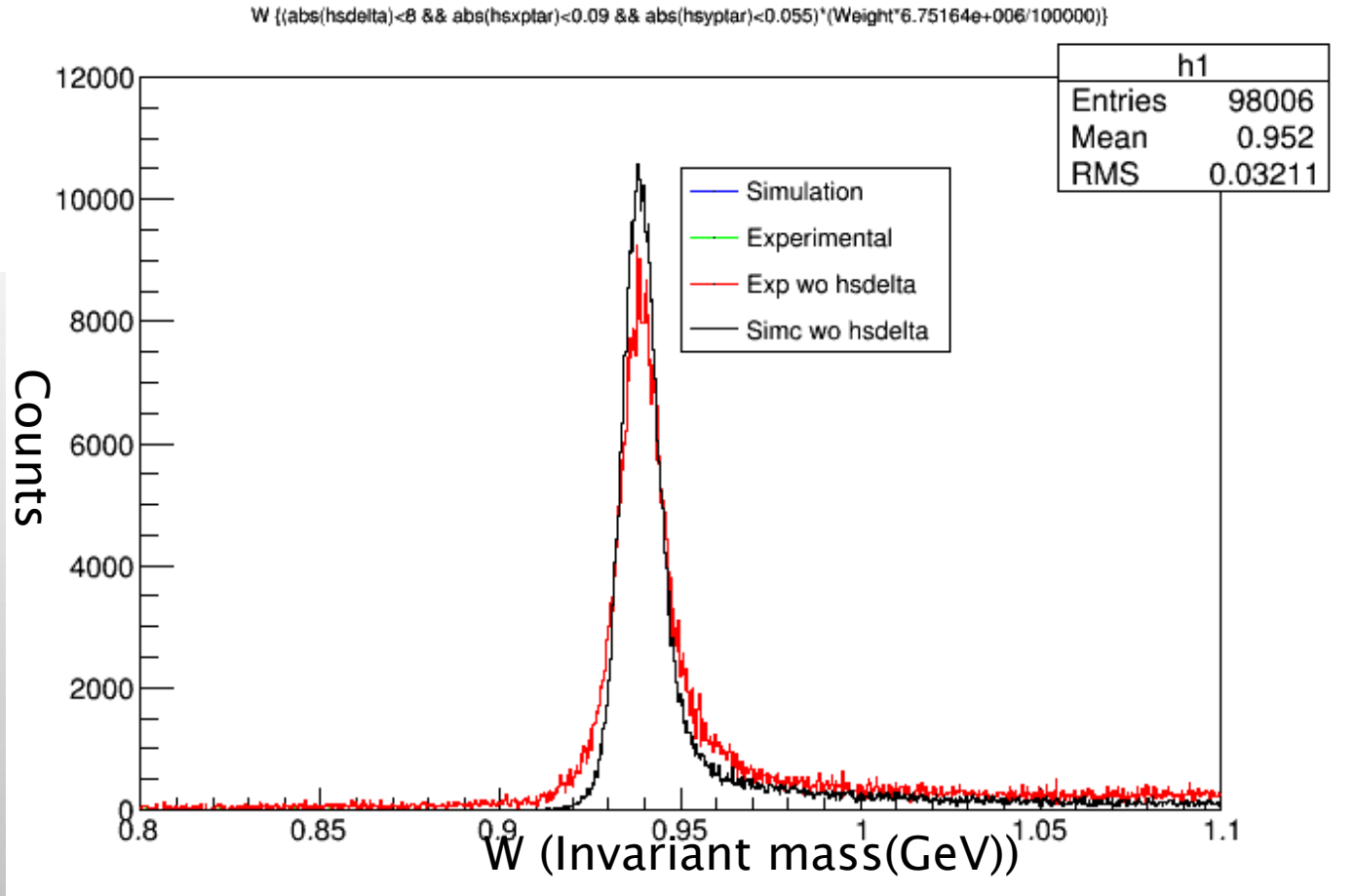
Input values	
Run	47339
Beam Energy	5246.5
e^- p	4494.4
e^- *theta*	12.0

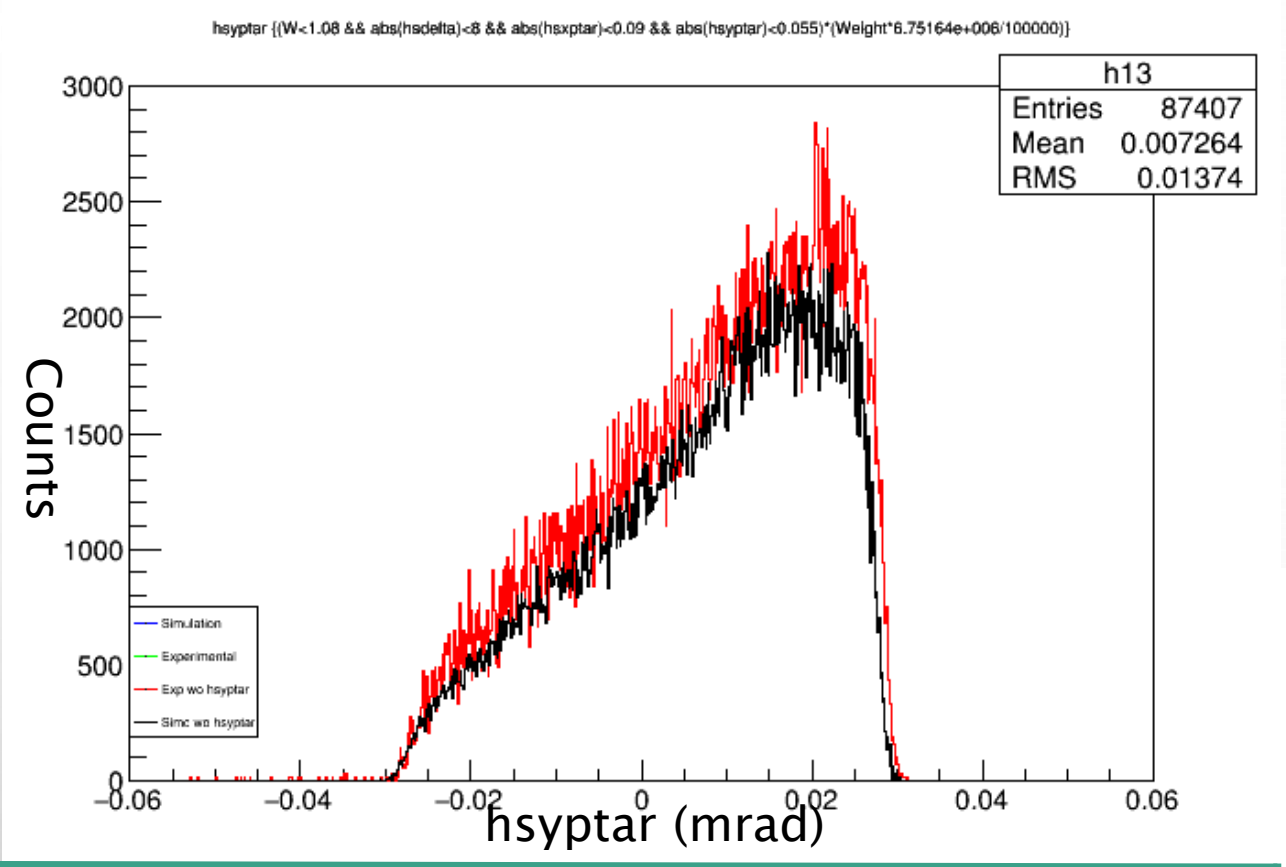


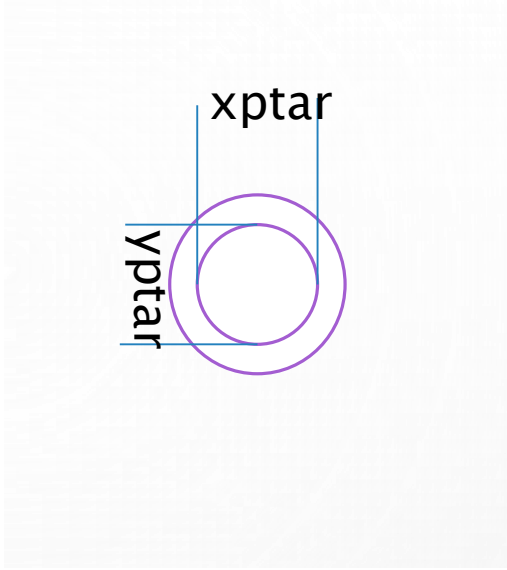

hsdelta {(W<1.08 && abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055)*(Weight*6.75164e+006/100000)}
h5
Entries 87407
Mean 4.184
RMS 1.635
Simulation
Experimental
Exp wo hsdelta
Simc wo hsdelta
Counts
hsdelta (%)

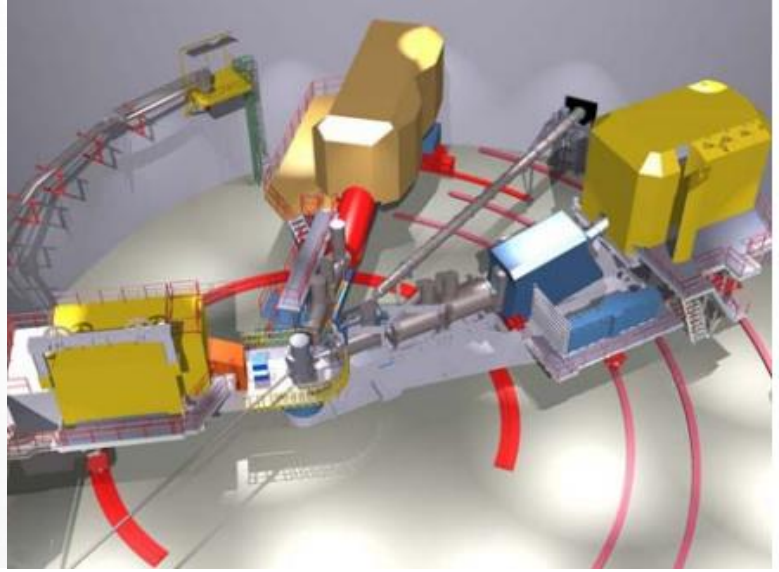


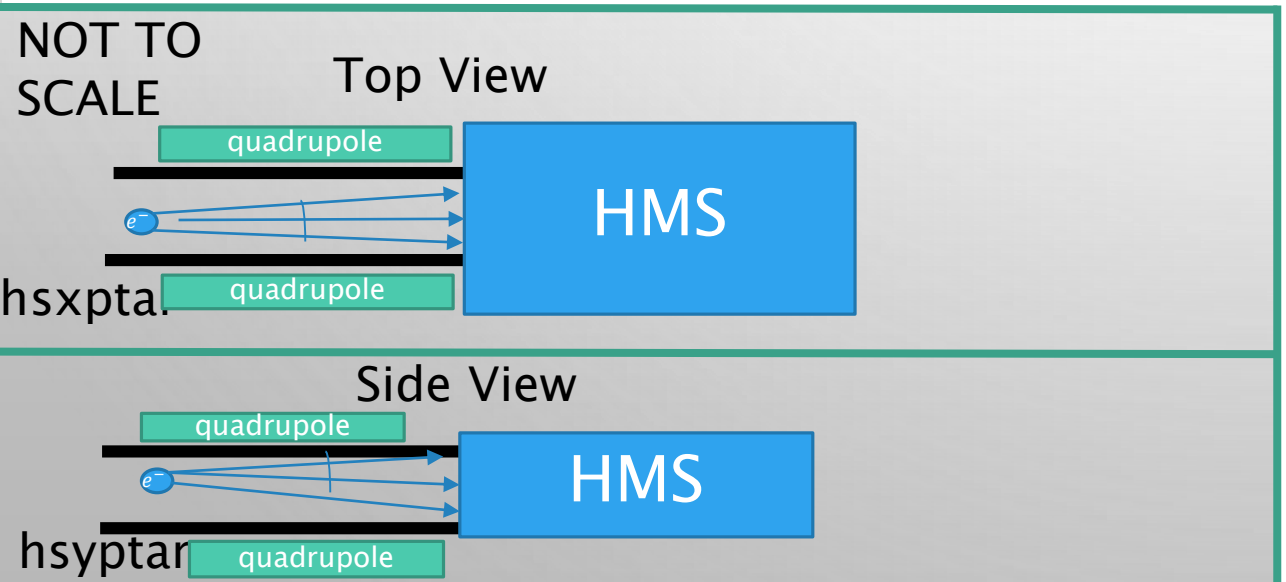

Spectrometer
Dipole magnet
r
$r = \frac{mv}{qB}$
Electric Charge
Electric Field

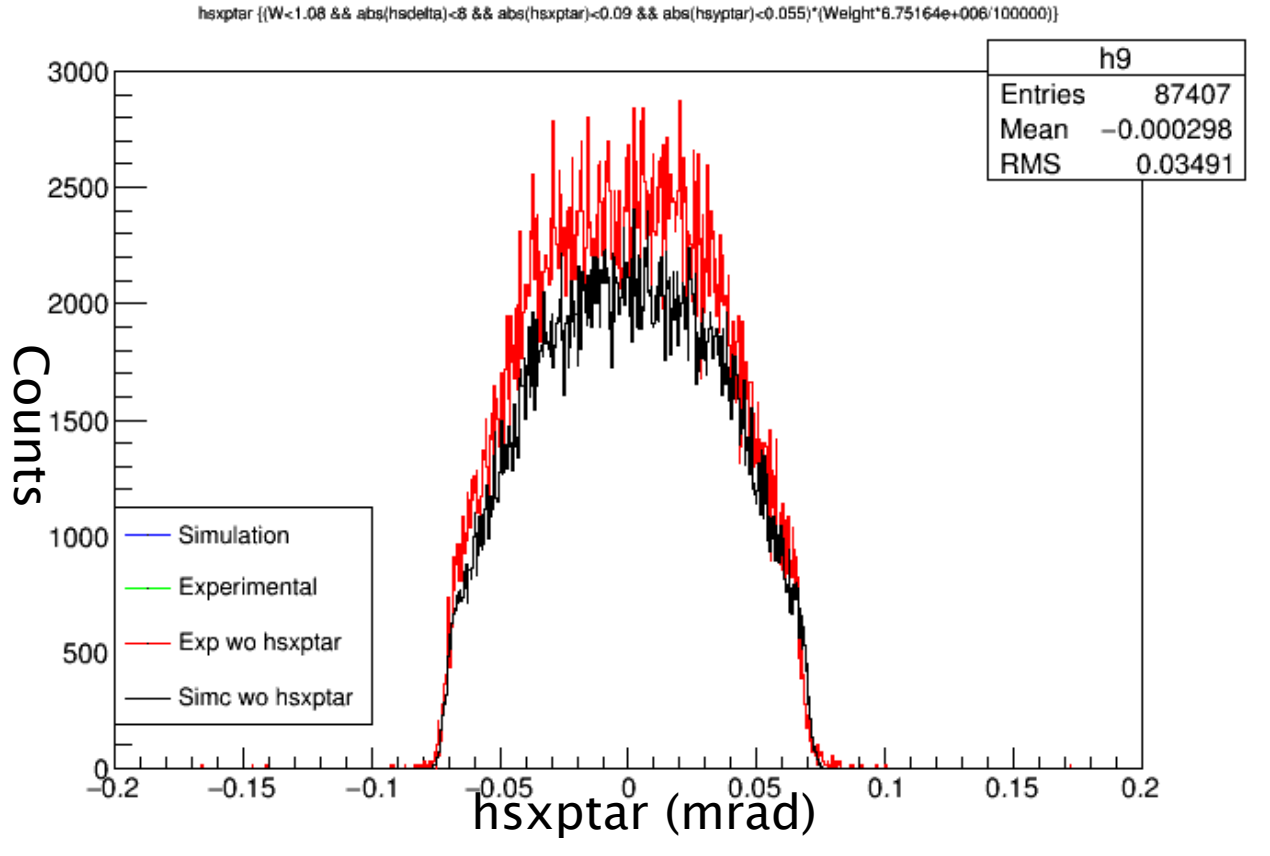

W {(abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055)*(Weight*6.75164e+006/100000)}
h1
Entries 98006
Mean 0.952
RMS 0.03211
Simulation
Experimental
Exp wo hsdelta
Simc wo hsdelta
Counts
W (Invariant mass(GeV))

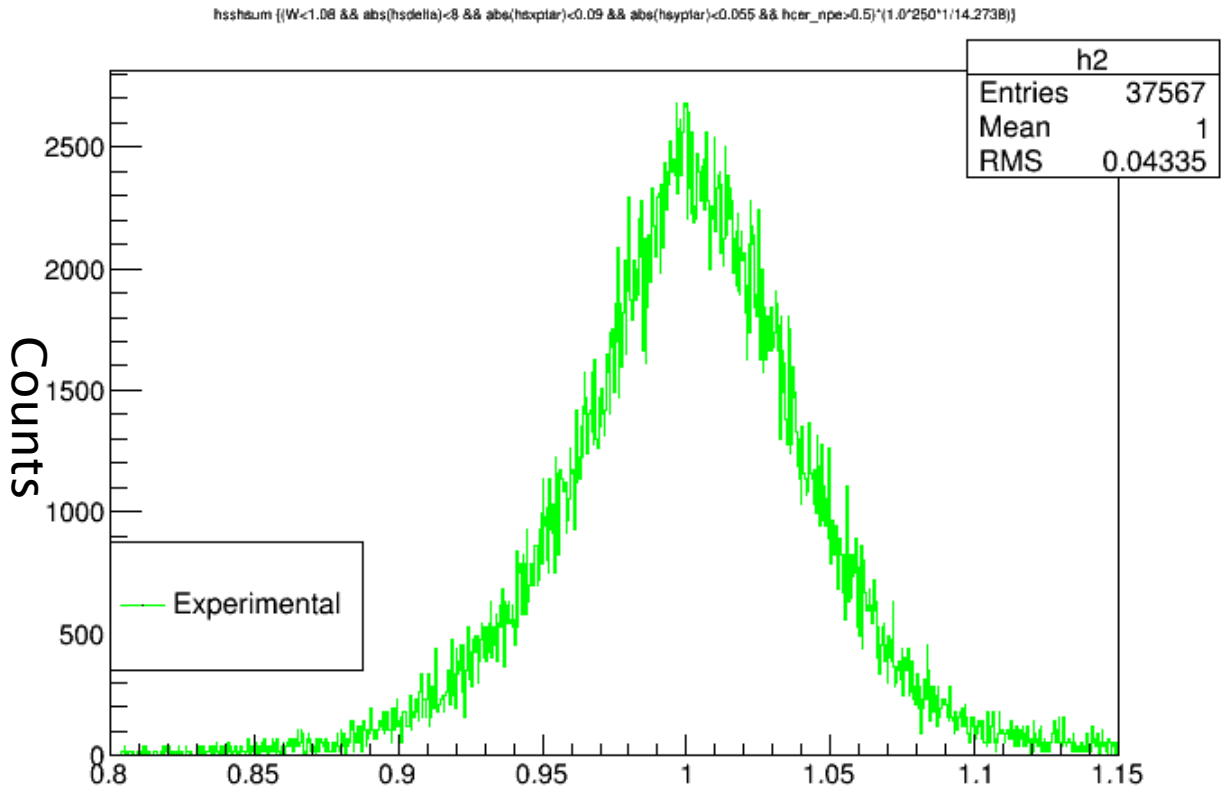

hsyptar {(W<1.08 && abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055)*(Weight*6.75164e+006/100000)}
h13
Entries 87407
Mean 0.007264
RMS 0.01374
Counts
hsyptar (mrad)
Simulation
Experimental
Exp wo hsyptar
Simc wo hsyptar

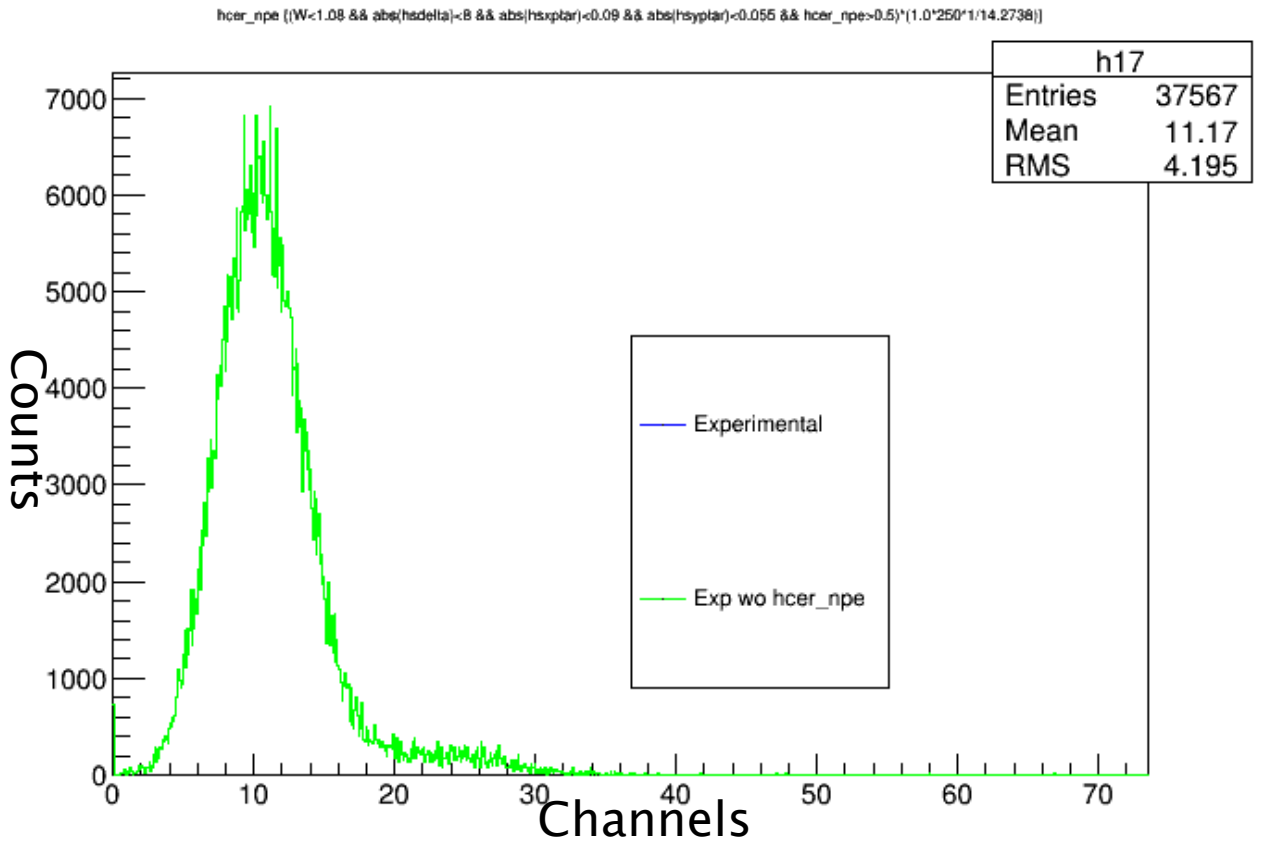

xptar
yptar



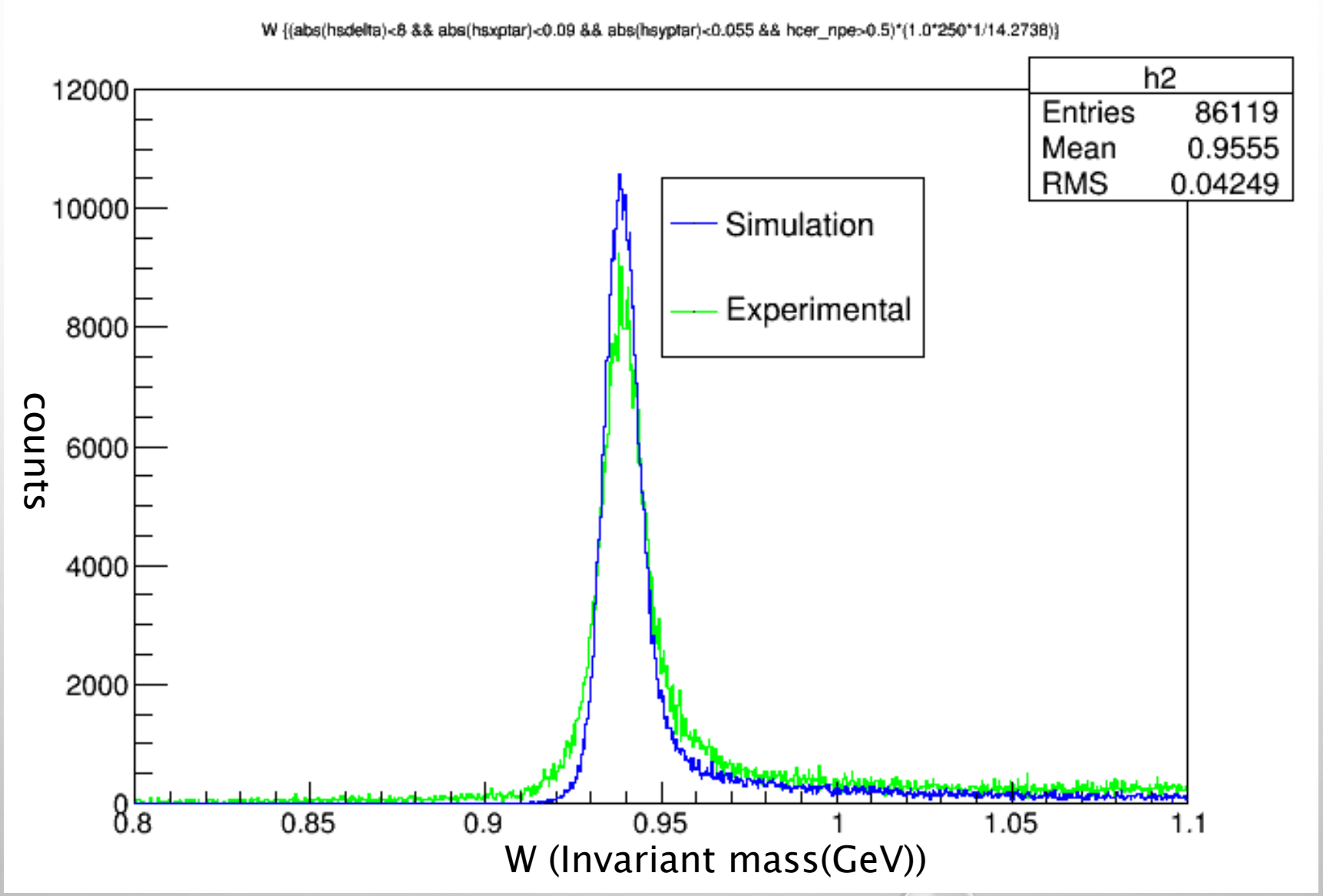

NOT TO SCALE
Top View
quadrupole
HMS
quadrupole
hsxptar
Side View
quadrupole
HMS
quadrupole
hsyptar


hsxptar {(W<1.08 && abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055)*(Weight*6.75164e+006/100000)}
h9
Entries 87407
Mean −0.000298
RMS 0.03491
Counts
hsxptar (mrad)
Simulation
Experimental
Exp wo hsxptar
Simc wo hsxptar


hssheum {(W<1.08 && abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && hcer_npe>0.5)*(1.0*250*1/14.2738)}
h2
Entries 37567
Mean 1
RMS 0.04335
Counts
Experimental


hcer_npe {(W<1.08 && abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && hcer_npe>0.5)*(1.0*250*1/14.2738)}
h17
Entries 37567
Mean 11.17
RMS 4.195
Counts
Channels
Experimental
Exp wo hcer_npe

ALL CUTS APPLIED



Input values	
Run	47339
Beam Energy	5246.5
e^- p	4494.4
e^- *theta*	12.0

Input values	
Run	47345
Beam Energy	5246.4
e^- p	4494.2
e^- theta	14.0

Input values	
Run	47350
Beam Energy	5246.4
e^- p	3724.4
e^- *theta*	22.0

Input values	
Run	47347
Beam Energy	5246.4
e^- p	43724.4
e^- thet	19.985

R-VALUE

Uncertainty:

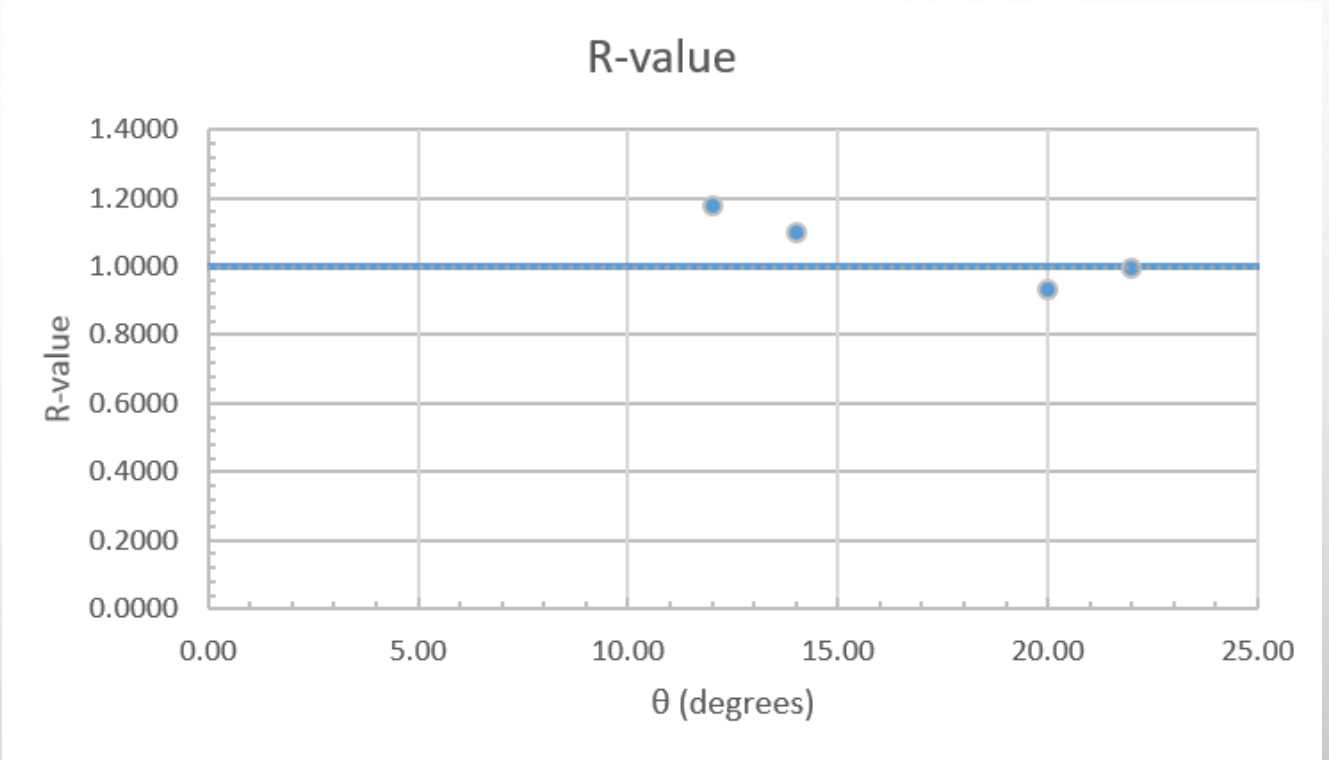
N=# of events

$$\delta y^2 = \sum_i (\frac{dy}{di})^2 \delta i^2$$

$$\frac{\delta y}{y} = \sqrt{N}/N$$

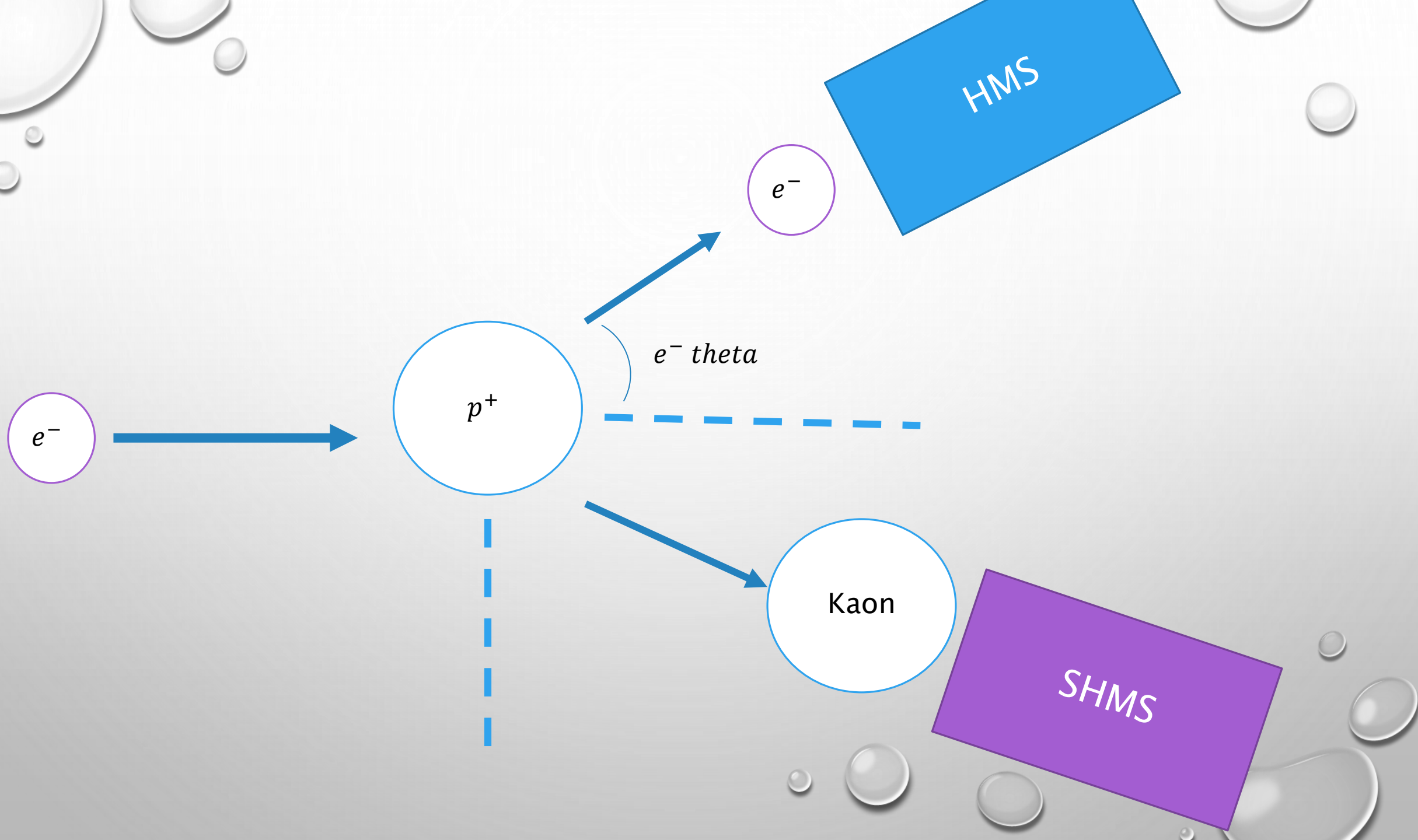
$$\delta R = R * \sqrt{(\frac{\delta Yd}{Yd})^2 + (\frac{\delta Ydmc}{Ydmc})^2}$$

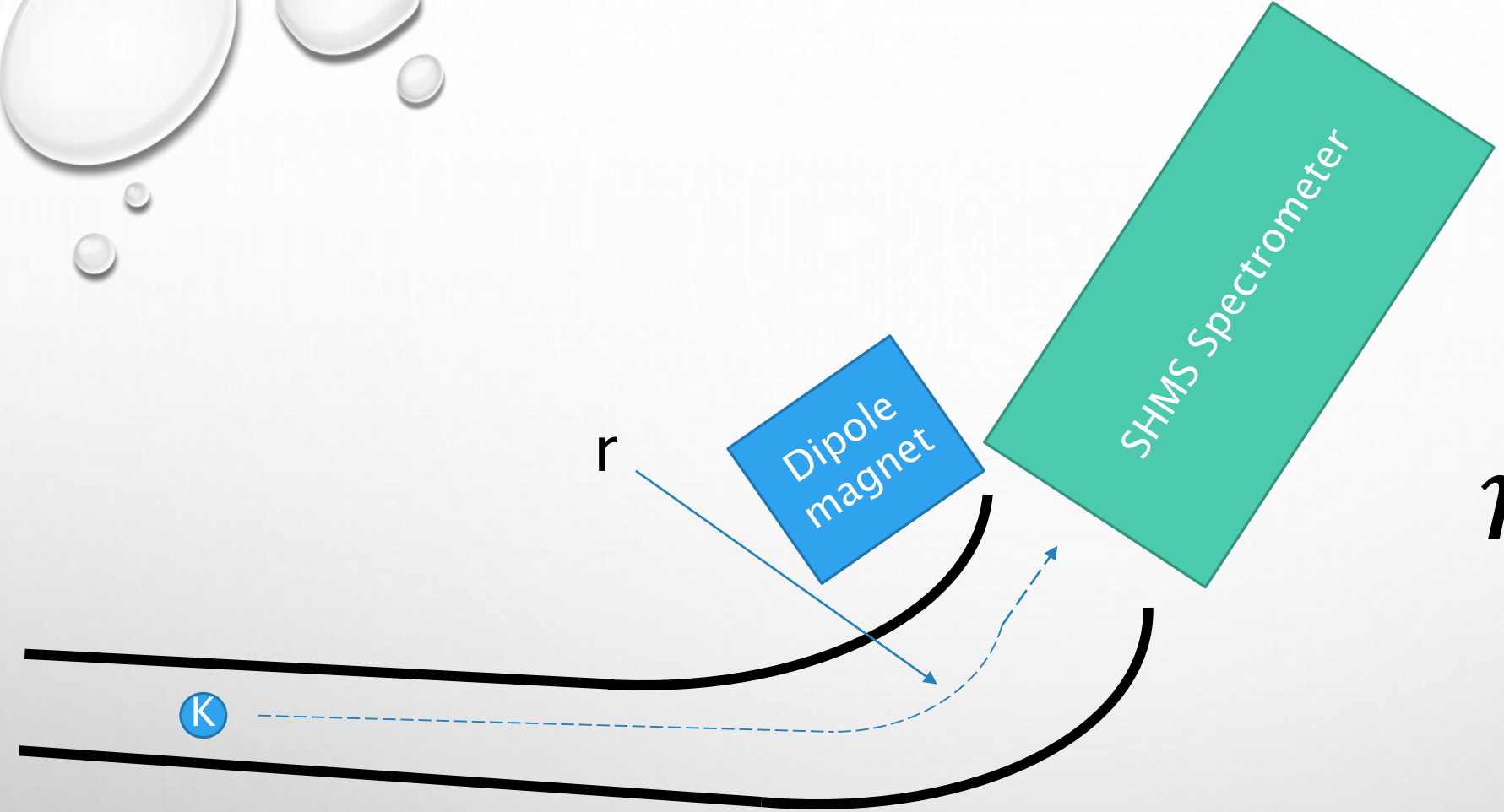
Experimental Y Simulation Y



		n^1/2/n	()^2	+	square root		times r
47339	exp	0.005159371	2.66191E-05	3.80598E-05	0.006169		0.007262
	sim	0.003382415	1.14407E-05				
37345	exp	0.004943594	2.44391E-05	3.56281E-05	0.005969		0.006556
	sim	0.003344987	1.11889E-05				
47347	exp	0.006616281	4.37752E-05	5.65829E-05	0.007522		0.007001
	sim	0.003578785	1.28077E-05				
47350	exp	0.005116043	2.61739E-05	3.7404E-05	0.006116		0.006079
	sim	0.003351142	1.12302E-05				

Kaon production analysis


HMS
e^-
e^- theta
e^-
p^+
Kaon
SHMS



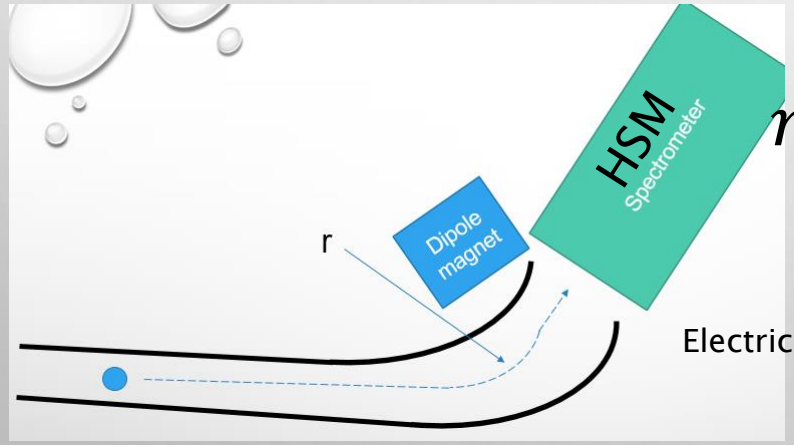
$$r = \frac{mv}{qB}$$

Electric Charge

Electric Field

Q2 1.7 GEV RUN

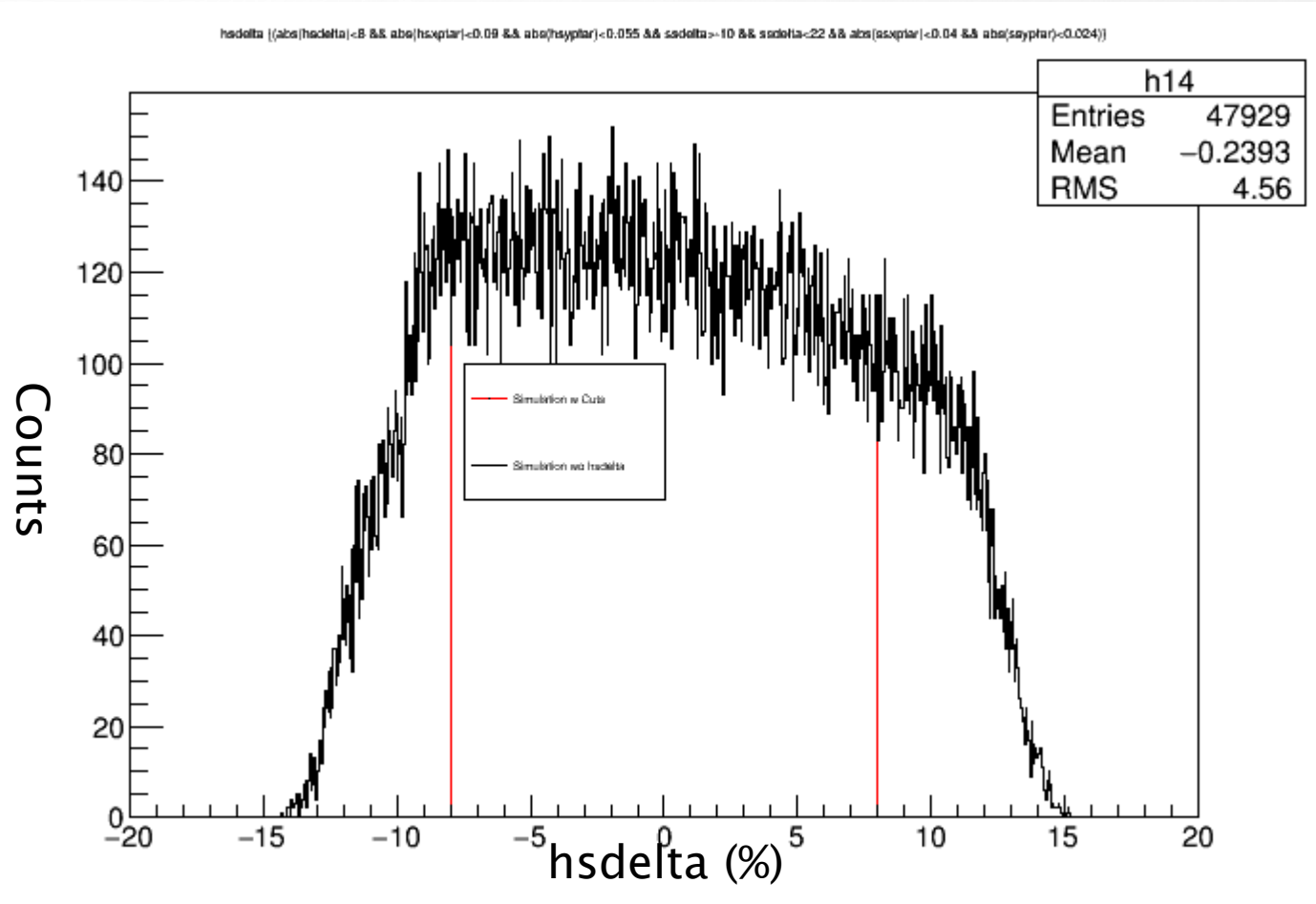
Input values	
Run	Q2 1.7
Beam Energy	5647
e^- p	2012
e^- theta	22.30
$ctua$	371.3
$kaon$	1

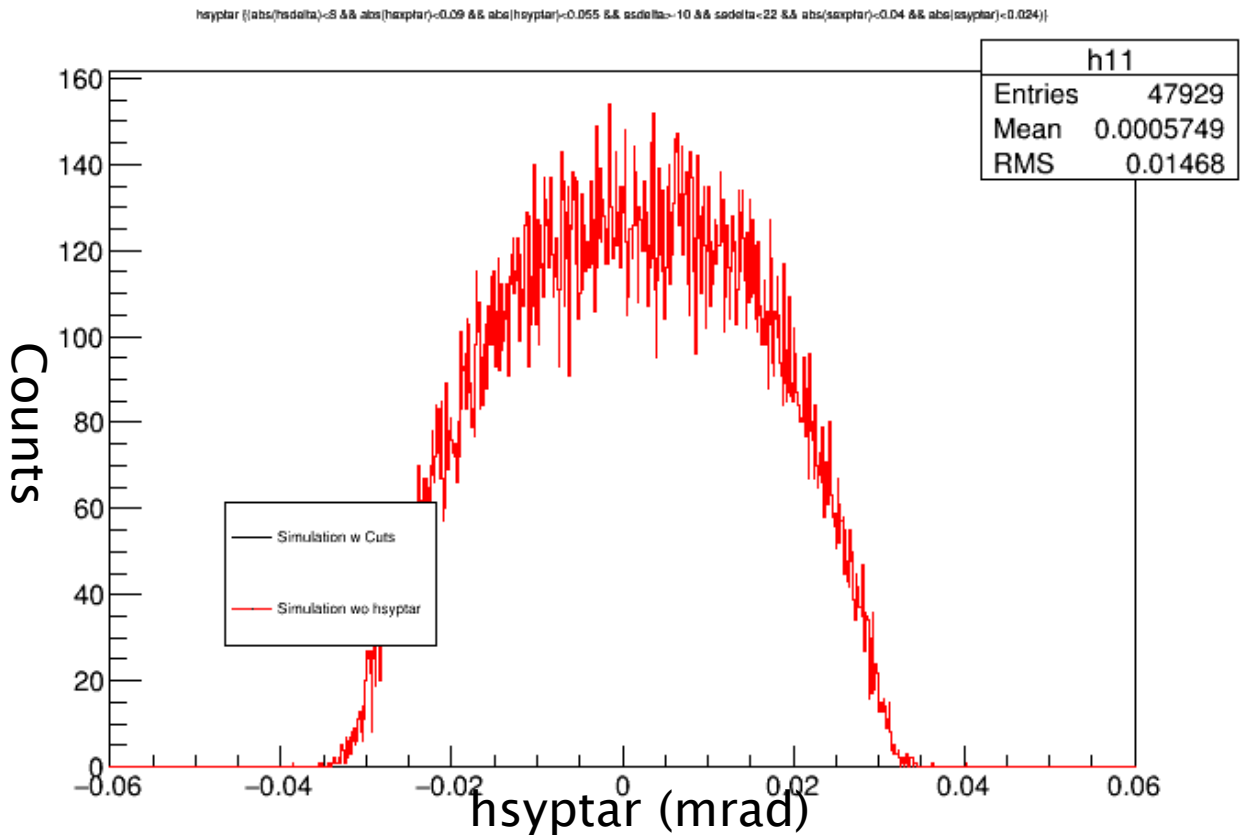


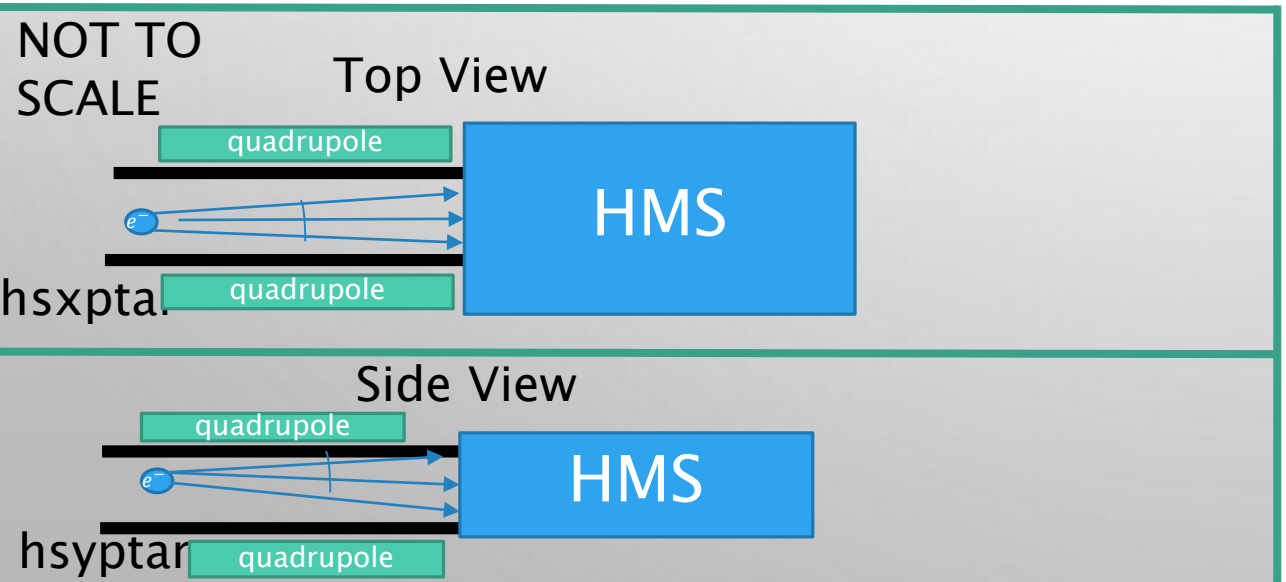
$$r = \frac{mv}{qB}$$

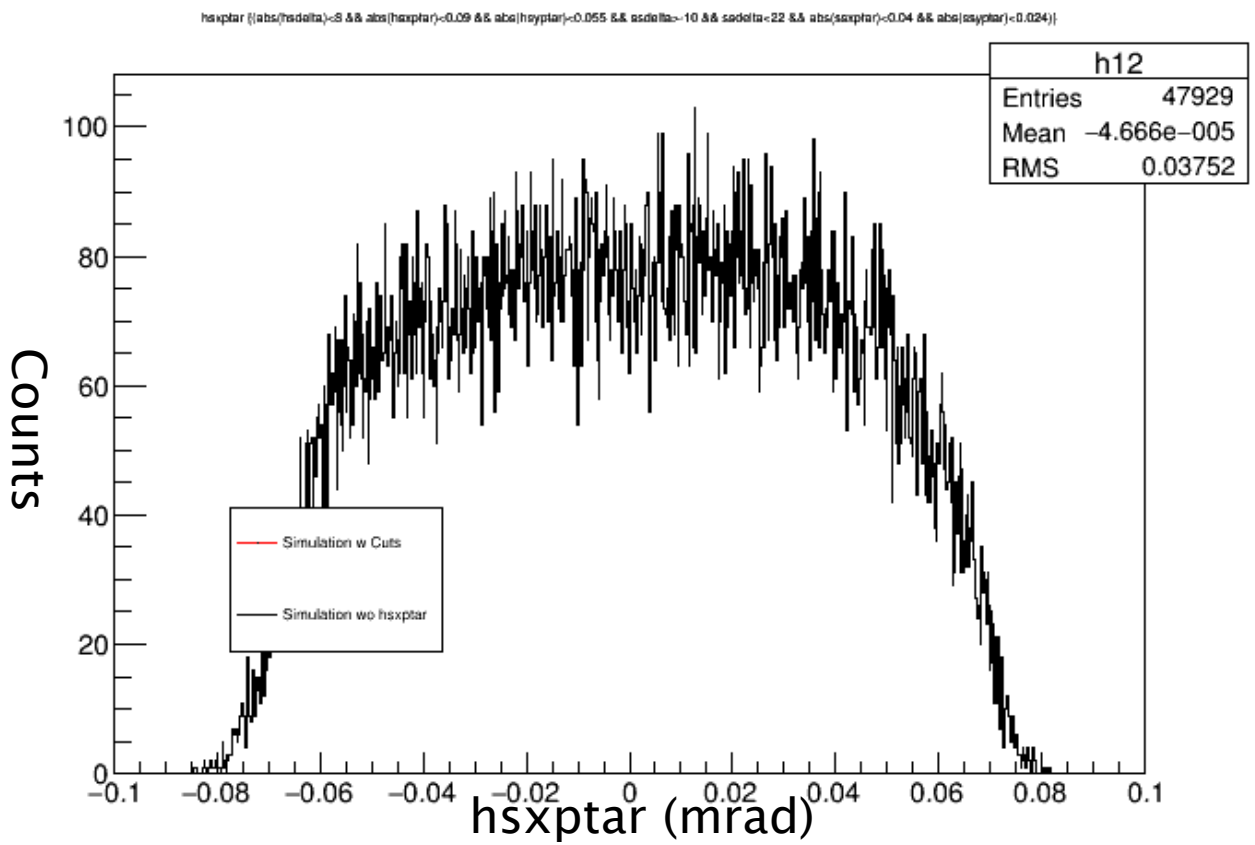
Electric Charge

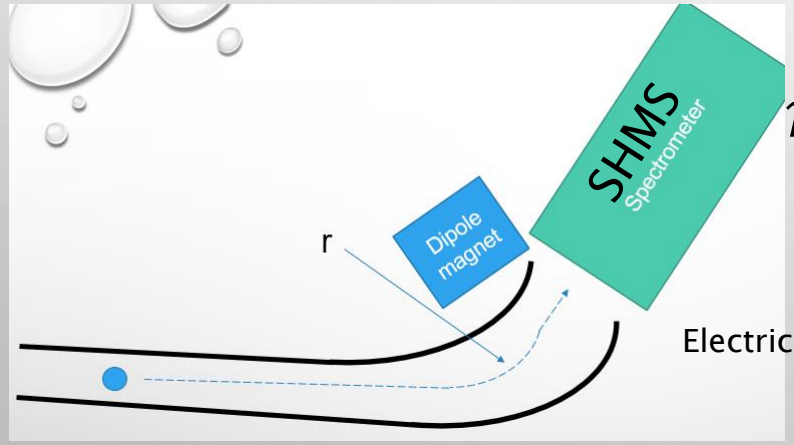
Electric Field




hsyptar (mrad)
Counts
h11
Entries 47929
Mean 0.0005749
RMS 0.01468
Simulation w Cuts
Simulation wo hsyptar


NOT TO SCALE
Top View
quadrupole
HMS
quadrupole
hsxptar
Side View
quadrupole
HMS
quadrupole
hsyptar

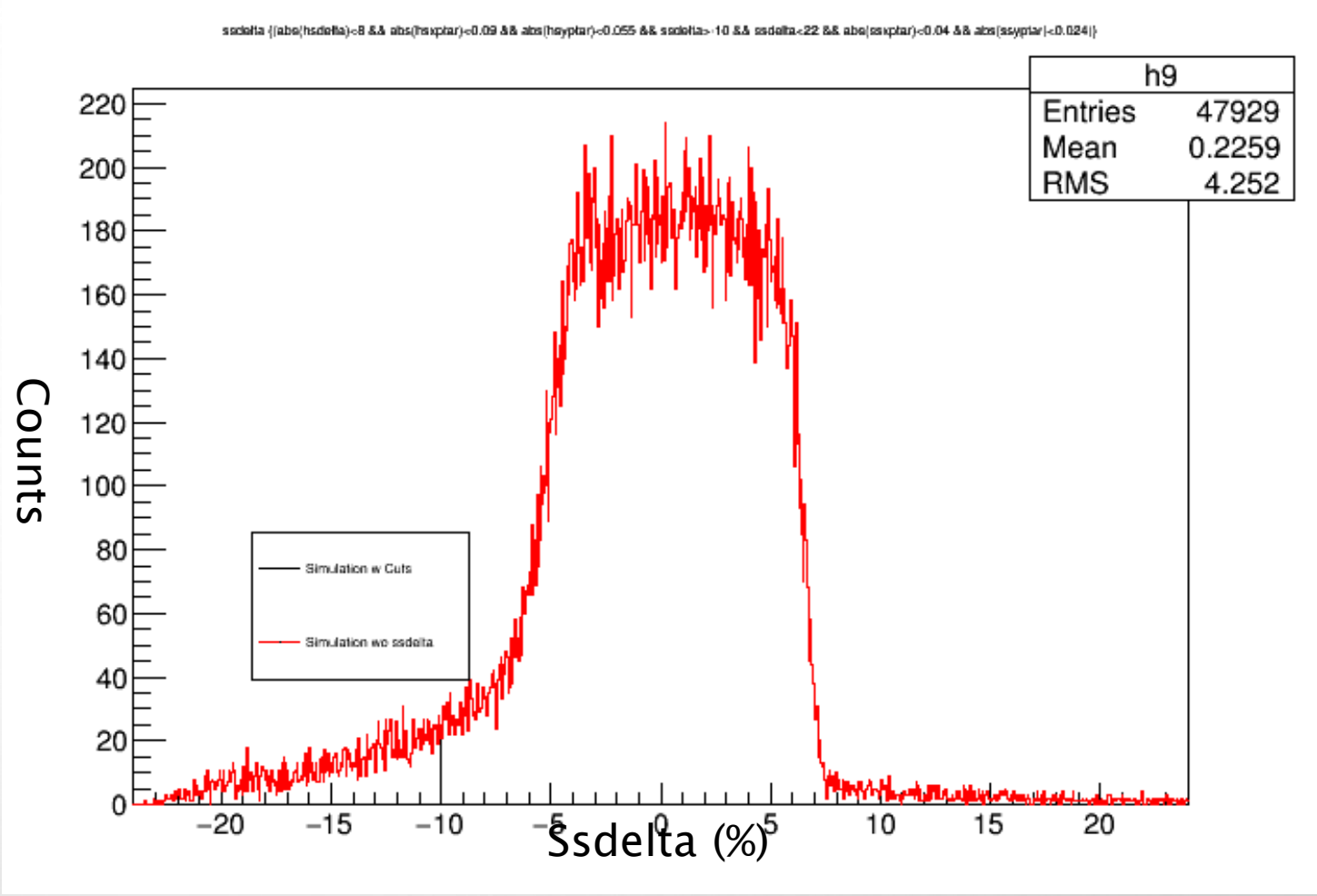

hsxptar (mrad)
Counts
h12
Entries 47929
Mean −4.666e−005
RMS 0.03752
Simulation w Cuts
Simulation wo hsxptar

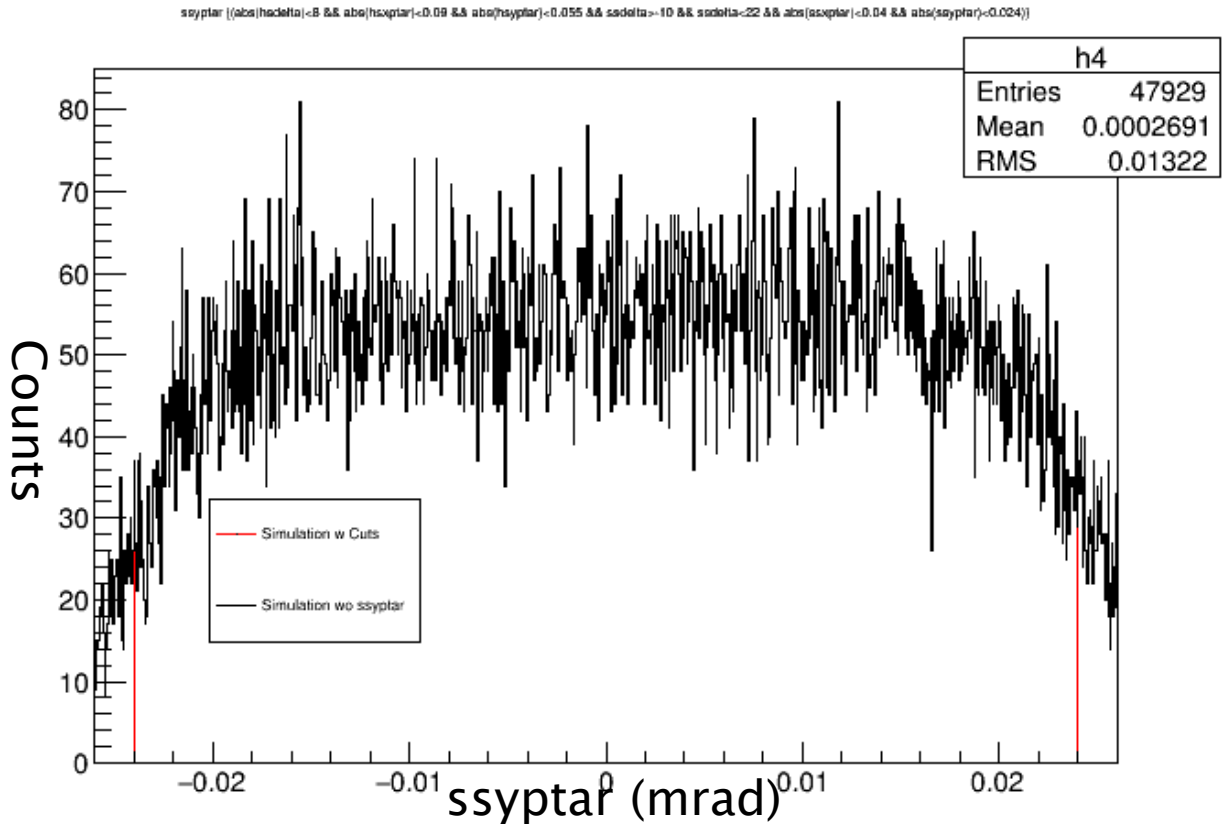


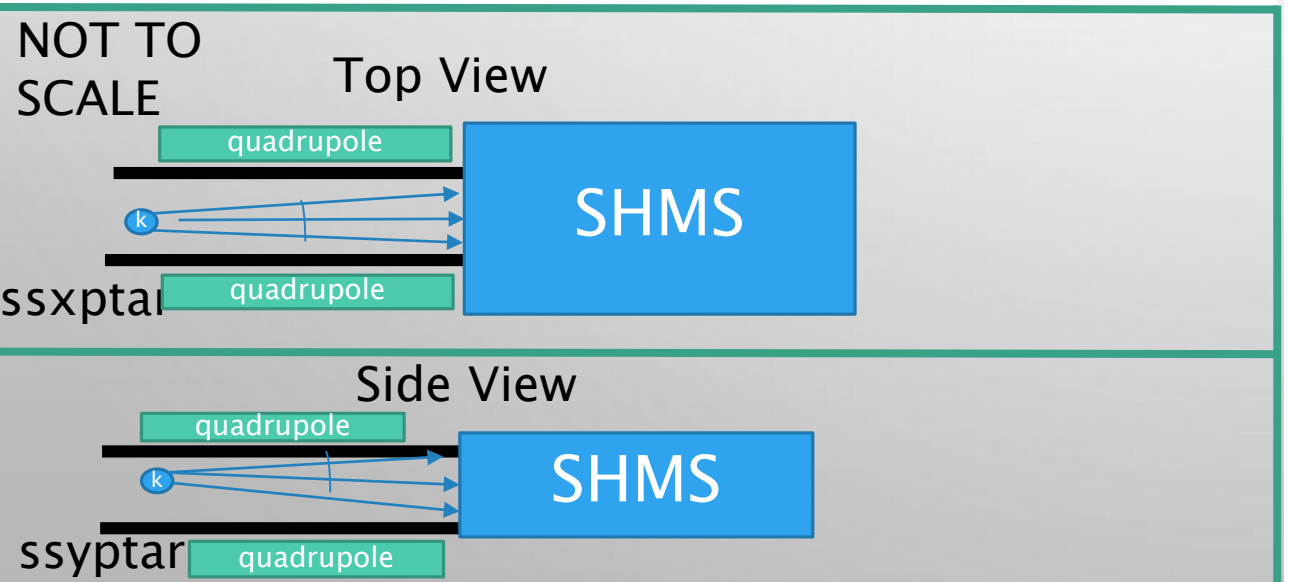
$$r = \frac{mv}{qB}$$

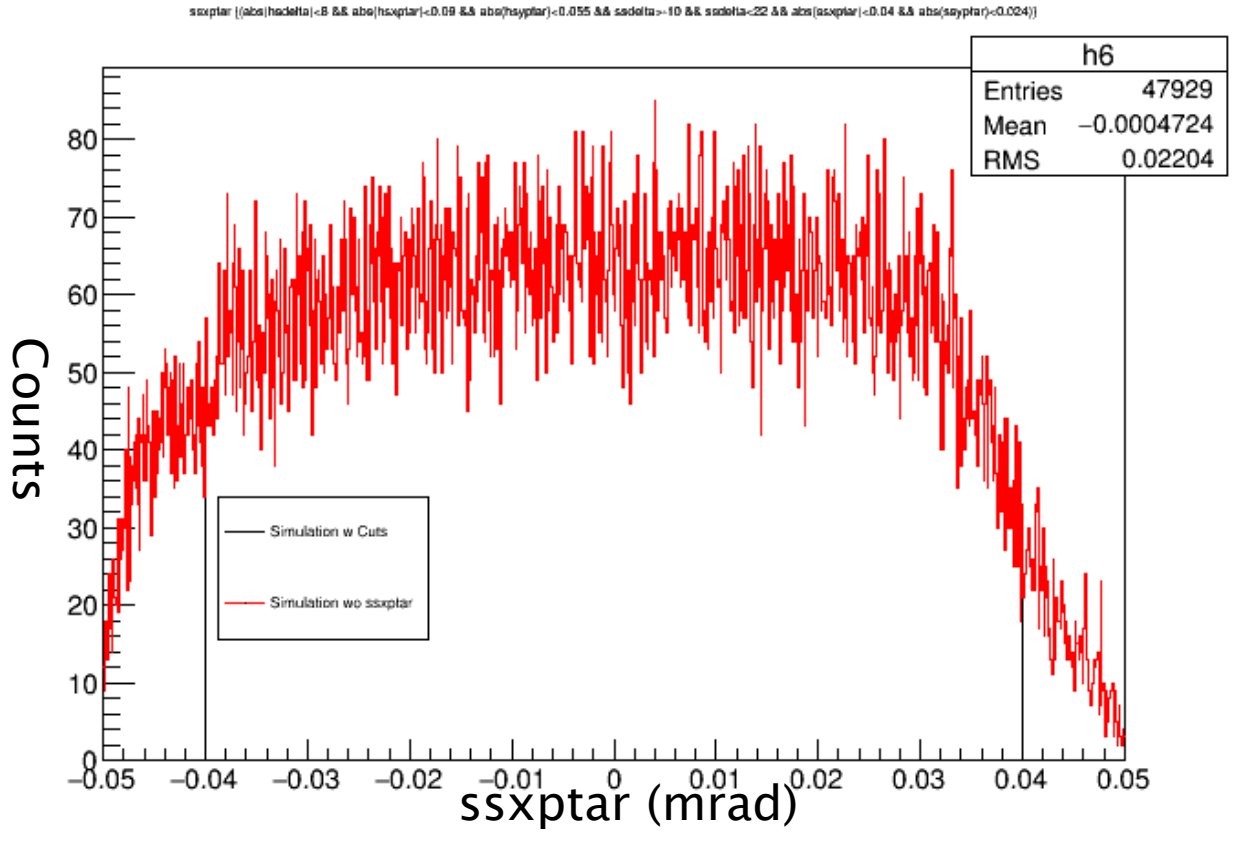
Electric Charge

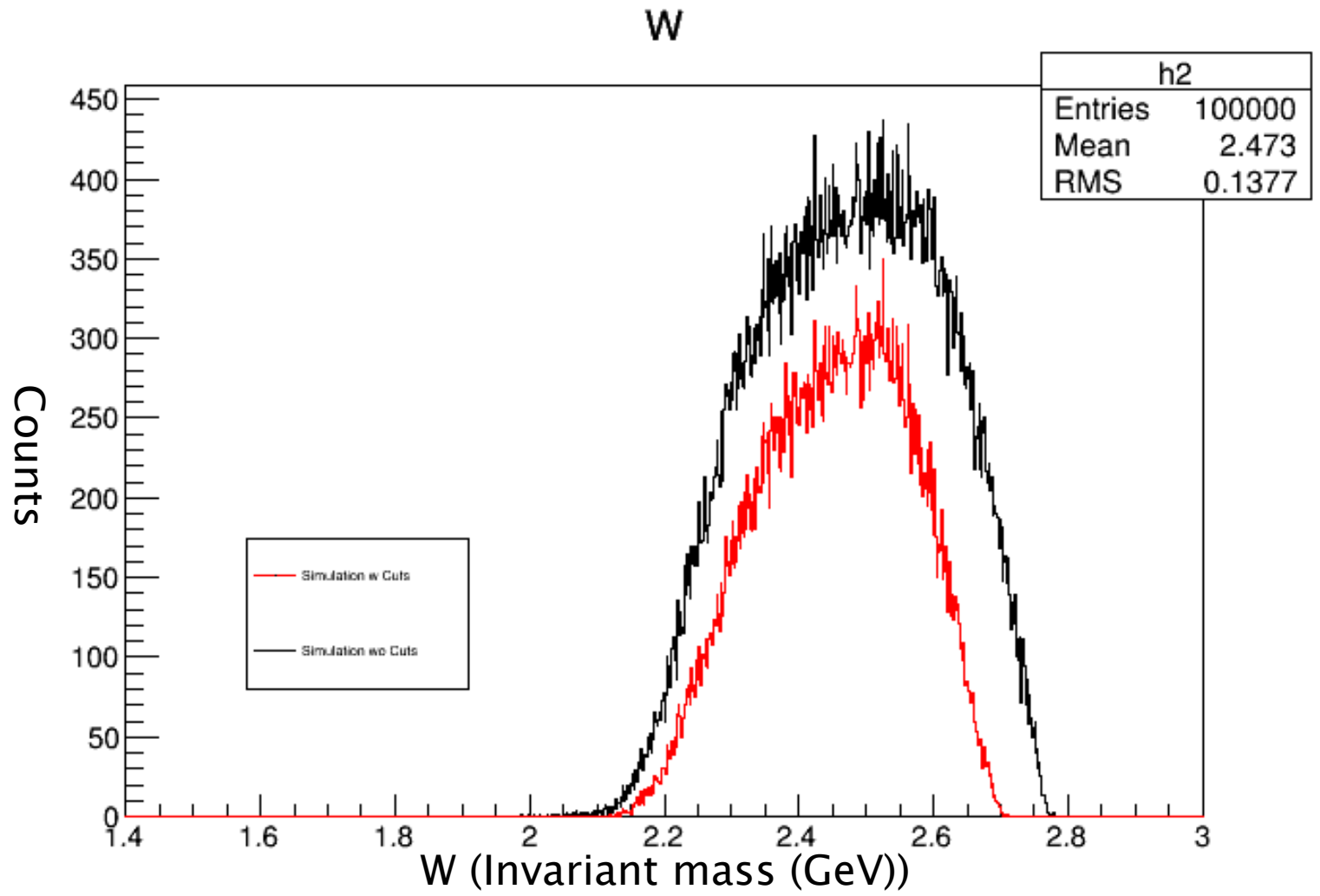
Electric Field

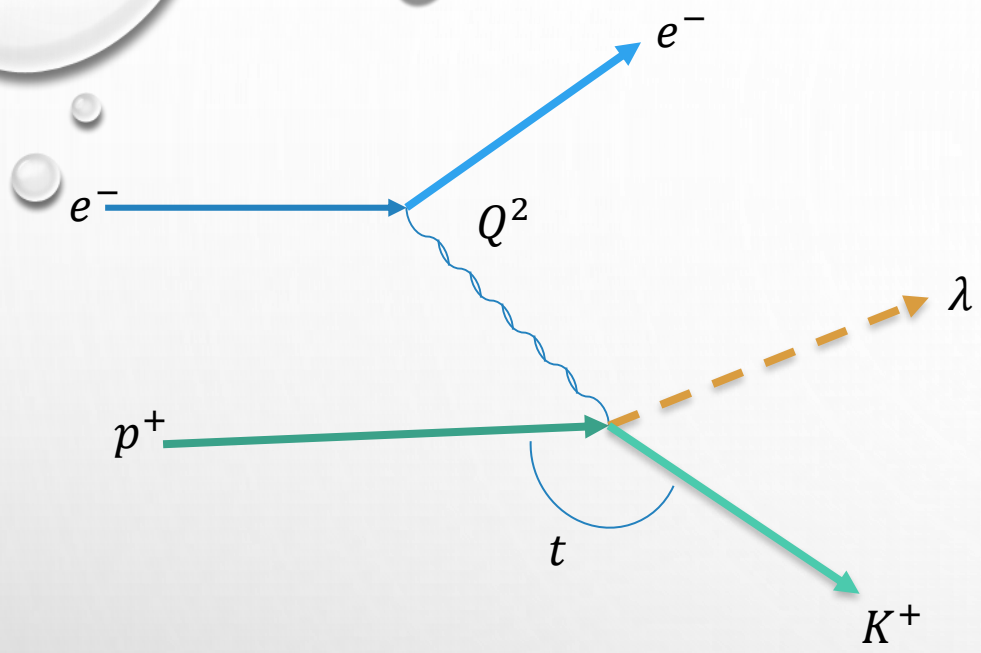


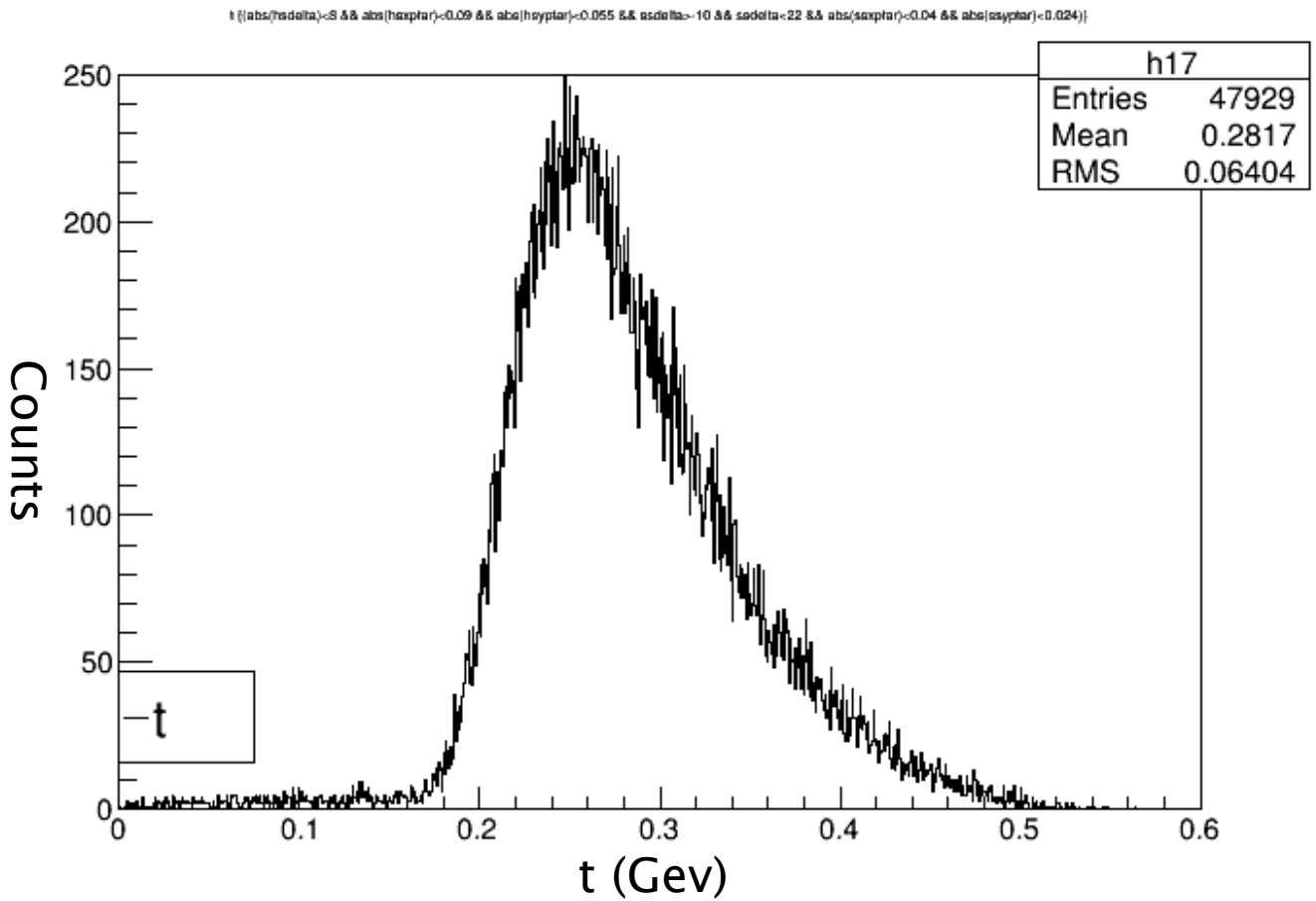

ssyptar |(abs(hdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && sdelta>-10 && sdelta<22 && abs(ssxptar)<0.04 && abs(ssyptar)<0.024)|
h4
Entries 47929
Mean 0.0002691
RMS 0.01322
Counts
ssyptar (mrad)
Simulation w Cuts
Simulation wo ssyptar

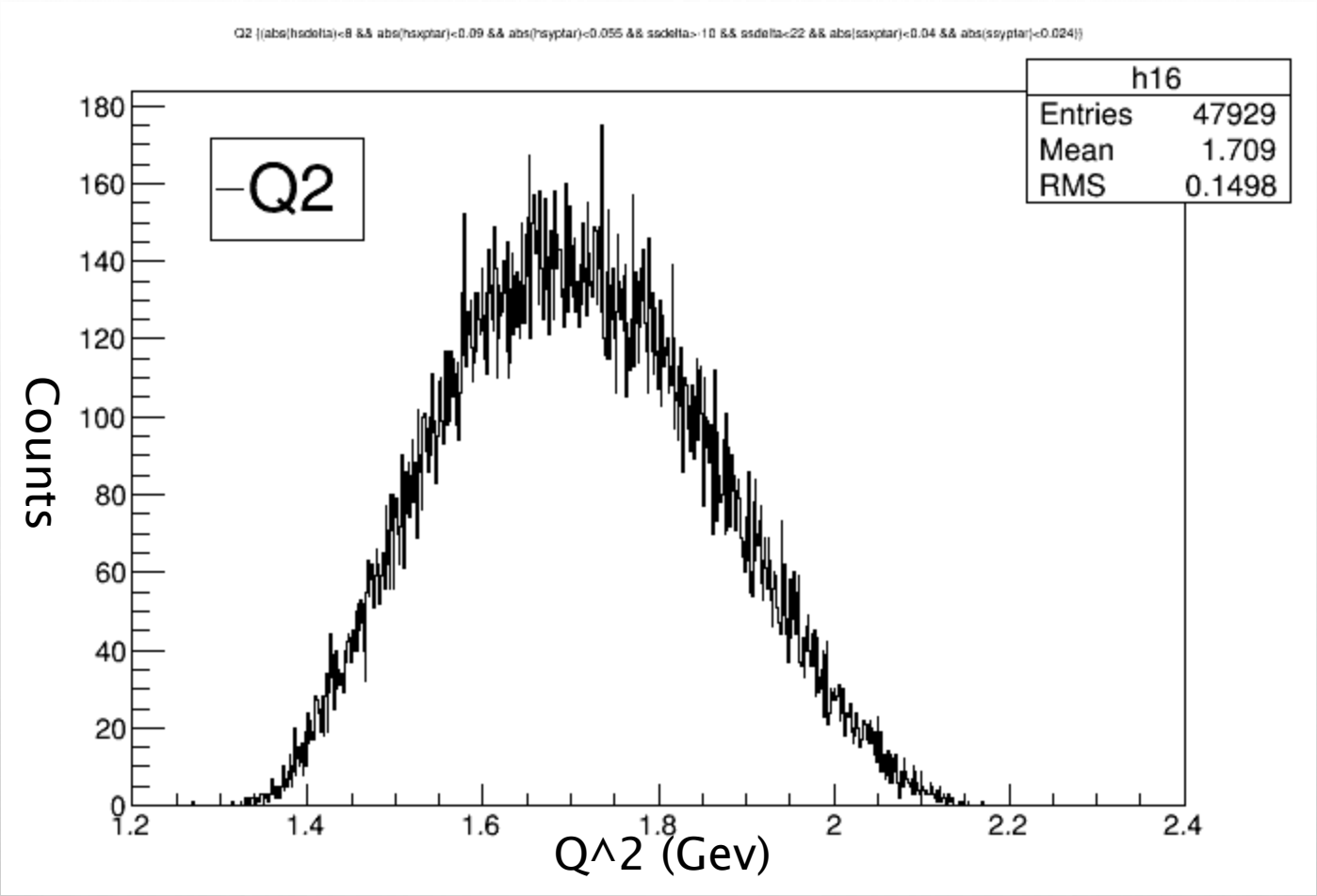

NOT TO SCALE
Top View
quadrupole
SHMS
quadrupole
ssxptar
Side View
quadrupole
SHMS
quadrupole
ssyptar


ssxptar |(abs(hdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && sdelta>-10 && sdelta<22 && abs(ssxptar)<0.04 && abs(ssyptar)<0.024)|
h6
Entries 47929
Mean −0.0004724
RMS 0.02204
Counts
ssxptar (mrad)
Simulation w Cuts
Simulation wo ssxptar


W
h2
Entries 100000
Mean 2.473
RMS 0.1377
Simulation w Cuts
Simulation wo Cuts
Counts
W (Invariant mass (GeV))
0
50
100
150
200
250
300
350
400
450
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3


e^-
e^-
Q^2
λ
p^+
t
K^+


h17
Entries 47929
Mean 0.2817
RMS 0.06404
Counts
t (Gev)
t
0
50
100
150
200
250
0.1
0.2
0.3
0.4
0.5
0.6


Q2 {(abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && ssdelta>-10 && ssdelta<22 && abs(ssxptar)<0.04 && abs(ssyptar)<0.024)}
h16
Entries 47929
Mean 1.709
RMS 0.1498
Q2
Counts
Q^2 (Gev)
0
20
40
60
80
100
120
140
160
180
1.2
1.4
1.6
1.8
2
2.2
2.4

KAON PREDICTION

$$N_k = y\left[\frac{\#}{mc}\right] * i[\mu A] * \Delta t[s] * 10^{-3}$$

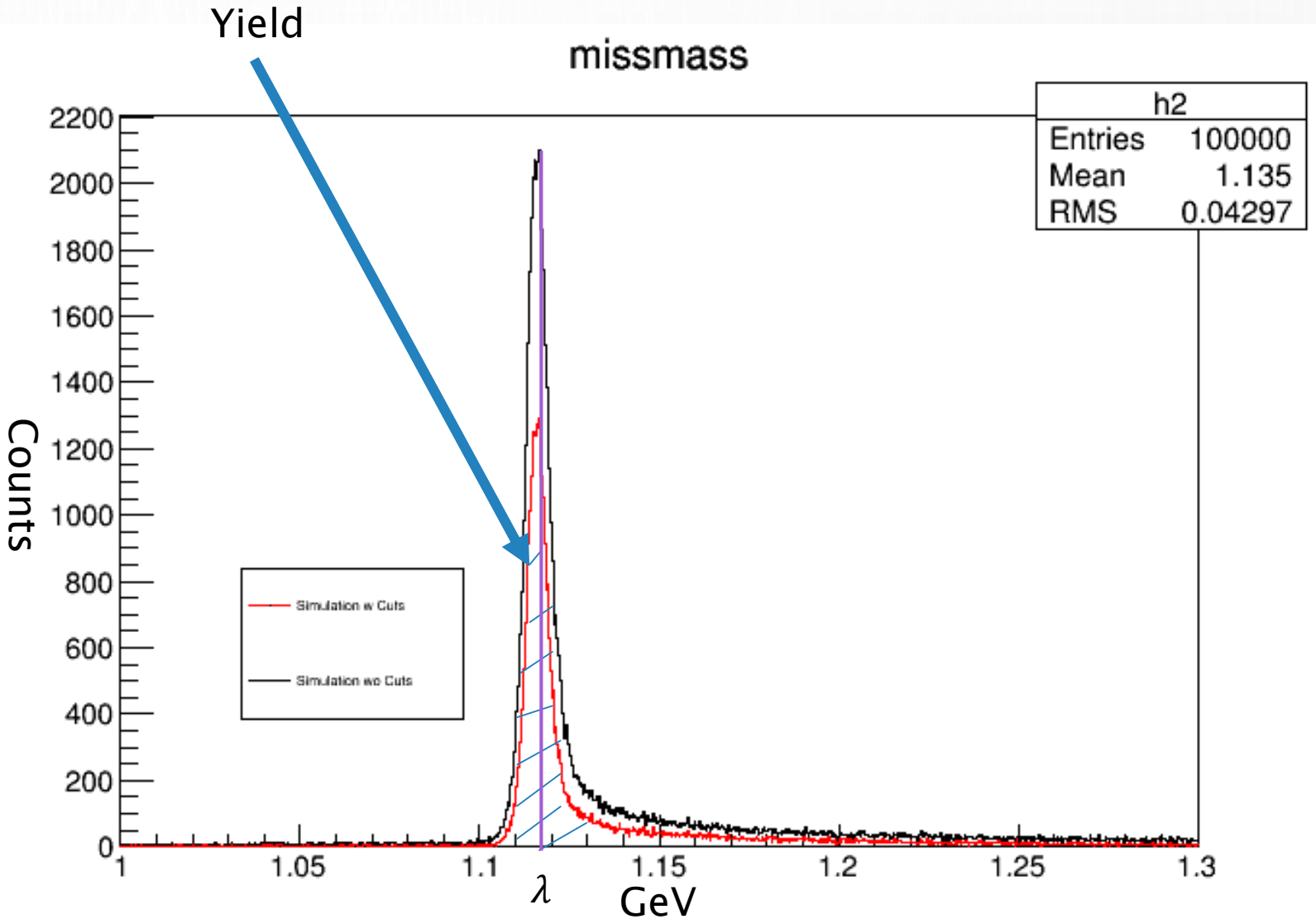
$$N_k = 4381020.0 \pm 2093.1$$

$$N_{k/s} = y\left[\frac{\#}{mc}\right] * i[\mu A] * 10^{-3}$$

$$N_{k/s} = 39.9 \pm 0.1$$

Uncertainty:

$$\sqrt{N}$$



Input values	
Run	Q2 1.7
Beam Energy	5647
e^- p	2012
e^- theta	22.30
$ctua$	371.3
$Kaon$	1

Input values	
Run	Q2 1.7 (r2)
Beam Energy	8761
e^- p	5125
e^- theta	11.16
$ctua$	371.3
$Kaon$	1

Input values	
Run	Q2 5.5
Beam Energy	10921
e^- p	3599
e^- theta	21.56
$ctua$	371.3
$Kaon$	1

Input values	
Run	Q2 5.5 (r2)
Beam Energy	9343
e^- p	2021
e^- theta	31.30
$ctua$	371.3
$Kaon$	1

1.7 (2)

$N_k = 3038212.8 \pm 1743.0$

$N_{k/s} = 42.8 \pm .1$

5.5

$N_k = 3096878.4 \pm 1759.8$

$N_{k/s} = 9.2 \pm .1$

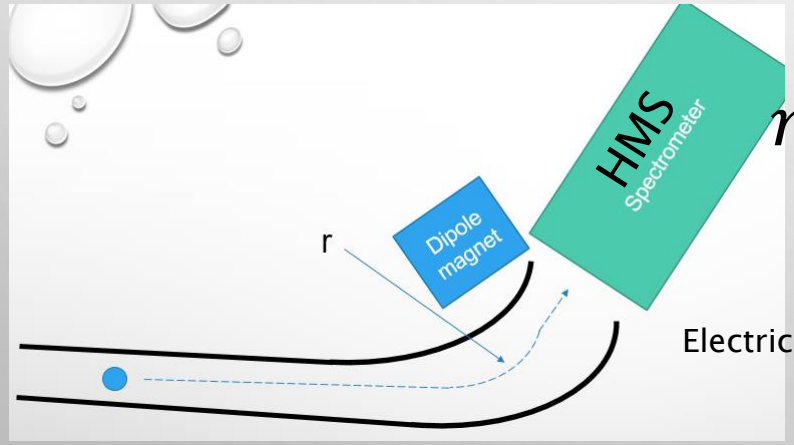
5.5(2)

$N_k = 4471840.8 \pm 2114.7$

$N_k = 11.6 \pm .1$

Pion Analysis

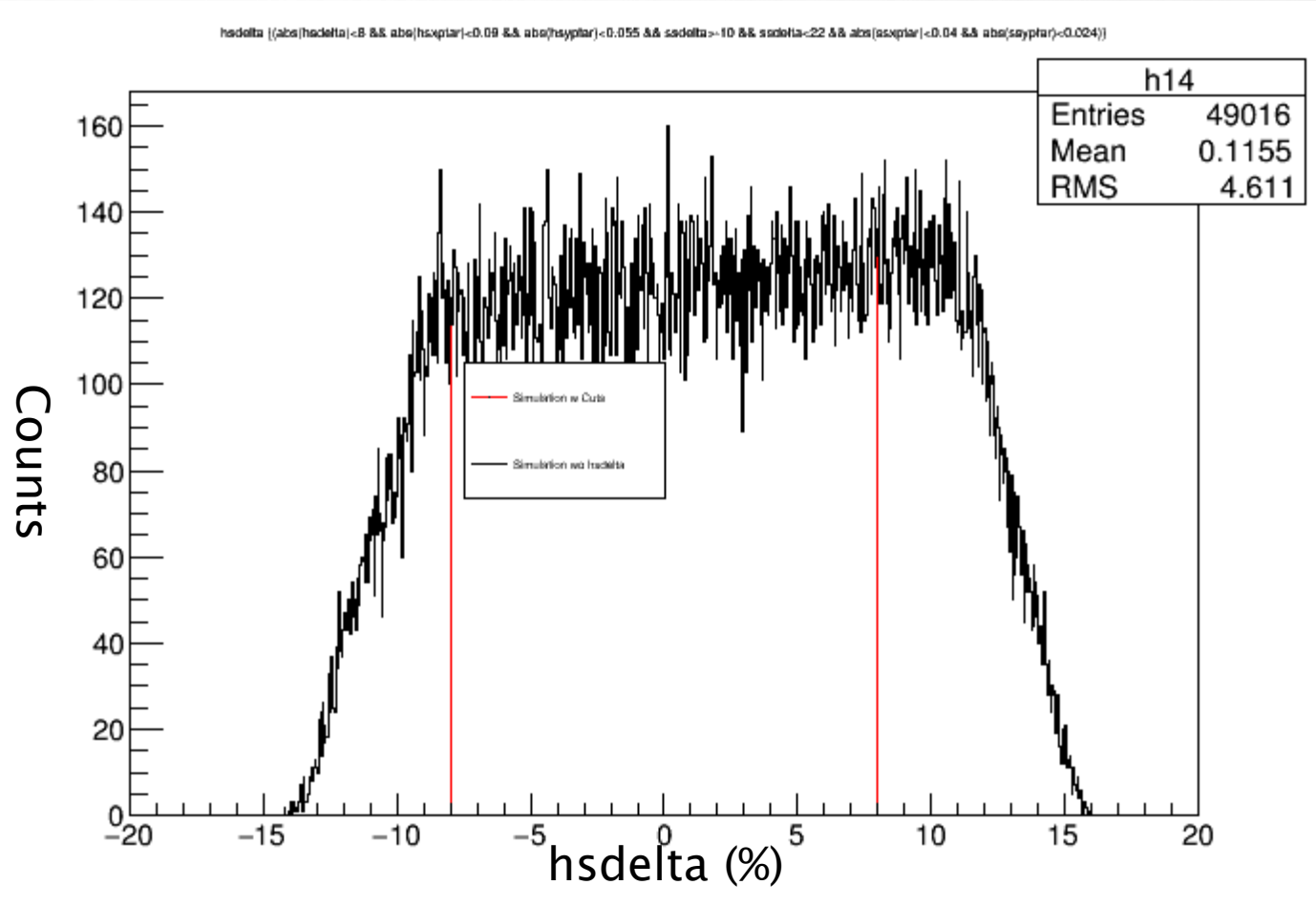
Input values	
Run	Q2 1.7
Beam Energy	5647
e^- p	2012
e^- theta	22.30
$ctua$	780.4
$Pion$	1

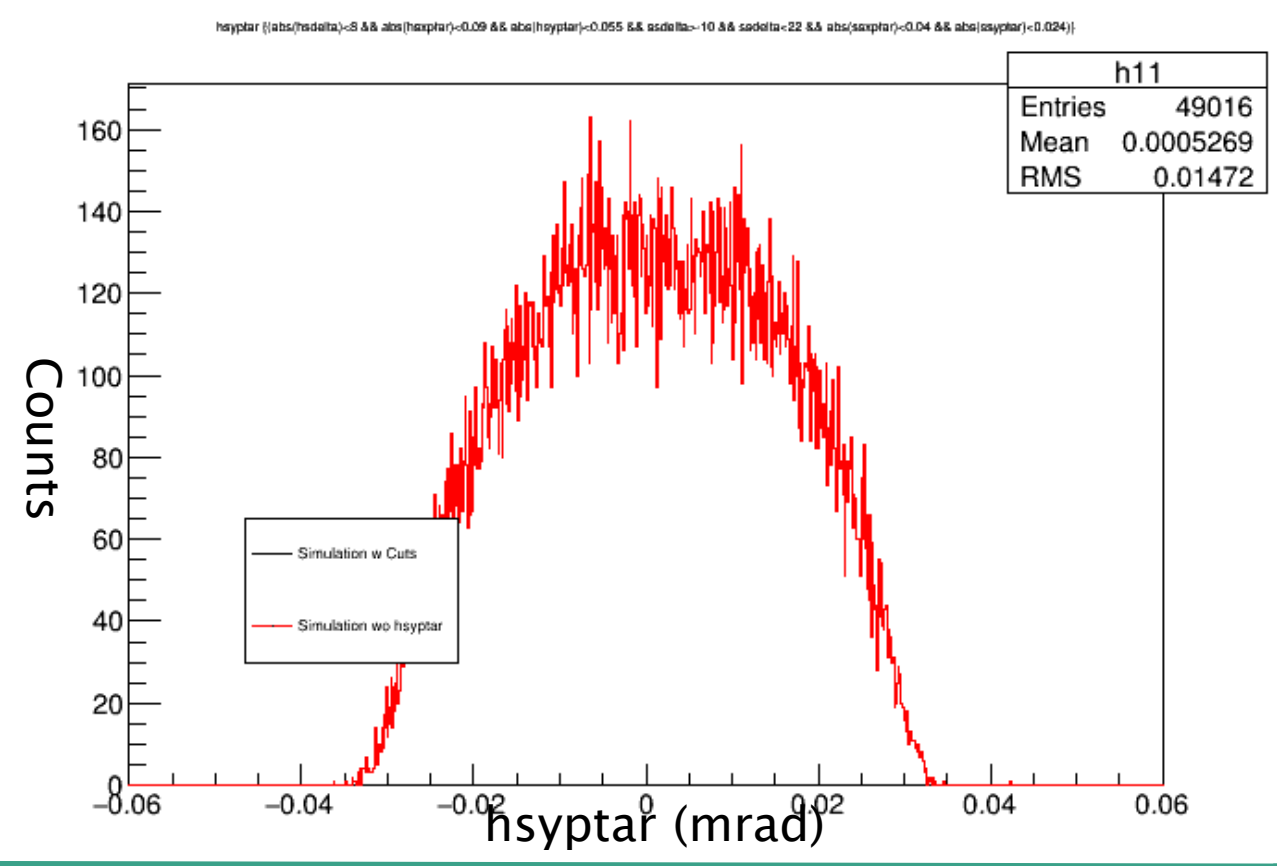


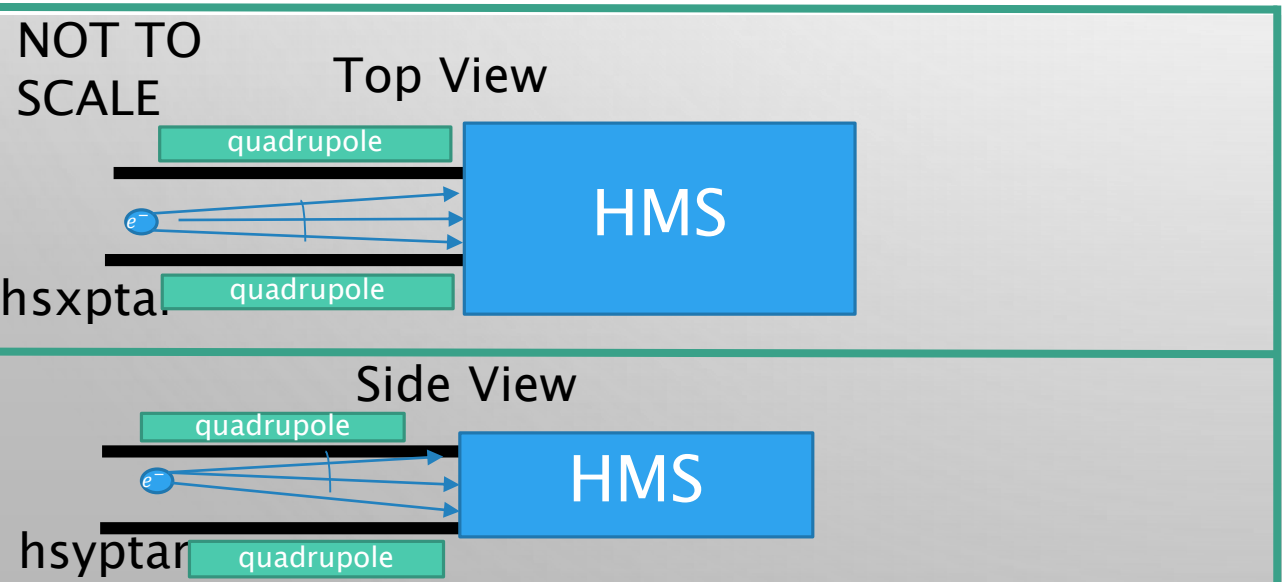
$$r = \frac{mv}{qB}$$

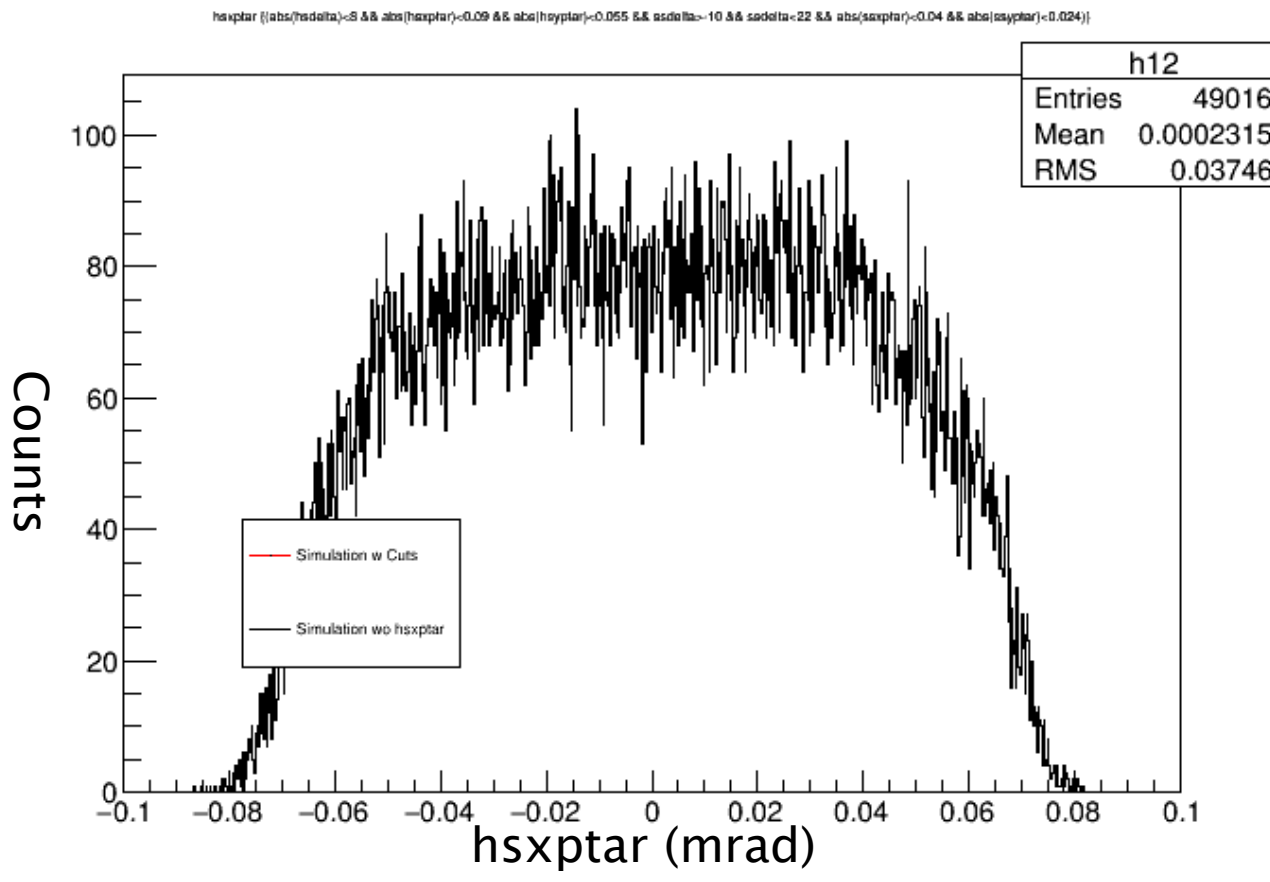
Electric Charge

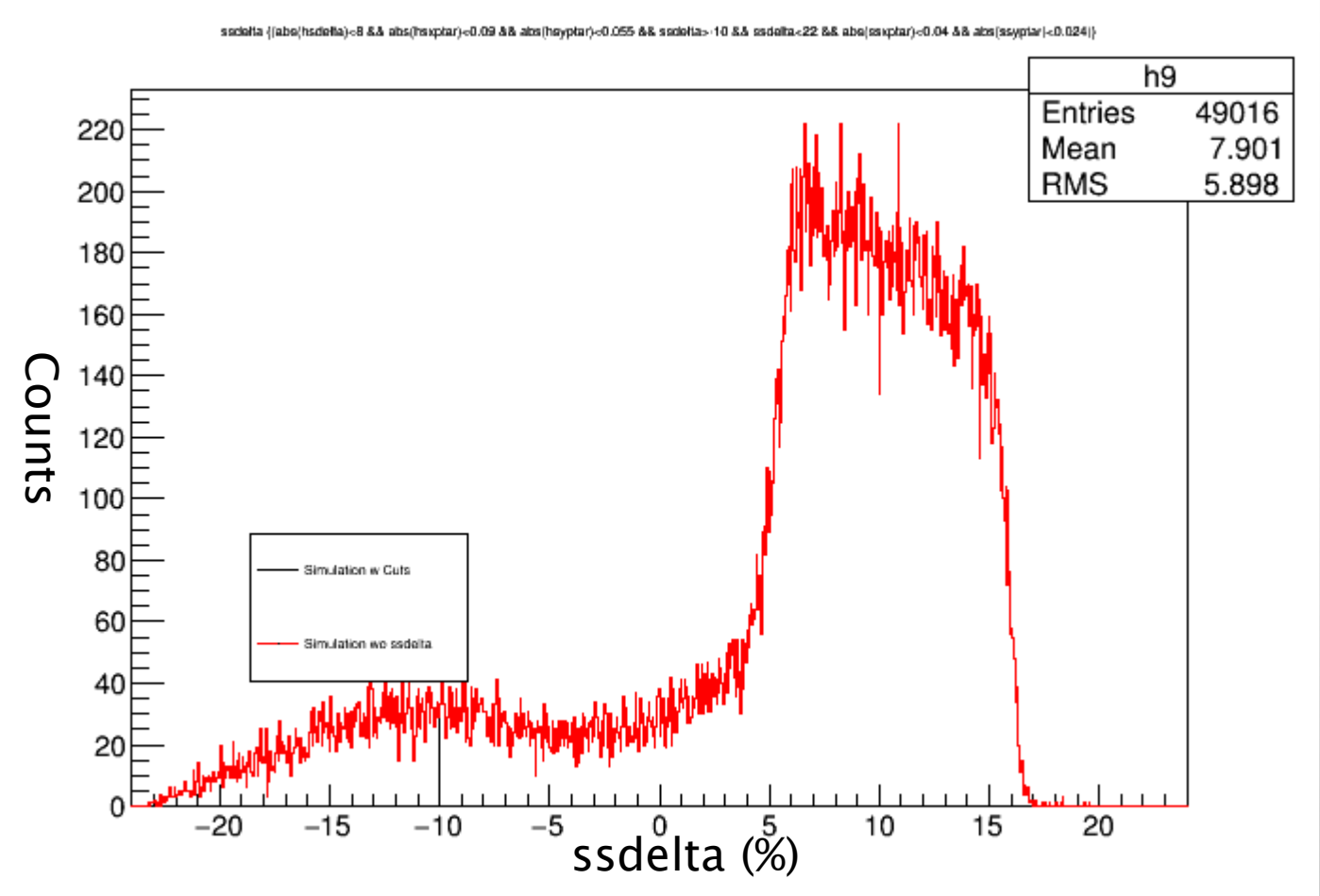
Electric Field

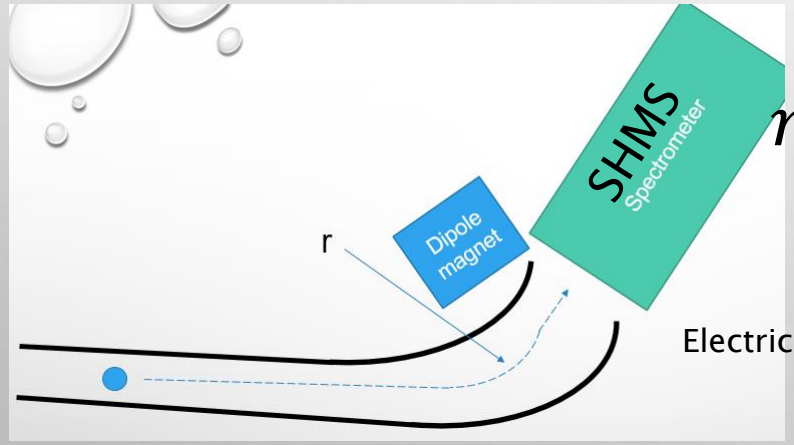



h11
Entries 49016
Mean 0.0005269
RMS 0.01472
Simulation w Cuts
Simulation wo hsyptar
Counts
hsyptar (mrad)


NOT TO SCALE
Top View
quadrupole
HMS
quadrupole
hsxptar
Side View
quadrupole
HMS
quadrupole
hsyptar


h12
Entries 49016
Mean 0.0002315
RMS 0.03746
Simulation w Cuts
Simulation wo hsxptar
Counts
hsxptar (mrad)

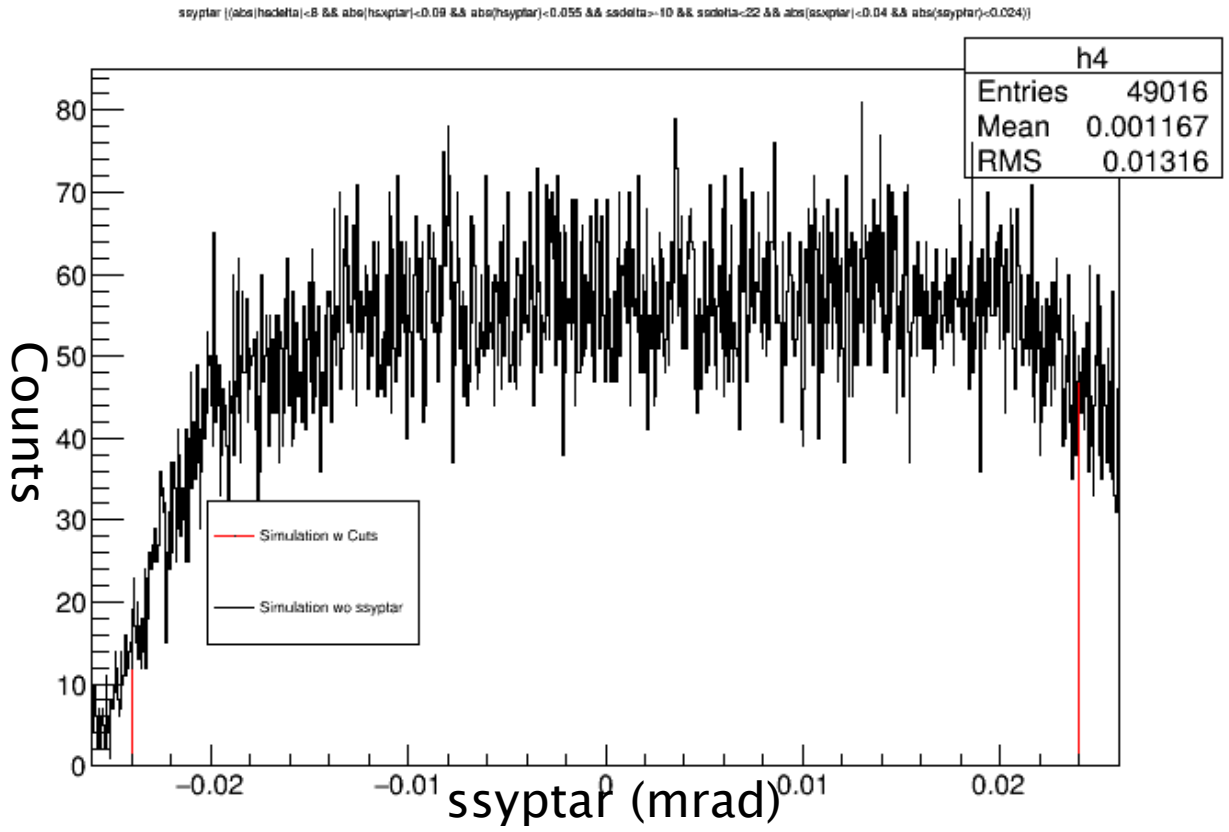


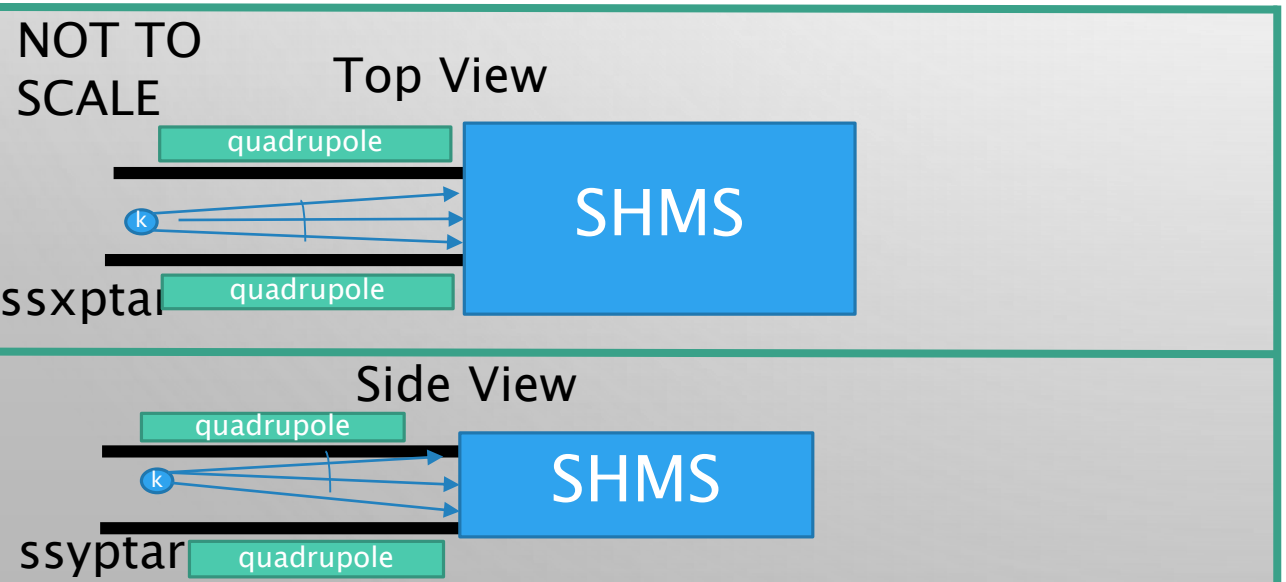


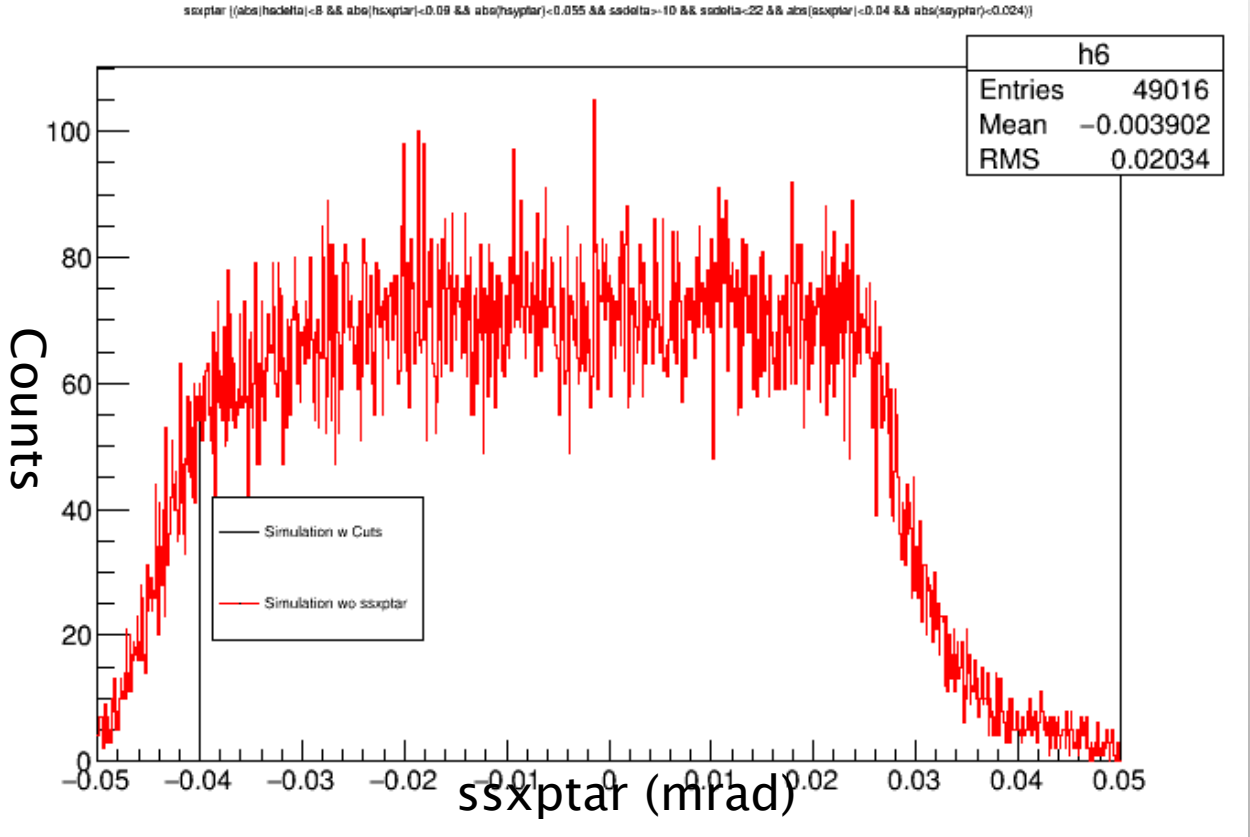
$$r = \frac{mv}{qB}$$

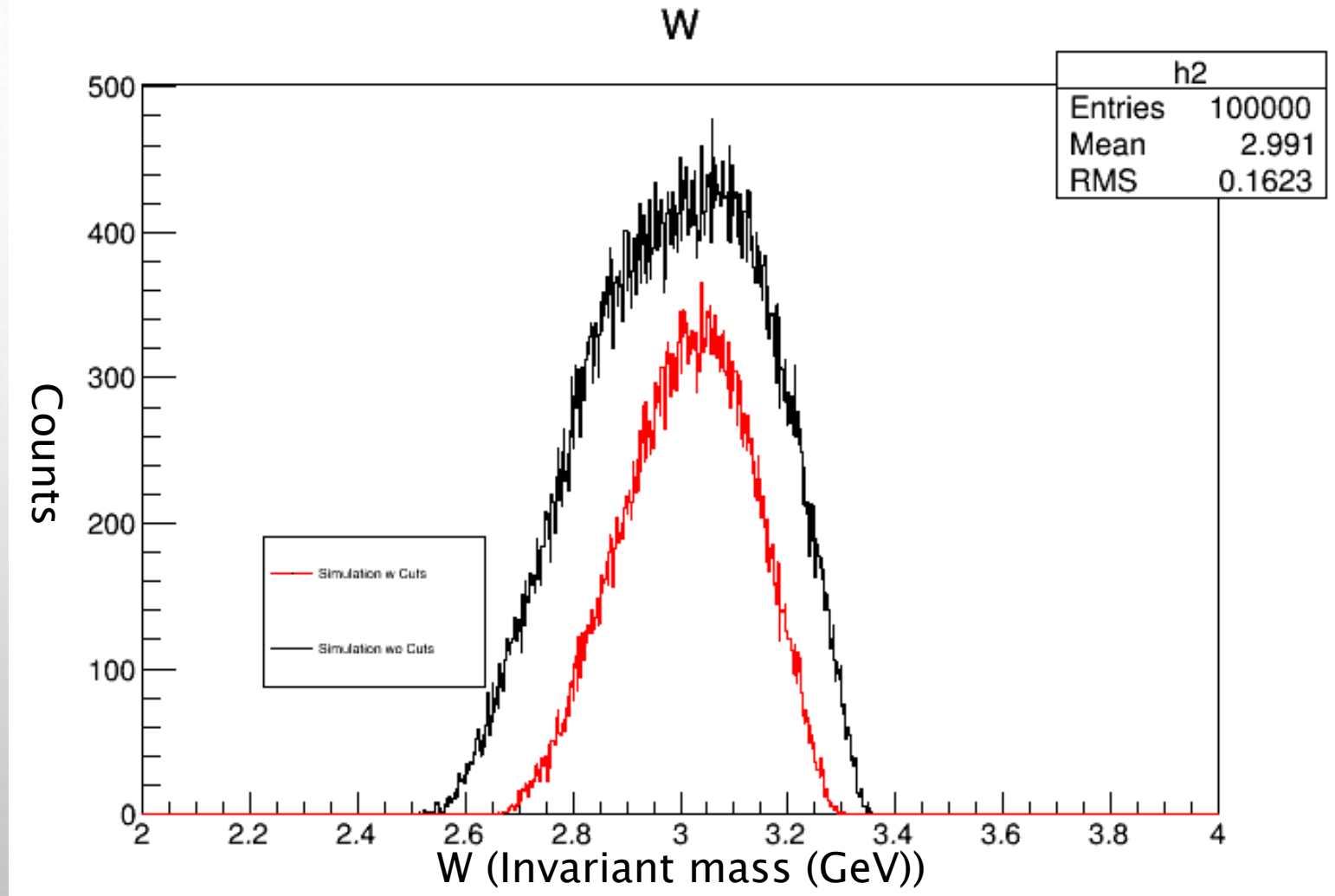
Electric Charge

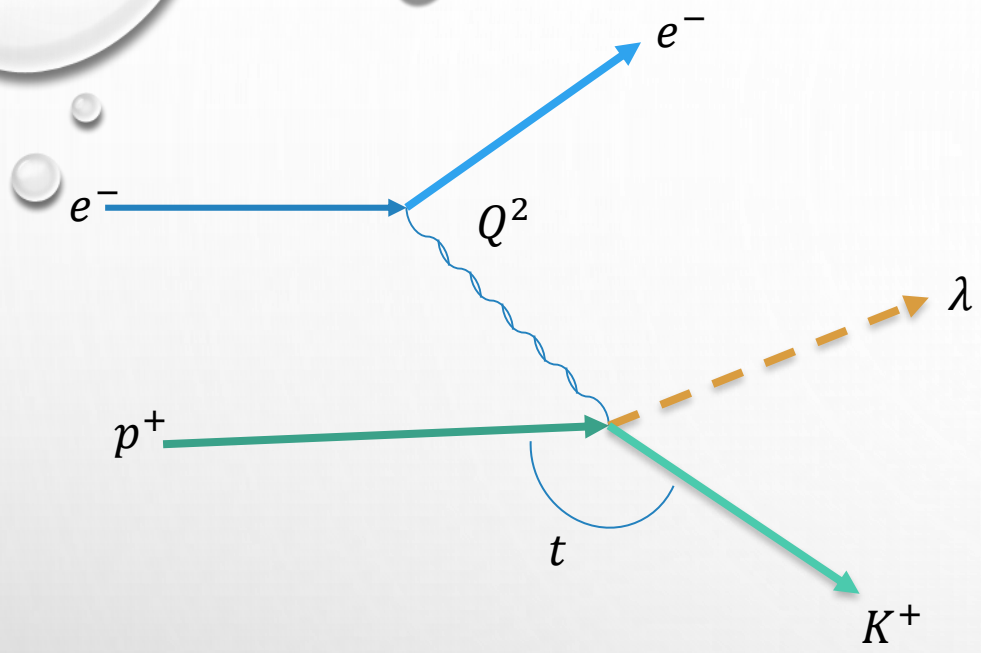
Electric Field

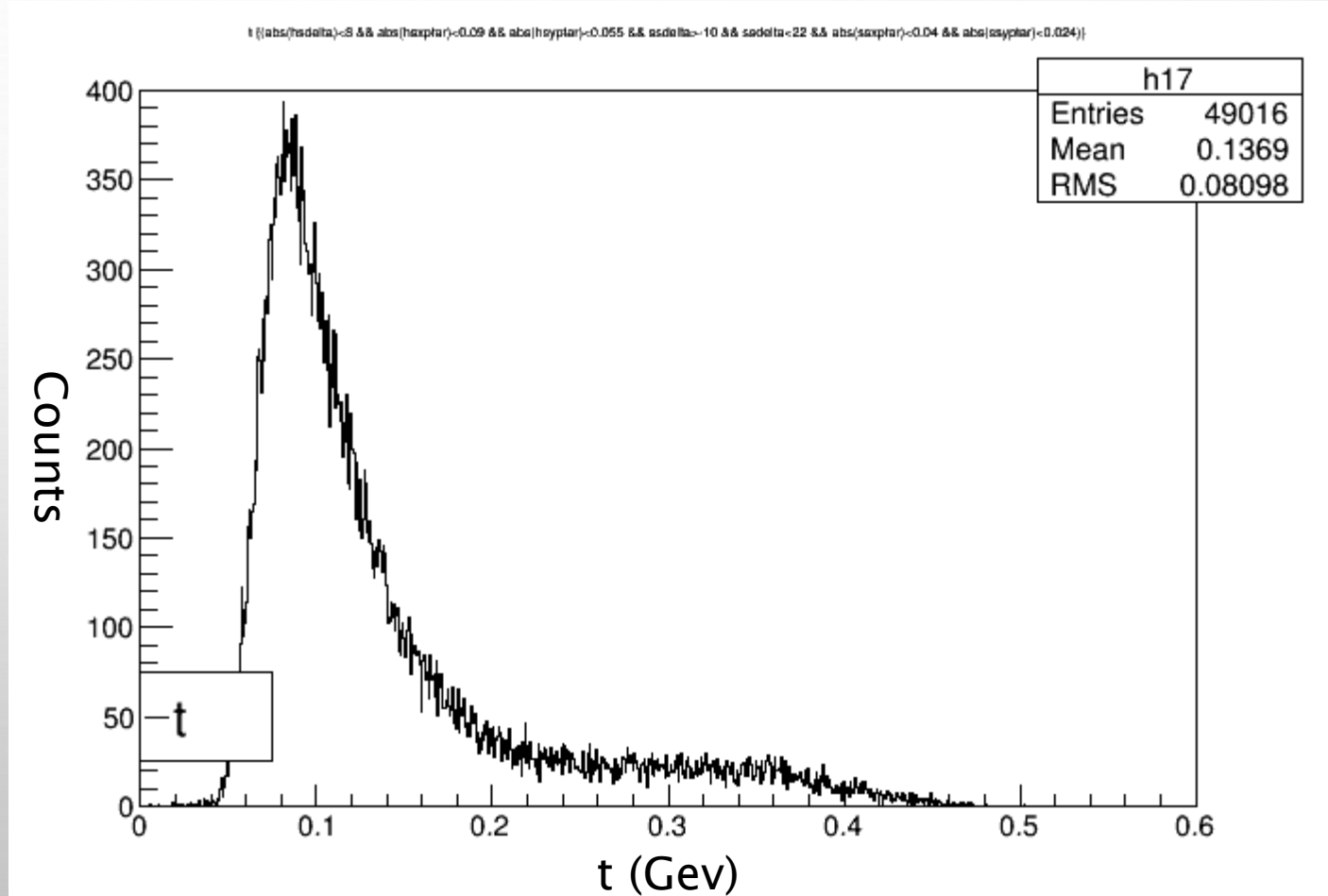

ssyptar (|(abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && ssdelta>-10 && ssdelta<22 && abs(ssxptar)<0.04 && abs(ssyptar)<0.024))
h4
Entries 49016
Mean 0.001167
RMS 0.01316
Counts
ssyptar (mrad)
Simulation w Cuts
Simulation wo ssyptar

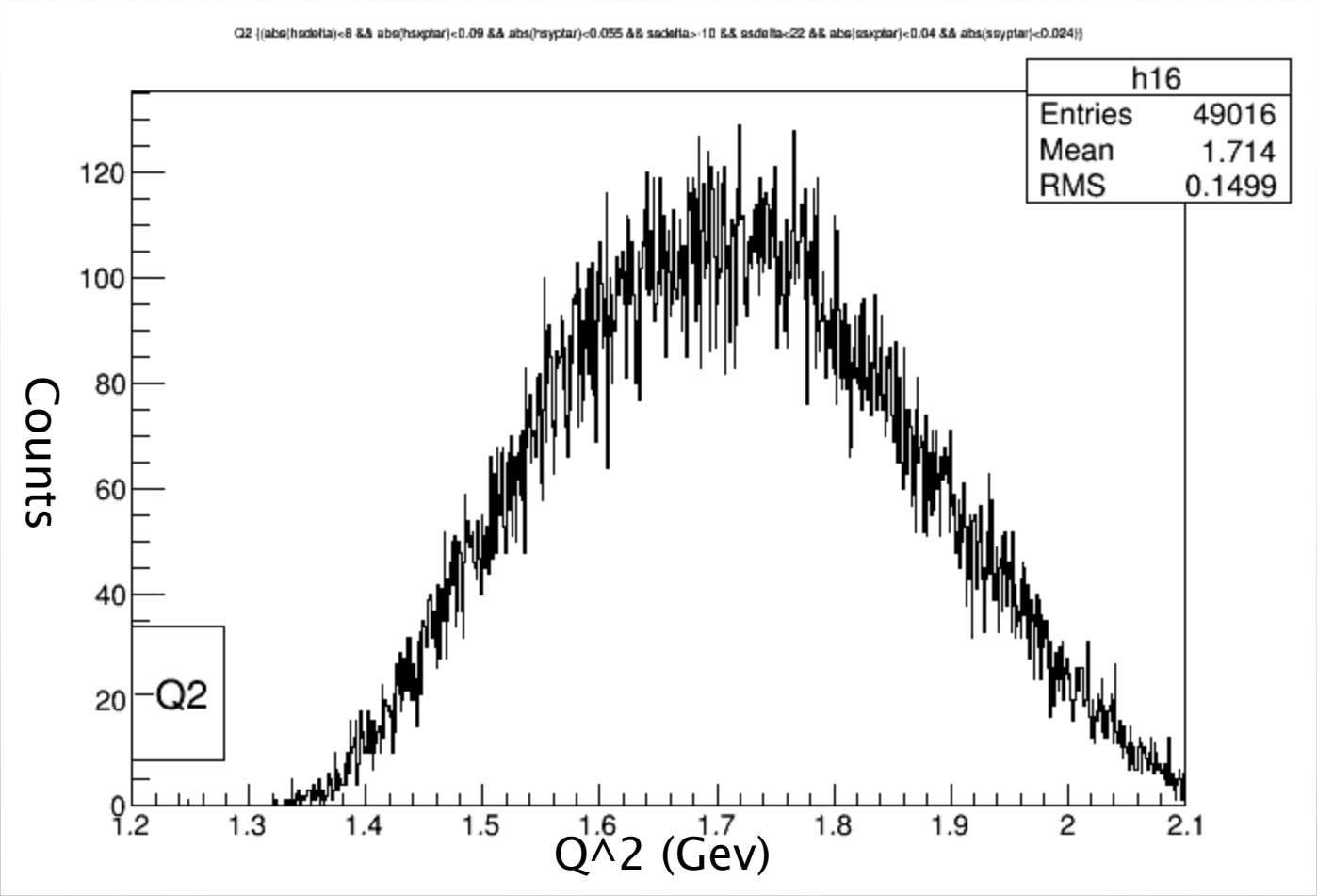

NOT TO SCALE
Top View
quadrupole
SHMS
quadrupole
ssxptar
Side View
quadrupole
SHMS
quadrupole
ssyptar


ssxptar (|(abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && ssdelta>-10 && ssdelta<22 && abs(ssxptar)<0.04 && abs(ssyptar)<0.024))
h6
Entries 49016
Mean −0.003902
RMS 0.02034
Counts
ssxptar (mrad)
Simulation w Cuts
Simulation wo ssxptar


W
h2
Entries 100000
Mean 2.991
RMS 0.1623
Simulation w Cuts
Simulation wo Cuts
Counts
W (Invariant mass (GeV))
0
100
200
300
400
500
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4


e^-
e^-
Q^2
λ
p^+
t
K^+


t (|abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && sdelta>-10 && sdelta<22 && abs(sxptar)<0.04 && abs(syptar)<0.024)|
h17
Entries 49016
Mean 0.1369
RMS 0.08098
Counts
t (Gev)
t
0
50
100
150
200
250
300
350
400
0.1
0.2
0.3
0.4
0.5
0.6


Q2 {(abs(hsdelta)<8 && abs(hsxptar)<0.09 && abs(hsyptar)<0.055 && ssdelta>-10 && ssdelta<22 && abs(ssxptar)<0.04 && abs(ssyptar)<0.024)}
h16
Entries 49016
Mean 1.714
RMS 0.1499
Q2
Counts
Q^2 (Gev)
0
20
40
60
80
100
120
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1

PION PREDICTION

$$N_{\pi on} = y\left[\frac{\#}{mc}\right] * i[\mu A] * \Delta t[s] * 10^{-3}$$

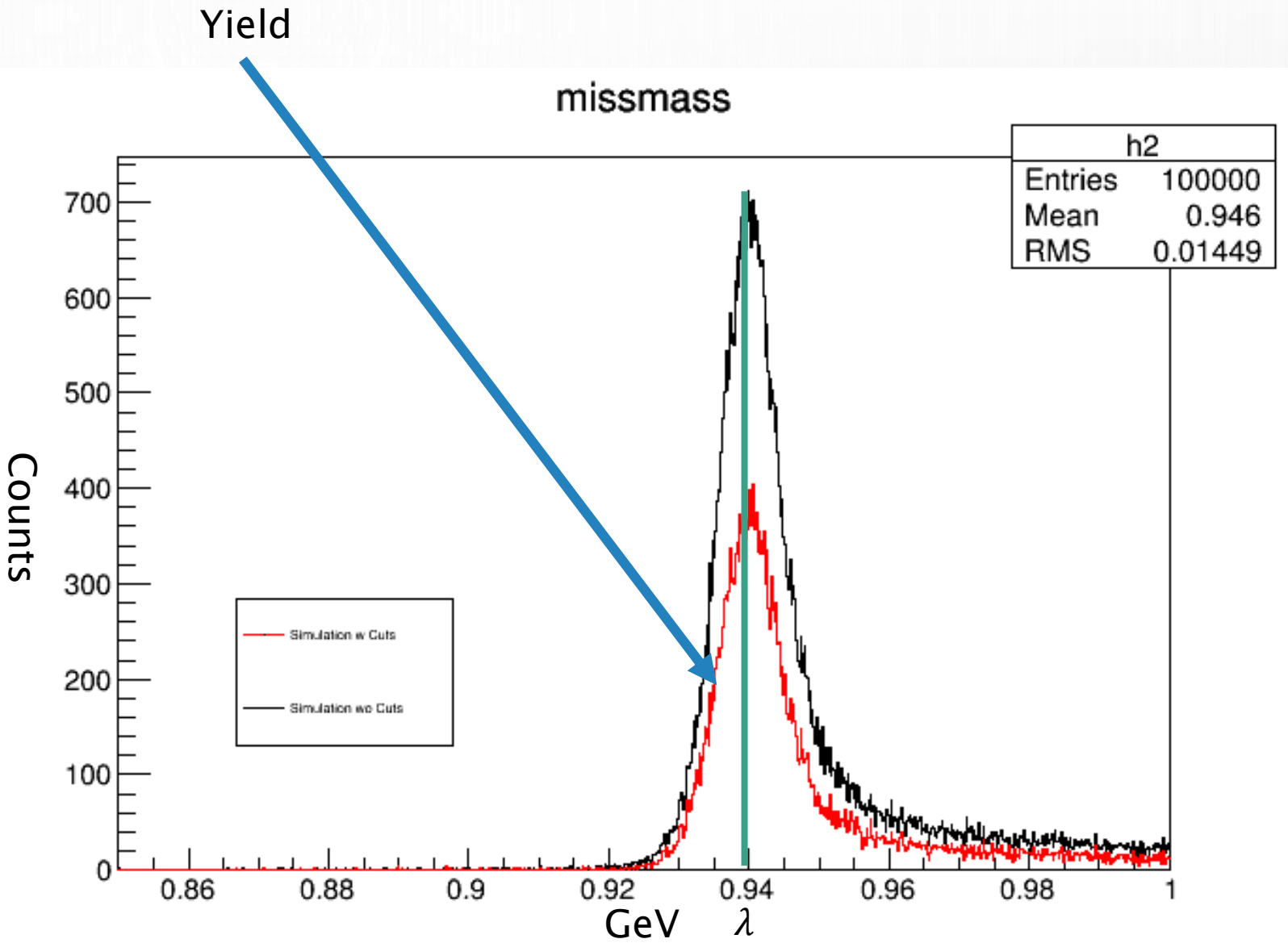
$$N_{\pi on} = 278263944.0 \pm 16681.2$$

$$N_{\pi on/s} = y\left[\frac{\#}{mc}\right] * i[\mu A] * 10^{-3}$$

$$N_{\pi on/s} = 2534.3 \pm .1$$

Uncertainty:

$$\sqrt{N}$$



1.7 (2)

$N_{\pi on} = 212734468.8 \pm 14585.4$

$N_{\pi on/s} = 2999.6 \pm .1$

5.5

$N_{\pi on} = 913086442.8 \pm 30217.3$

$N_{\pi on/s} = 2724.3 \pm .1$

5.5(2)

$N_{\pi on} = 951801681.6 \pm 30851.3$

$N_{\pi on/s} = 2473.2 \pm .1$