Pion Uncertainty

Updating the wiki and starting the paper

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Elastic Analysis, at CUA [edit]

File:123.pdf

Abbreviated table

Date	GeV	Q2	Pions per sec	GeV	time (hours)	# of pions detected	epsilon	r=T/L	stat unc	stat unc %	delta(sigma)
5/31/2016	1.1	1.7	99.9057	5.6	24	8631852.48	0.5947	0.4	0.000340367	0.034037	3.452535317
6/5/2016	1.23	.4, high epsilon	1279.43	5.0	24	110542752	0.6849	0.4	9.51119E-05	0.009511	3.452535302
6/6/2016	1.23	.4, high epsilon	1279.43	5.0	24	110542752	0.6849	0.4	9.51119E-05	0.009511	3.452535302
6/12/2016	1.23	.4, low epsilon	127.648	3.8	24	11028787.2	0.4108	0.4	0.000301118	0.030112	3.452535313
6/13/2016	1.23	.4, low epsilon	127.648	3.8	24	11028787.2	0.4108	0.4	0.000301118	0.030112	3.452535313

$$\frac{\Delta F_\pi}{F_\pi} = \frac{1}{2}\frac{1}{(\epsilon_1 - \epsilon_2)}\frac{\Delta\sigma}{\sigma}\sqrt{(r+\epsilon_1)^2 + (r+\epsilon_2)^2}.$$

Total Unc= statistical + systematic

Fractional statistical unc= $\frac{\sqrt{number\ of\ pions}}{number\ of\ pions}$*100

r= ratio of the longitudinal to the transverse of the kaon cross section

Systematic Error			
source	pt to pt %	t-correlated %	unc scale %
acceptance	0.4	0.4	1
Target thickness	0	0.2	0.8
Beam charge	0	0.2	0.5
HMS+SHMS Tracking	0.1	0.1	1.5
Coincidence Blocking	0	0.2	0
PID	0	0.4	0
pion decay	0.03	0	0.5
pion absorbtion	0	0.1	1.5
Monte Carlo generator	0.2	1	0.5
Radiactive correction	0.1	0.4	2
offsets	0.4	1	0
quadrature sum	0.6	1.6	3
fpi-2 values	0.9	1.9	3.5

$$\sqrt{.6^2 + 1.6^2 + 3^2 + fractional\ statistical^2}$$

$$\frac{\Delta F_\pi}{F_\pi} = \frac{1}{2}\frac{1}{(\epsilon_1 - \epsilon_2)}\frac{\Delta\sigma}{\sigma}\sqrt{(r+\epsilon_1)^2 + (r+\epsilon_2)^2}.$$

Pion form fac unc		
Date	Q2	UNC (%)
5-Jun	0.4 High epsilon	1.637611
6-Jun	0.4 High epsilon	1.637611
7-Jun	0.4 High epsilon	1.637611
8-Jun	0.4 High epsilon	1.637611
9-Jun	0.4 High epsilon	1.637611
10-Jun	0.4 High epsilon	1.637611
12-Jun	0.4 low epsilon	2.478501
13-Jun	0.4 low epsilon	2.478501
14-Jun	0.4 low epsilon	2.478501
15-Jun	0.4 low epsilon	2.478501
16-Jun	0.4 low epsilon	2.478501
17-Jun	0.4 low epsilon	2.478501
18-Jun	0.4 low epsilon	2.478501
19-Jun	0.4 low epsilon	2.478501
20-Jun	0.4 low epsilon	2.478501

Outlook

- Apply the uncertainty to the other trials (1.7, 5.5)
- Continue with the wiki
- Continue to write the report
- Make projections on how well the pion form factor could be determined