

KaonLT Meeting

October 10th, 2025

Richard L. Trotta

Fpi-2 Fits

$\sigma_L = \frac{p_1 Q^2}{(1 + p_2 Q^2 + 0.05 Q^4)^2} \exp \left[(p_3 - p_4 \ln Q^2)(- t) \right],$	3.50000e+02	1
	1.77000e+00	2
$\sigma_T = \frac{p_5}{Q^2} + \frac{p_6}{Q^4},$	1.60000e+01	3
	7.50000e+00	4
$\sigma_{LT} = \left(\exp \left[p_9 + \frac{p_{10}}{\sqrt{Q^2}}(- t) \right] + p_{11} - \frac{p_{12}}{Q^4} \right) \sin \theta_{\text{cm}},$	4.50000e+00	5
	2.00000e+00	6
	0.00000e+00	7
$\sigma_{TT} = \frac{p_{13}}{Q^4} \left(\frac{- t }{(- t + m_\pi^2)^2} \right) \sin^2 \theta_{\text{cm}},$	0.00000e+00	8
	7.90000e-01	9
$w_{\text{factor}} = \frac{1}{(W^2 - m_{\text{tar}}^2)^2},$	3.40000e+00	10
	1.10000e+00	11
	3.60000e+00	12
	-5.00000e+00	13
	0.00000e+00	14
	0.00000e+00	15
	0.00000e+00	16

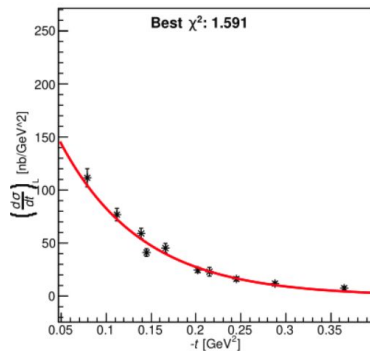
Fpi-2 Fits from Fit-SA-Minuit (FitSAMin, FiSAMI)

$$Q^2=1.6+2.45, W=2.22$$

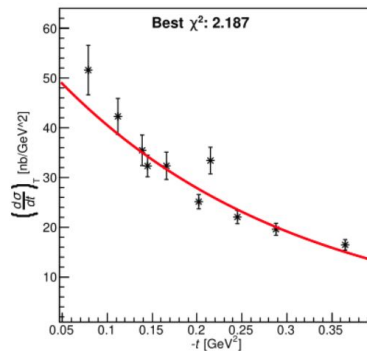
Next step look at

- Fpi-1
- Nacer (Kaon) and Vijay (Pion) sets

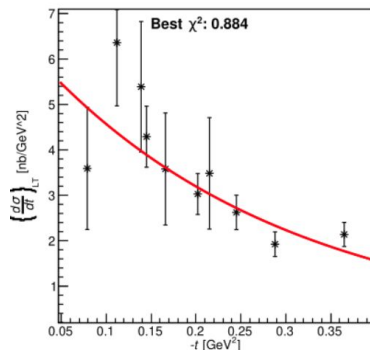
Sigma L Model Fit



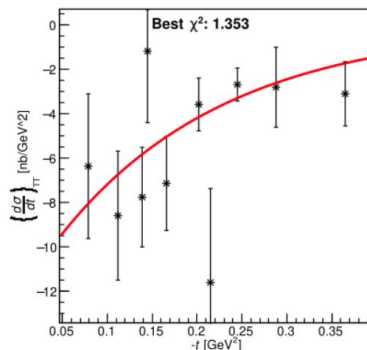
Sigma T Model Fit



Sigma LT Model Fit



Sigma TT Model Fit



5.08356e+01	1
-3.97485e-01	2
-3.31994e+01	3
-1.27150e+02	4
6.83925e-02	5
-7.48387e-01	6
0.00000e+00	7
0.00000e+00	8
7.40524e-02	9
-6.87573e-01	10
1.79001e+00	11
-5.14612e+00	12
-6.06280e+02	13
0.00000e+00	14
0.00000e+00	15
0.00000e+00	16

Constants:

$$\pi, \quad m_{\text{tar}} = 0.93827231, \quad m_{\pi^+} = 0.139570, \quad m_{K^+} = 0.493677$$

$$t_{\text{av}} = (0.05032 + 0.01345 \ln Q_{\text{set}}^2) Q_{\text{set}}^2,$$

$$f_{t\text{av}} = \frac{|t| - t_{\text{av}}}{t_{\text{av}}},$$

$$f_t = \frac{|t|}{(|t| + m_{K^+}^2)^2},$$

$$\sigma_L = (p_1 f_t) \exp(-|p_2 t|),$$

$$\sigma_T = \frac{p_5}{|t|^{p_6}} \exp(-|p_7 t|),$$

$$\sigma_{LT} = \frac{p_9}{|t|},$$

$$\sigma_{TT} = \frac{p_{13}}{|t|^{p_{14}}} \exp(-|p_{15} t|),$$

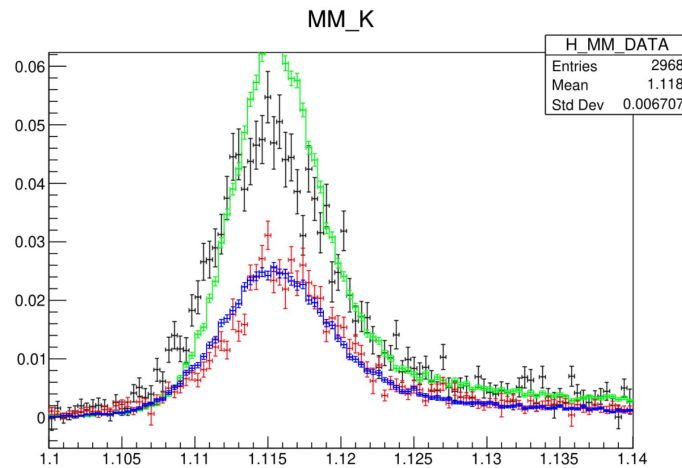
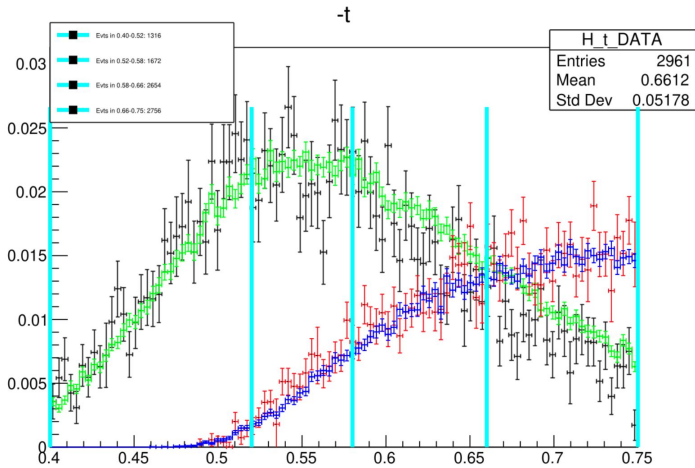
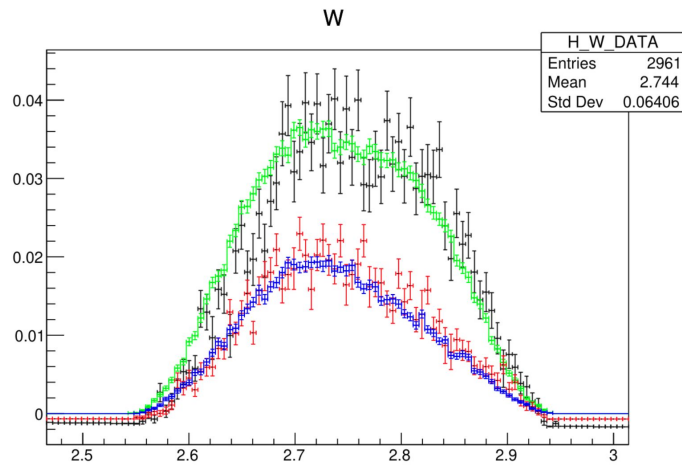
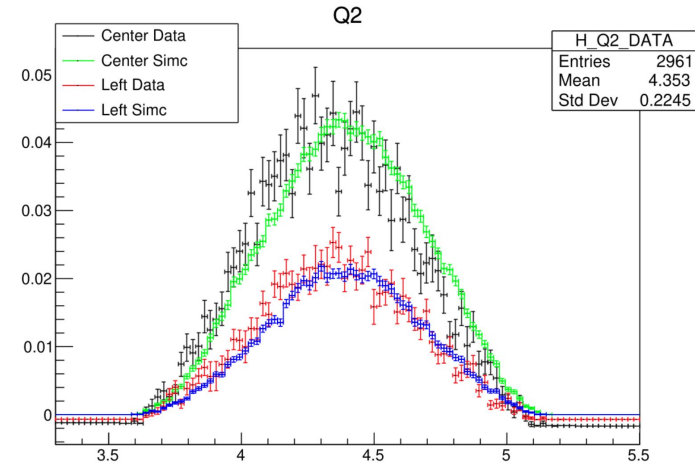
$$w_{\text{factor}} = \frac{1}{(W^2 - m_{\text{tar}}^2)^{0.85} W_{\text{set}}^2 - 5.97 W_{\text{set}} + 12.68}.$$

**KaonLT
Analysis**

Data has pion subtraction and empirical fit

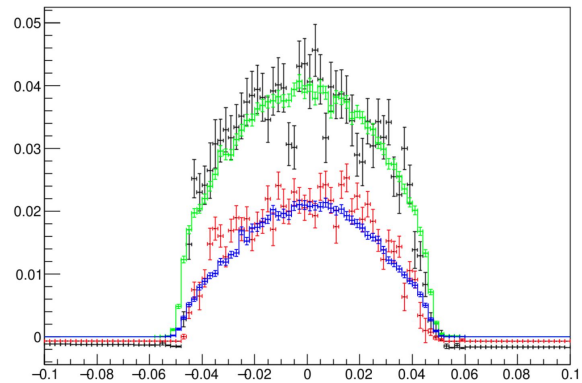
- No Σ fit

$Q^2=4.4$, $W=2.74$ | $1.10 \leq M_K \leq 1.14$, $0.88 \leq M_\pi \leq 0.94$

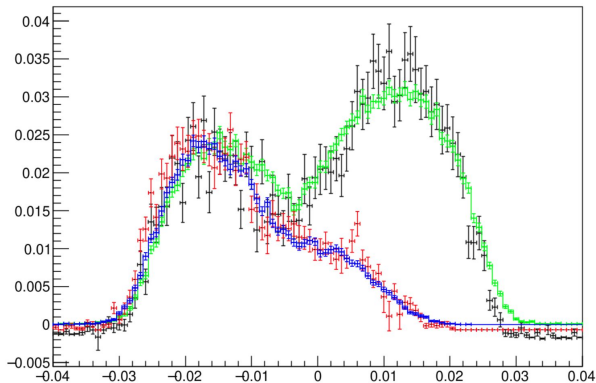


$Q^2=4.4$, $W=2.74$ | $1.10 \leq M_K \leq 1.14$, $0.88 \leq M_\pi \leq 0.94$

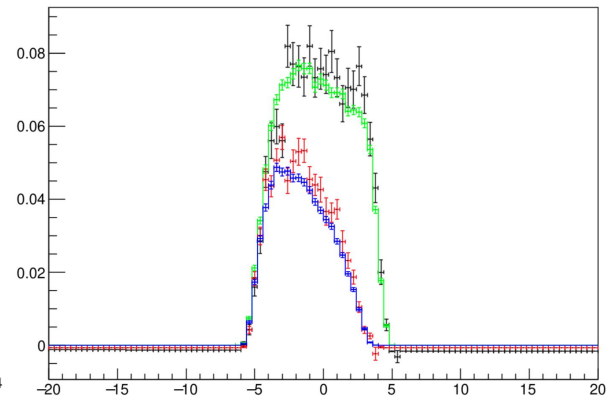
SHMS xptar



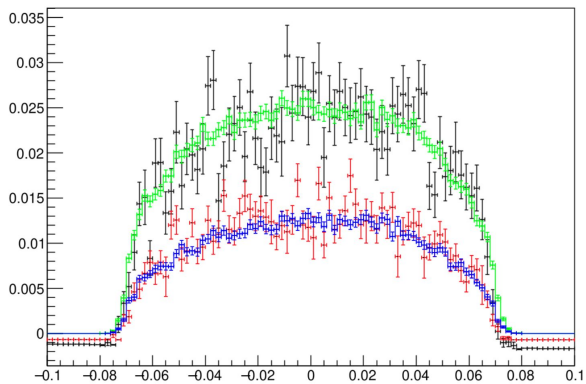
SHMS yptar



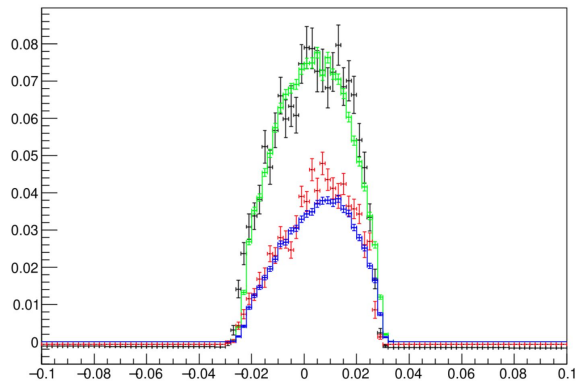
SHMS delta



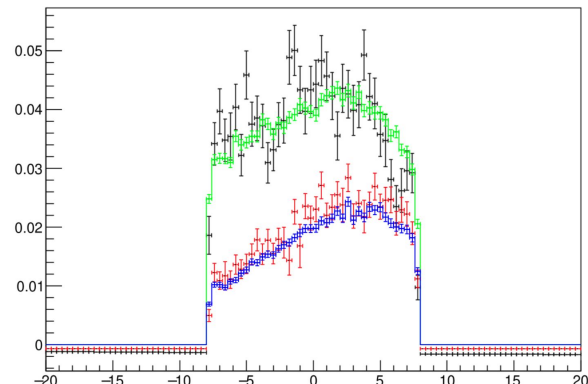
HMS xptar



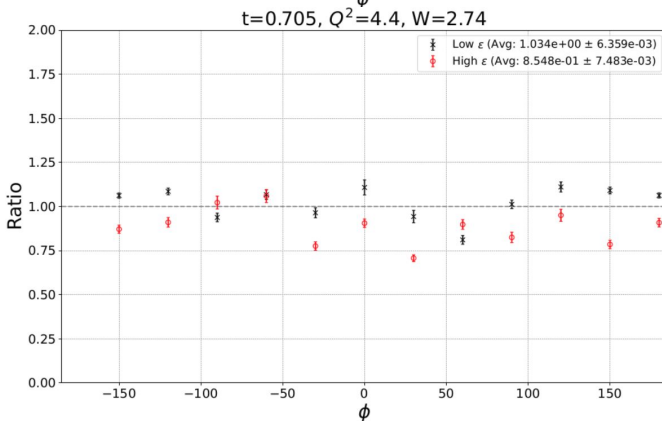
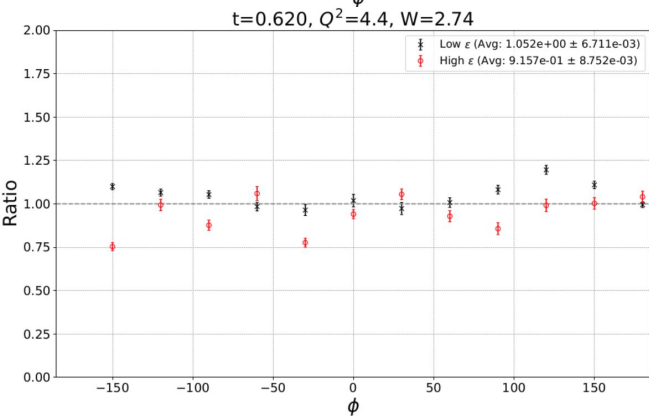
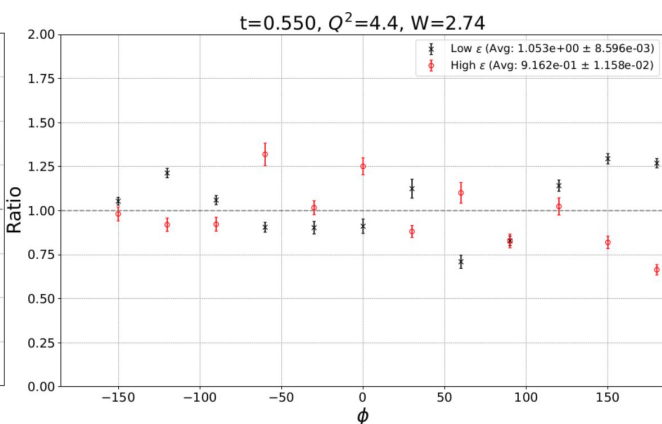
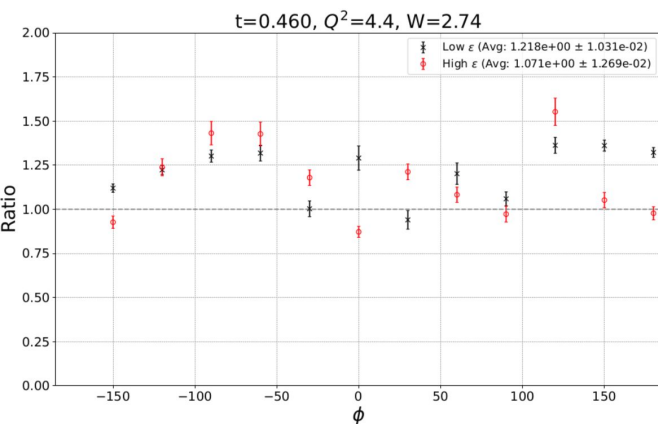
HMS yptar



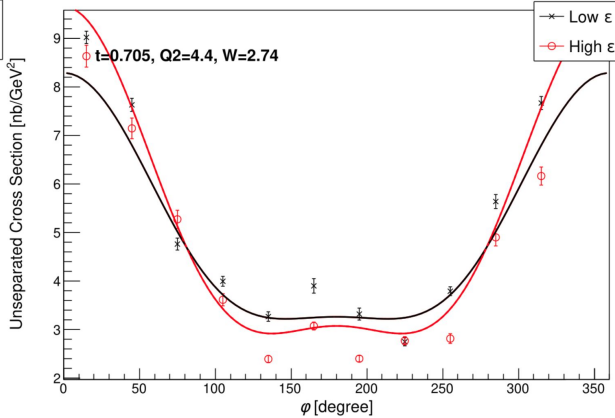
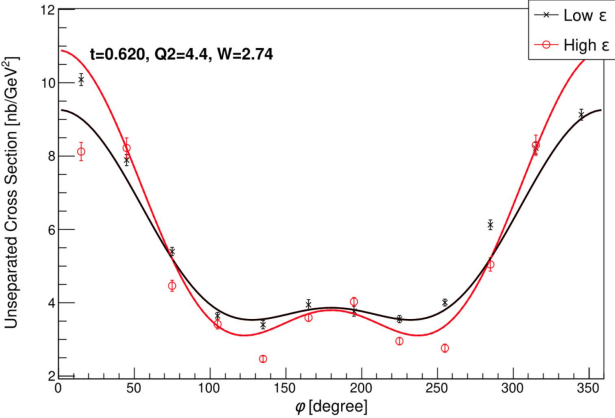
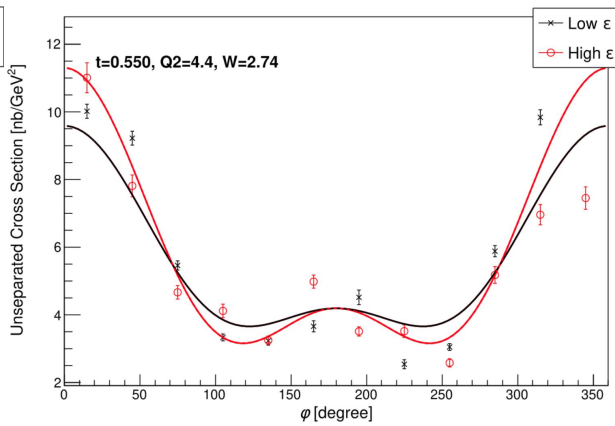
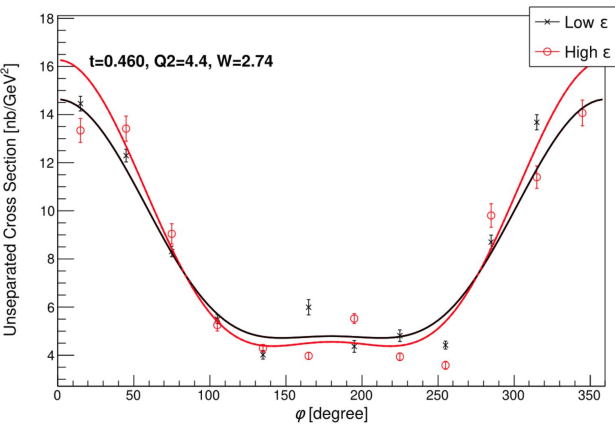
HMS Delta



$$Q^2=4.4, W=2.74 \mid 1.10 \leq M_K \leq 1.14, 0.88 \leq M_\pi \leq 0.94$$

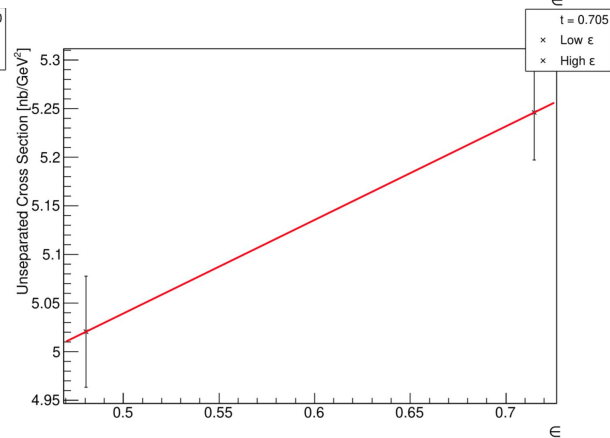
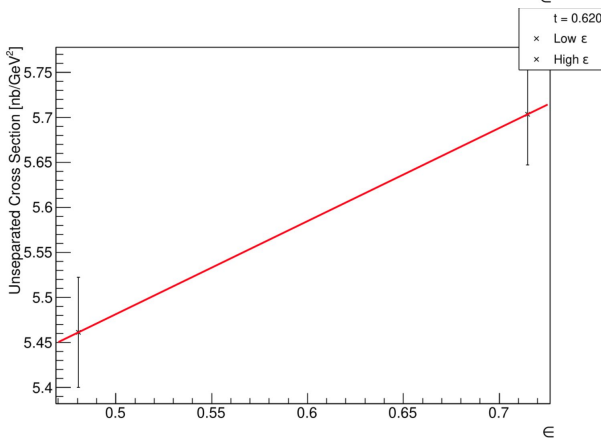
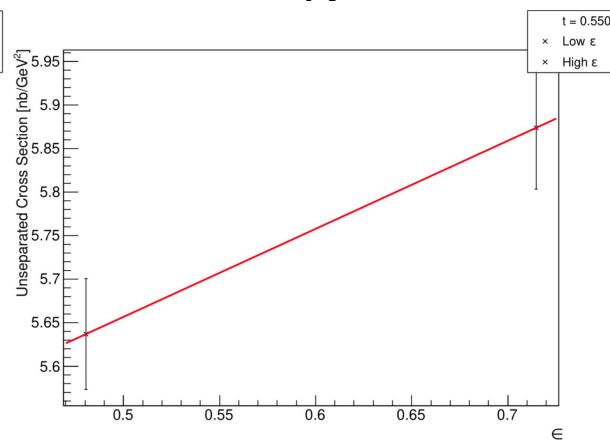
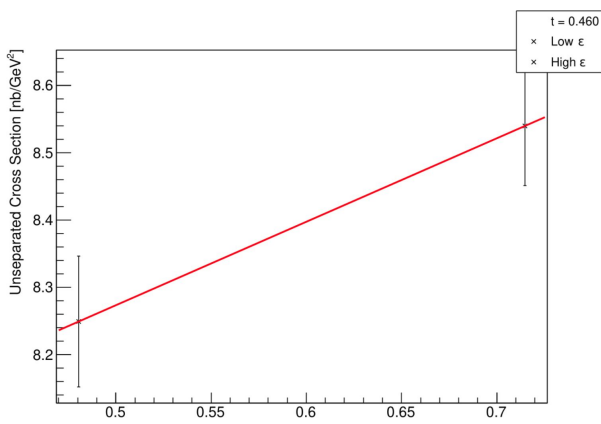


$$Q^2=4.4, W=2.74 \mid 1.10 \leq M_K \leq 1.14, 0.88 \leq M_\pi \leq 0.94$$



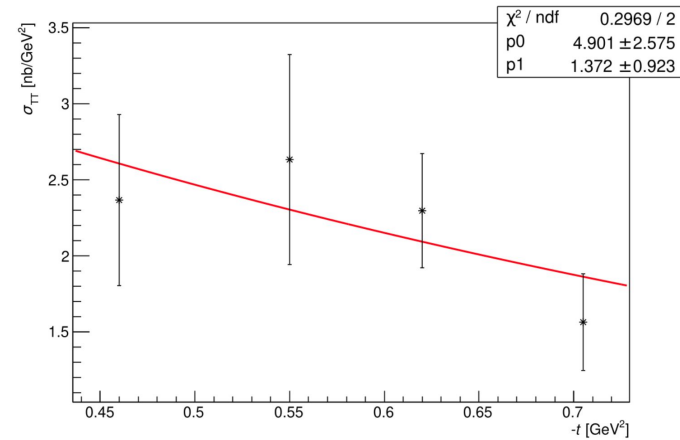
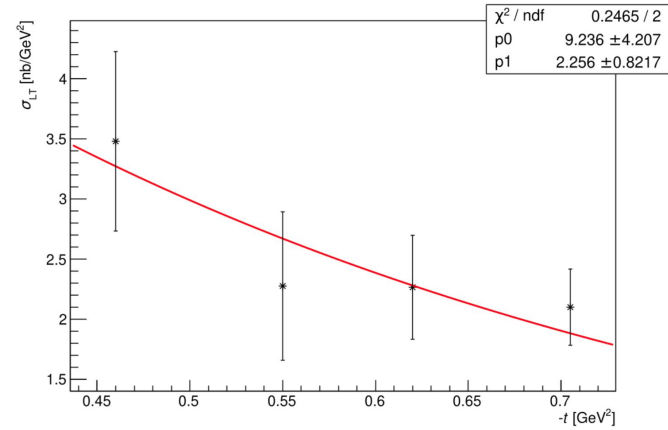
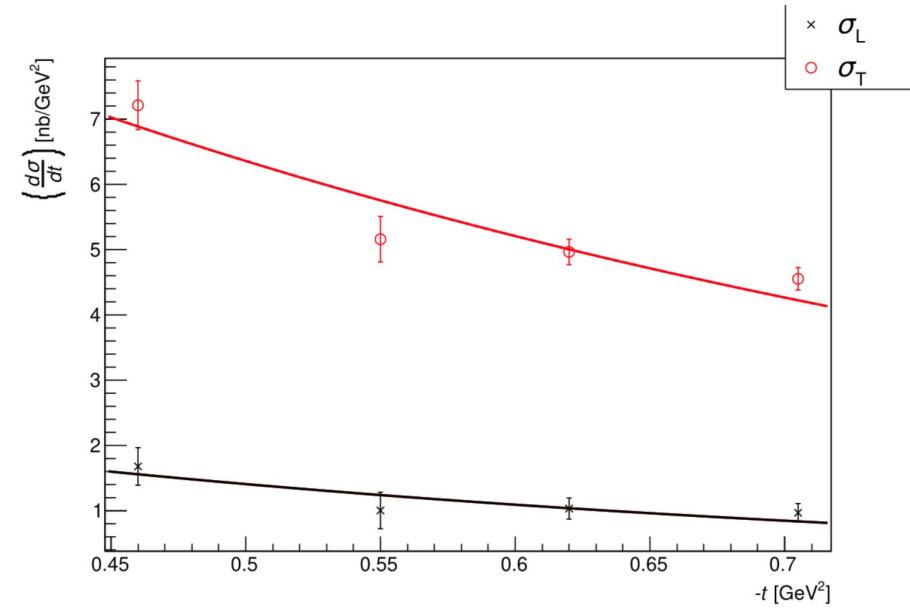
Not including full fitting
uncertainty

$$Q^2=4.4, W=2.74 \mid 1.10 \leq M_K \leq 1.14, 0.88 \leq M_\pi \leq 0.94$$



Weighted average
unseparated cross
sections

$$Q^2=4.4, W=2.74 \mid 1.10 \leq M_K \leq 1.14, 0.88 \leq M_\pi \leq 0.94$$



Next Steps for Analysis

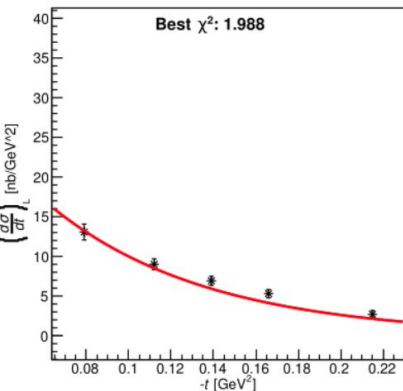
- Reanalyze...
 - $Q^2=3.0/W=2.32$
 - $Q^2=4.4/W=2.74$ ✓
 - $Q^2=5.5/W=3.02$
- Kin's work...
 - $Q^2=2.115/W=2.95$
 - $Q^2=3.0/W=3.14$
- Refine model, last fit optimizations (**Mid-October**)
- Preliminary systematics study (**Start of November**)
- Final full replay and finalize systematics study (**Before Thanksgiving**)

EXTRA

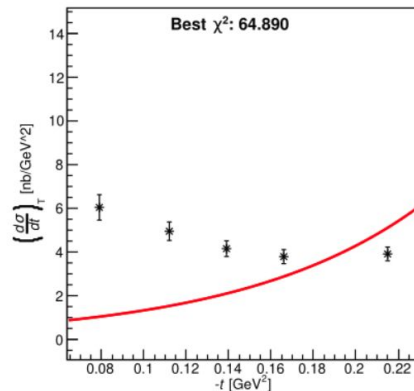
Fpi-2 Fits from ariv 0809.3161

$Q^2=1.6$, $W=2.22$

Sigma L Model Fit

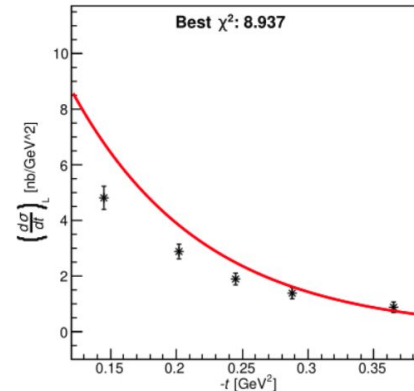


Sigma T Model Fit

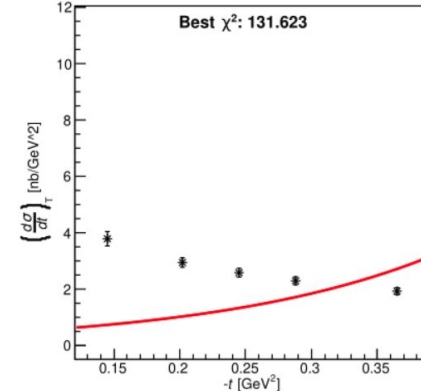


$Q^2=2.45$, $W=2.22$

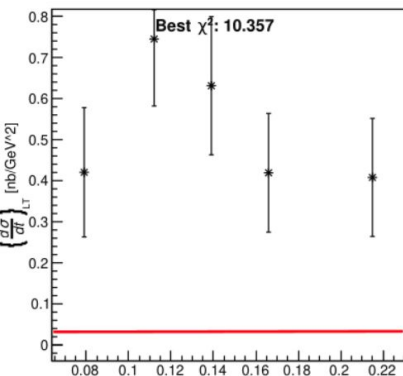
Sigma L Model Fit



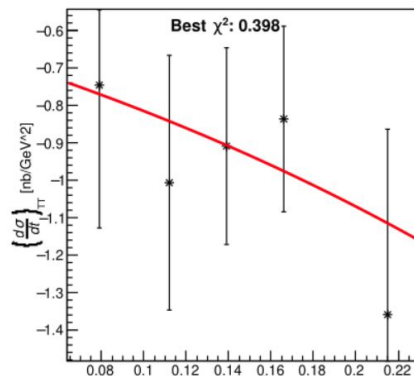
Sigma T Model Fit



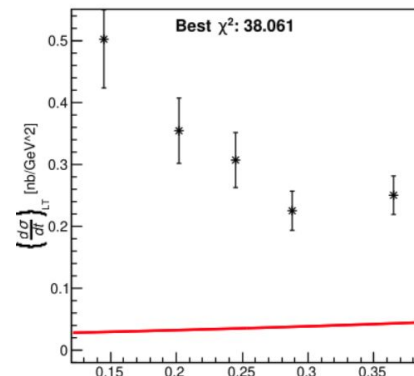
Sigma LT Model Fit



Sigma TT Model Fit



Sigma LT Model Fit



Sigma TT Model Fit

