

COMPTON ANALYSIS REPORT

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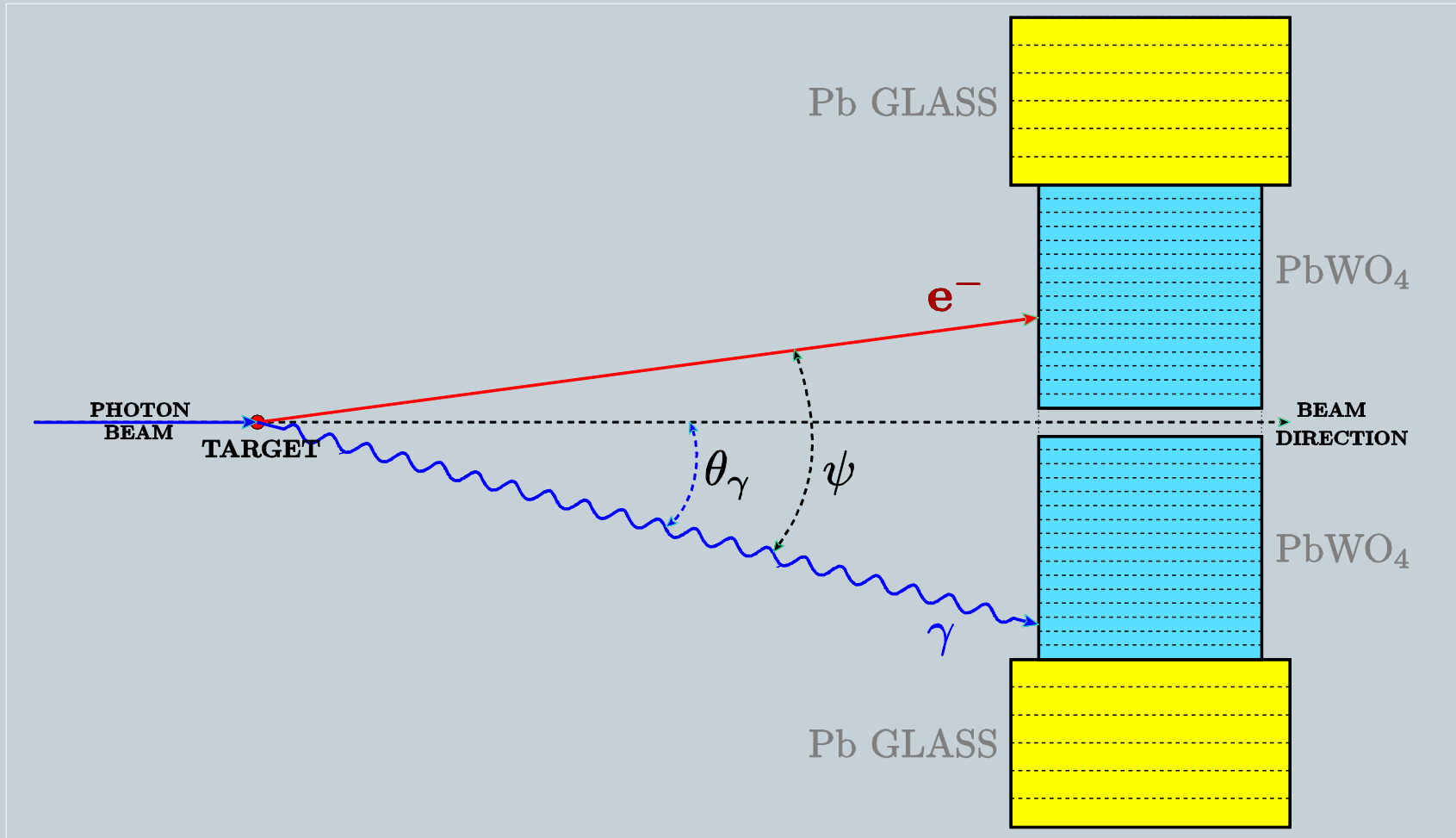
PAWEL AMBROZEWICZ NC A&T

OUTLINE:

- **Event Selection**
- **Extraction Procedure**
- **Yield Fits**
- **Results**
 - **Total Cross Section**
 - **Total Cross Section (Large Statistics)**
 - **Forward Solid Angle Cross Section**
 - **Time Stability**
 - **Uncertainties**
- **Summary**

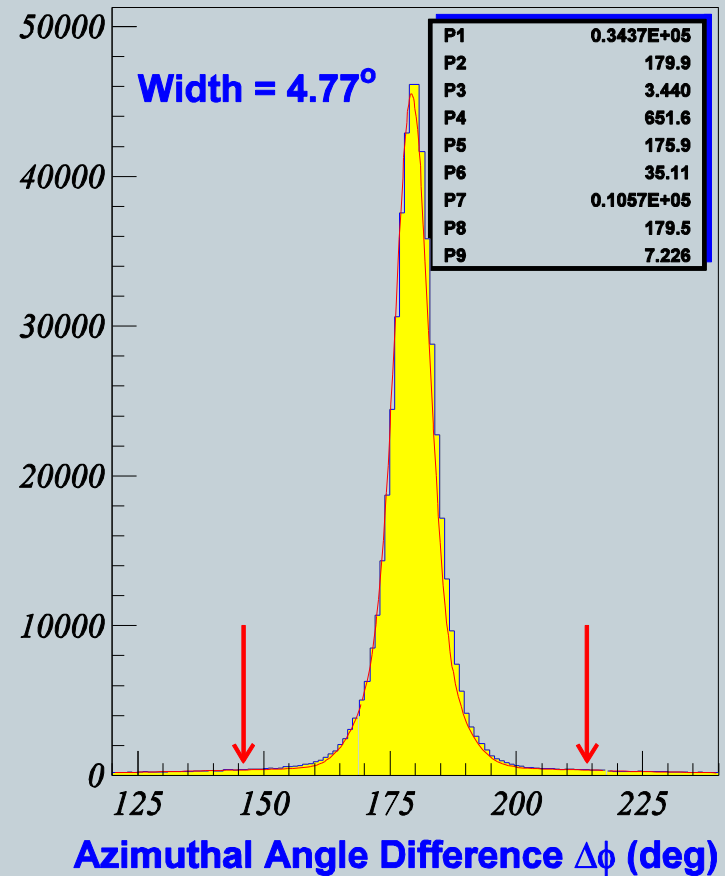
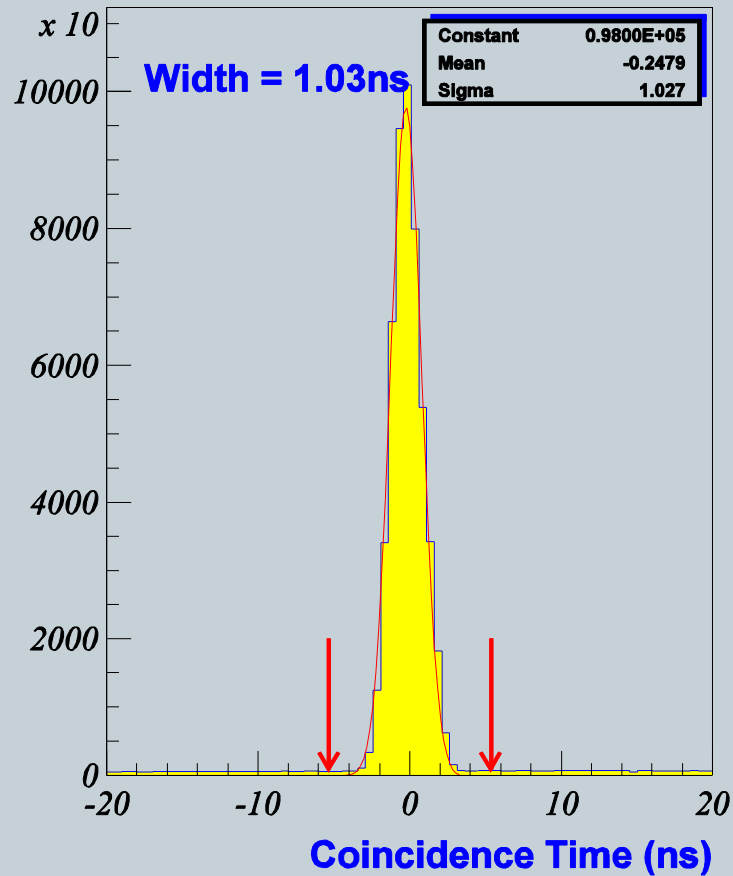
COMPTON EVENT

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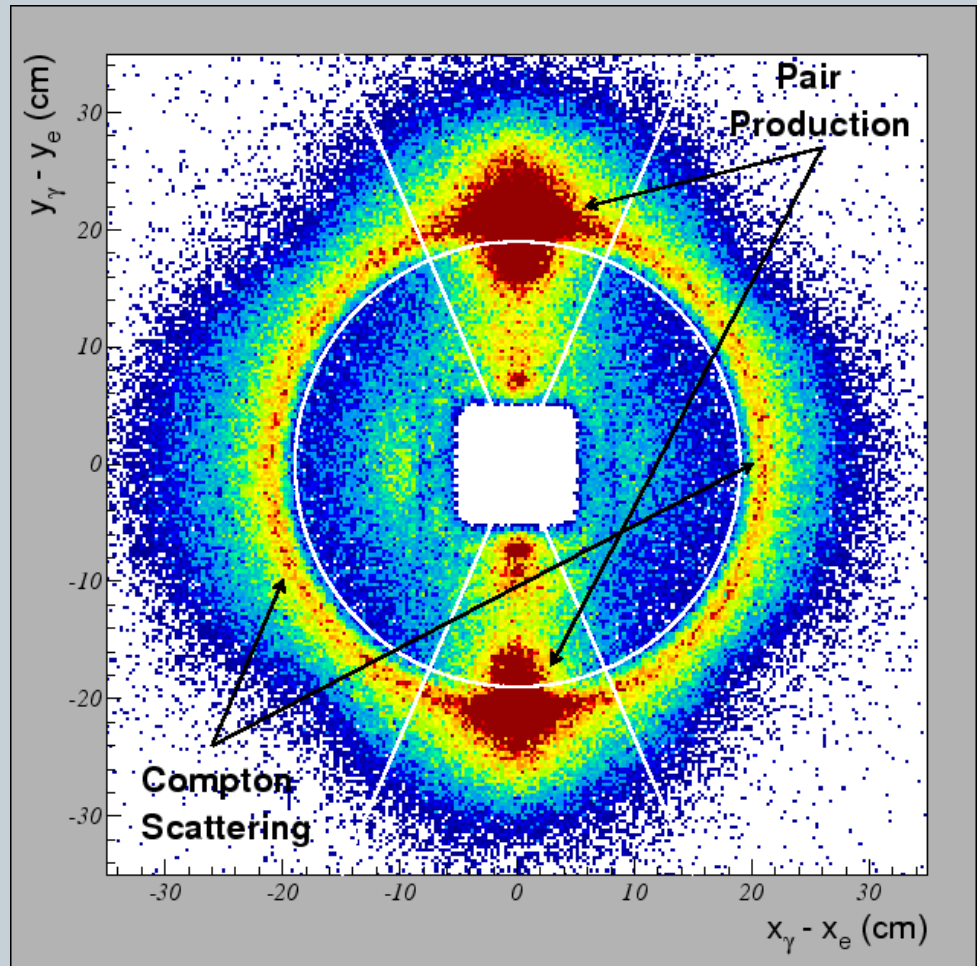
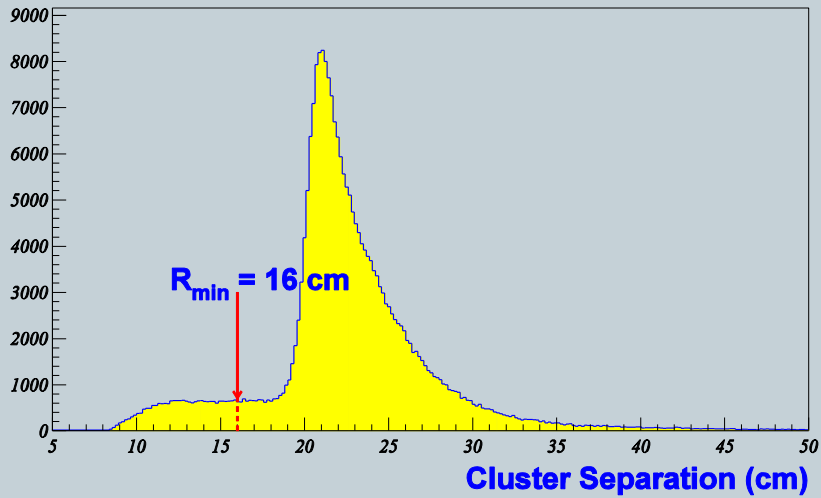
SELECTION CUTS

3



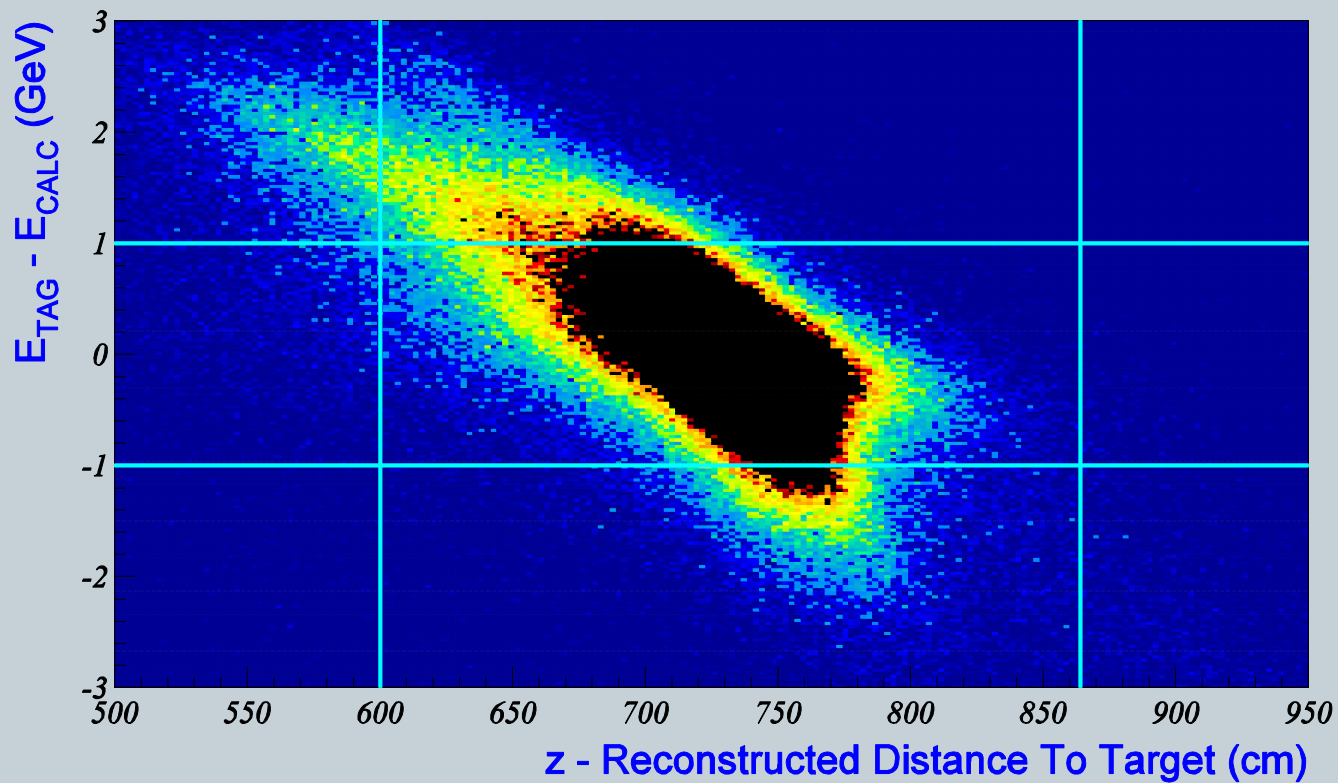
SELECTION CUTS

4



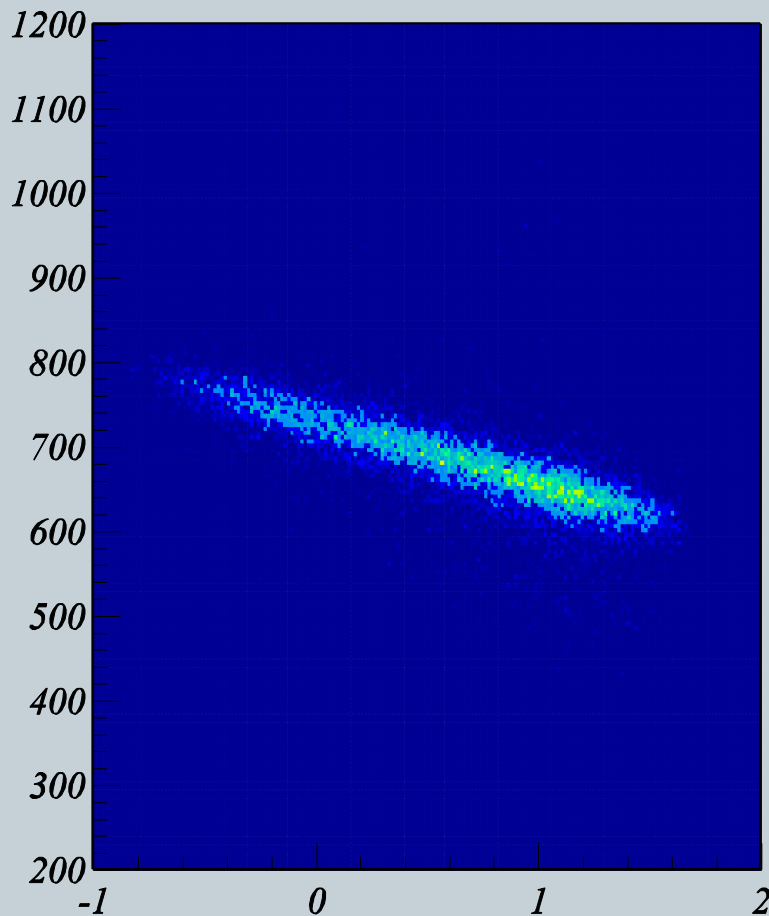
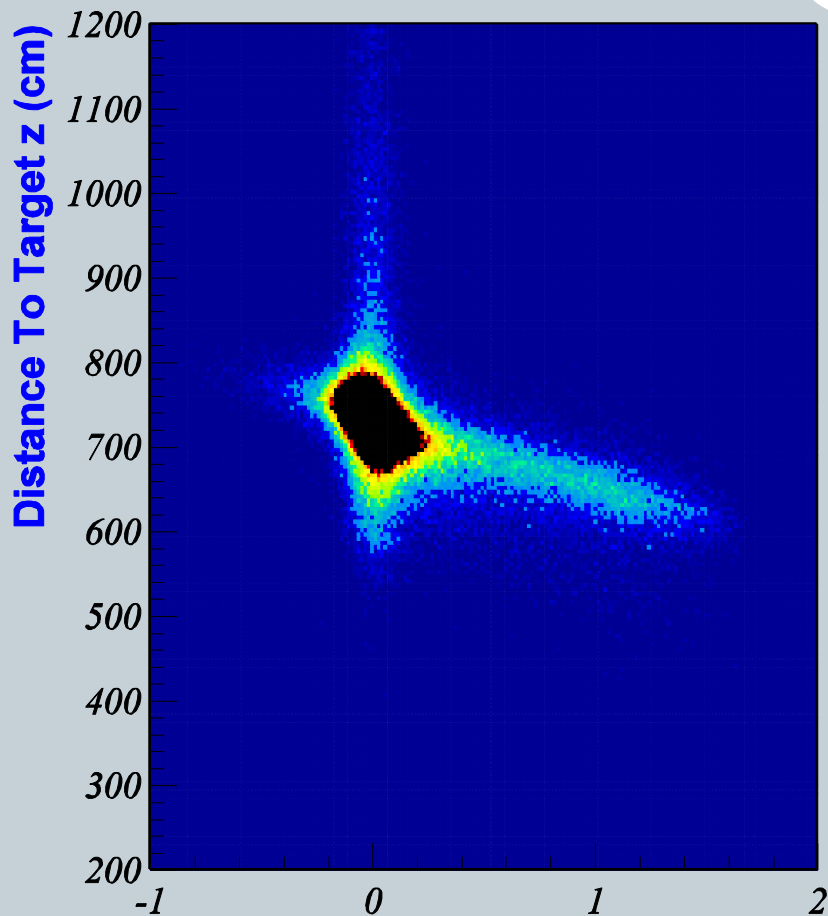
SELECTION CUTS

5



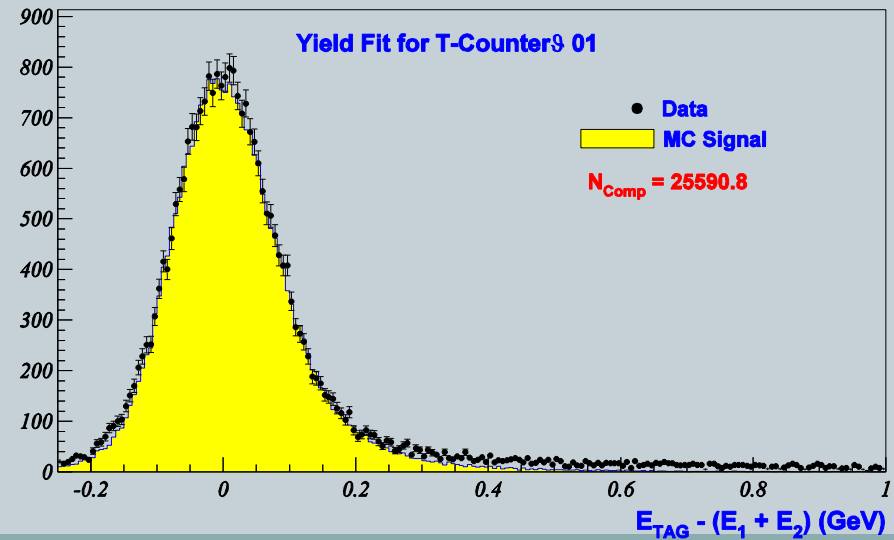
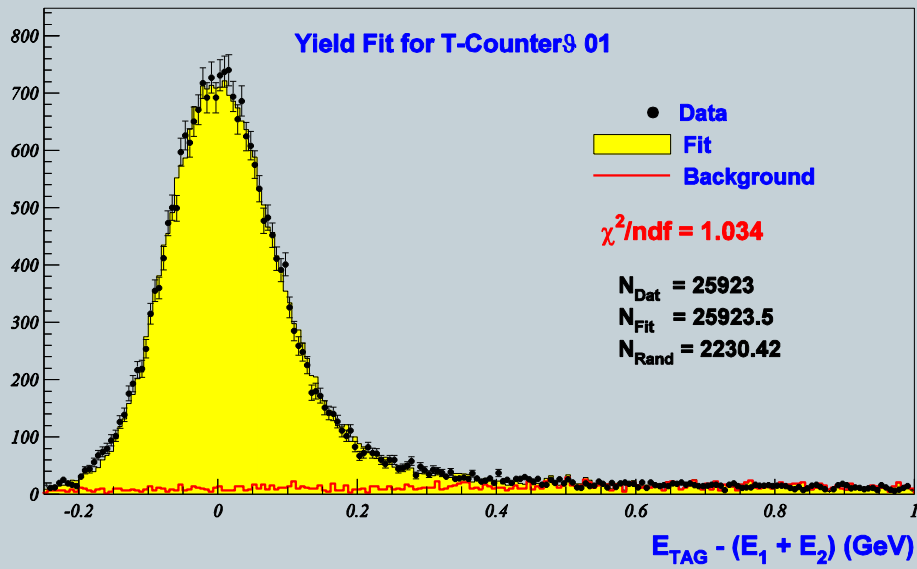
BACKGROUND MODEL

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LINE SHAPE YIELD FITS

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CROSS SECTION EXTRACTION PROCEDURE

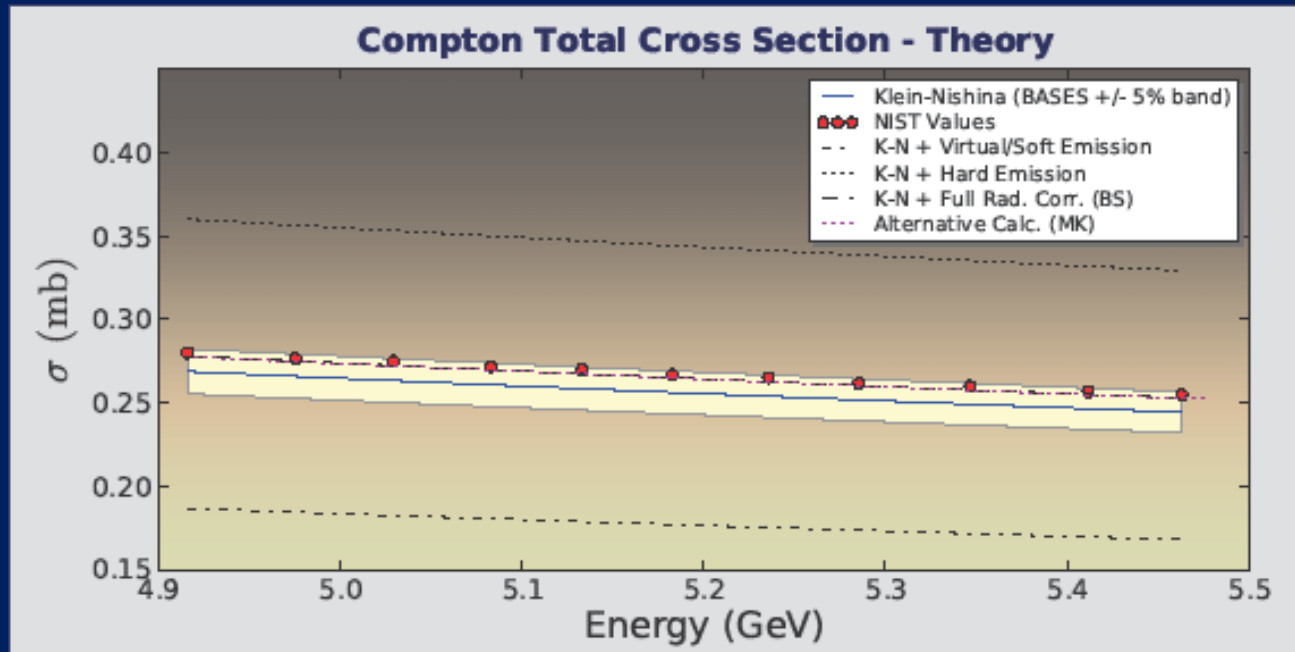
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**TOTAL CROSS SECTION
(RADIATED)**

$$\left\langle \frac{d\sigma}{d\nu} \right\rangle = \frac{1}{n_e \Gamma_\gamma \mathcal{A}_{CZP}} \frac{N}{\Delta\nu}$$

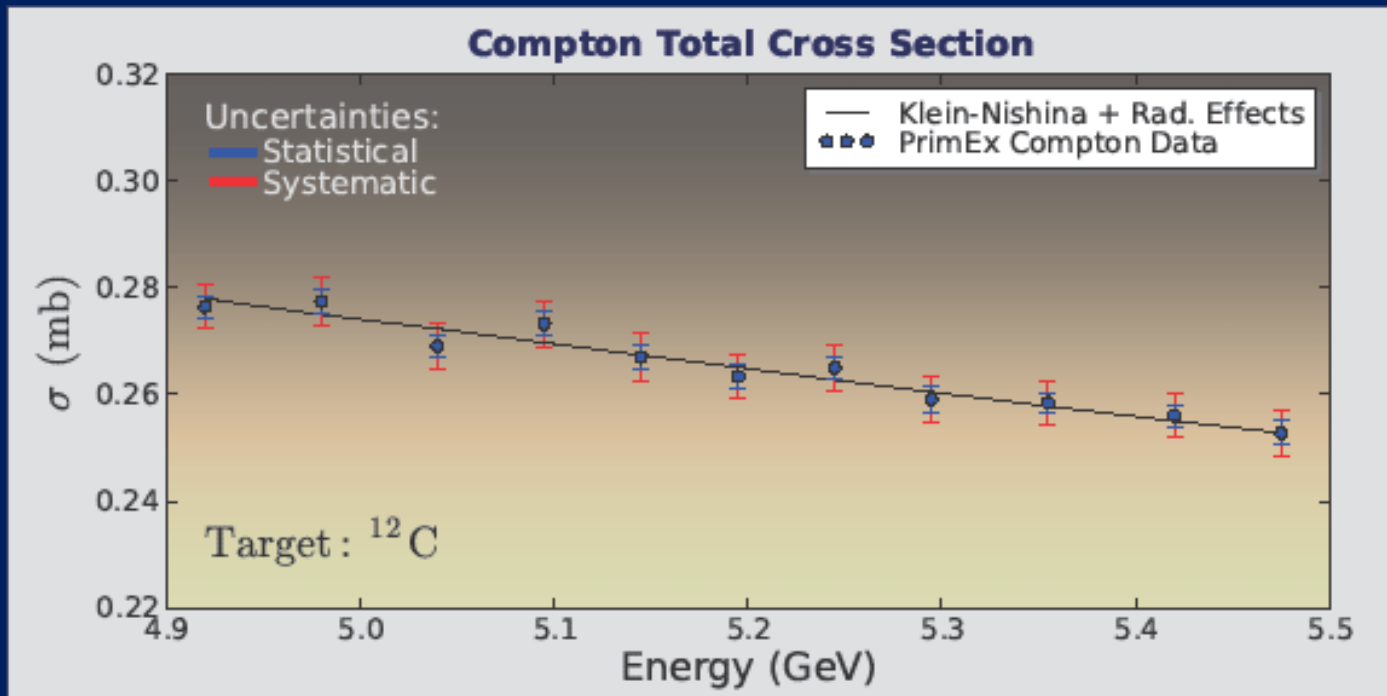
**FORWARD SOLID ANGLE
CROSS SECTION
(BORN LEVEL)**

$$\sigma_{DAT} = \sigma_{KN} \frac{Y_{DAT}}{Y_{MC}}$$



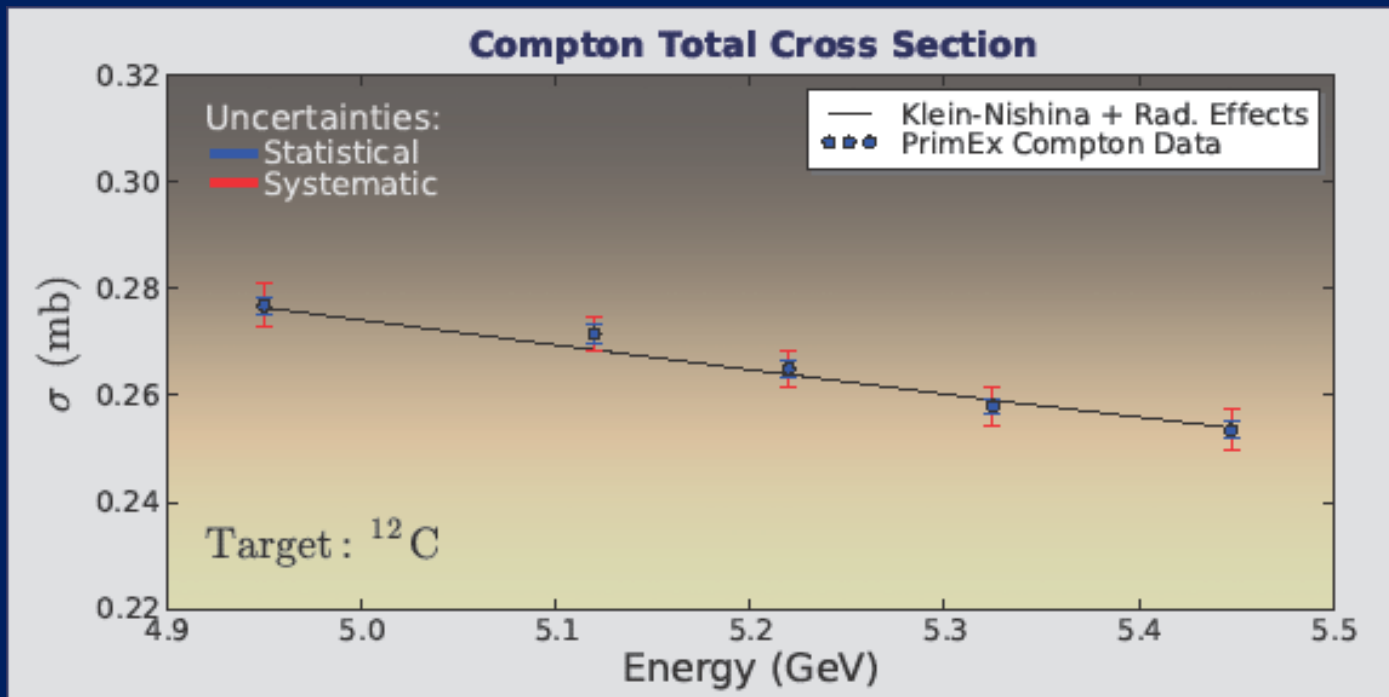
TOTAL CROSS SECTION

9



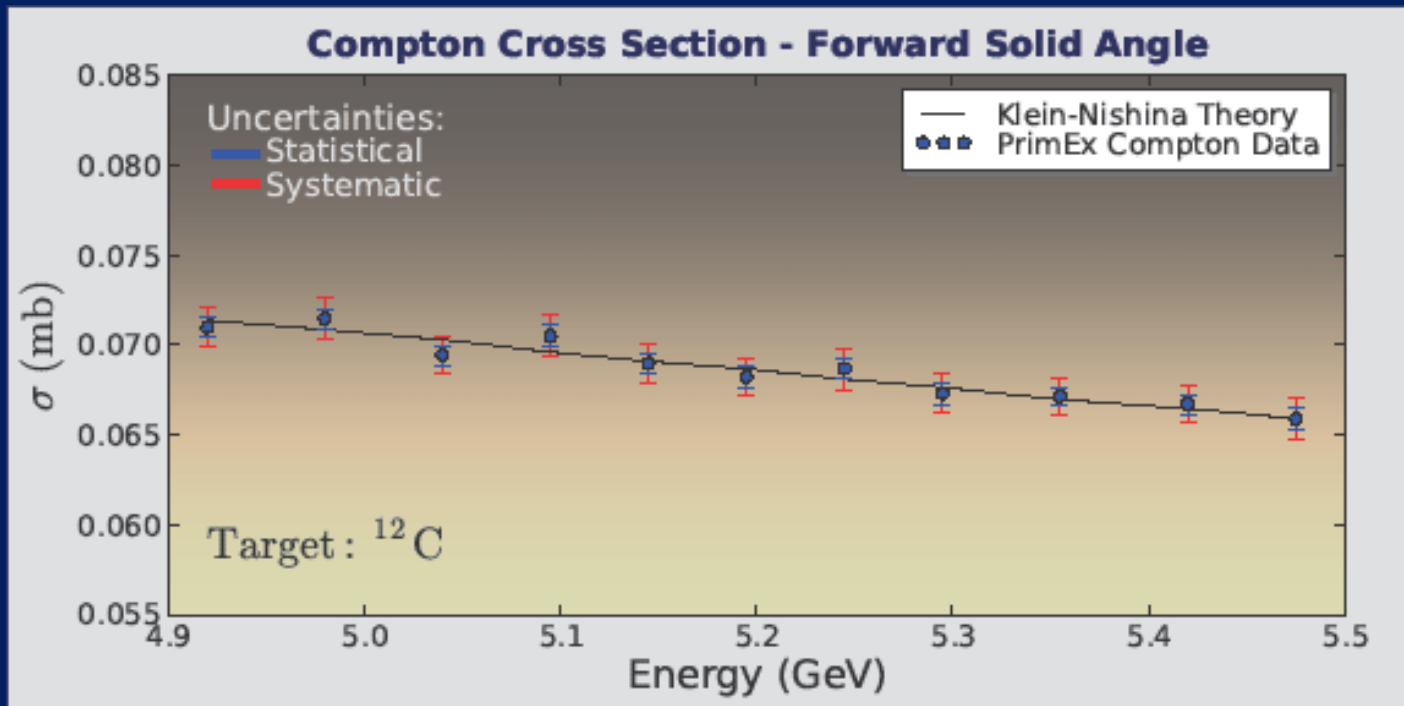
TOTAL CROSS SECTION

10



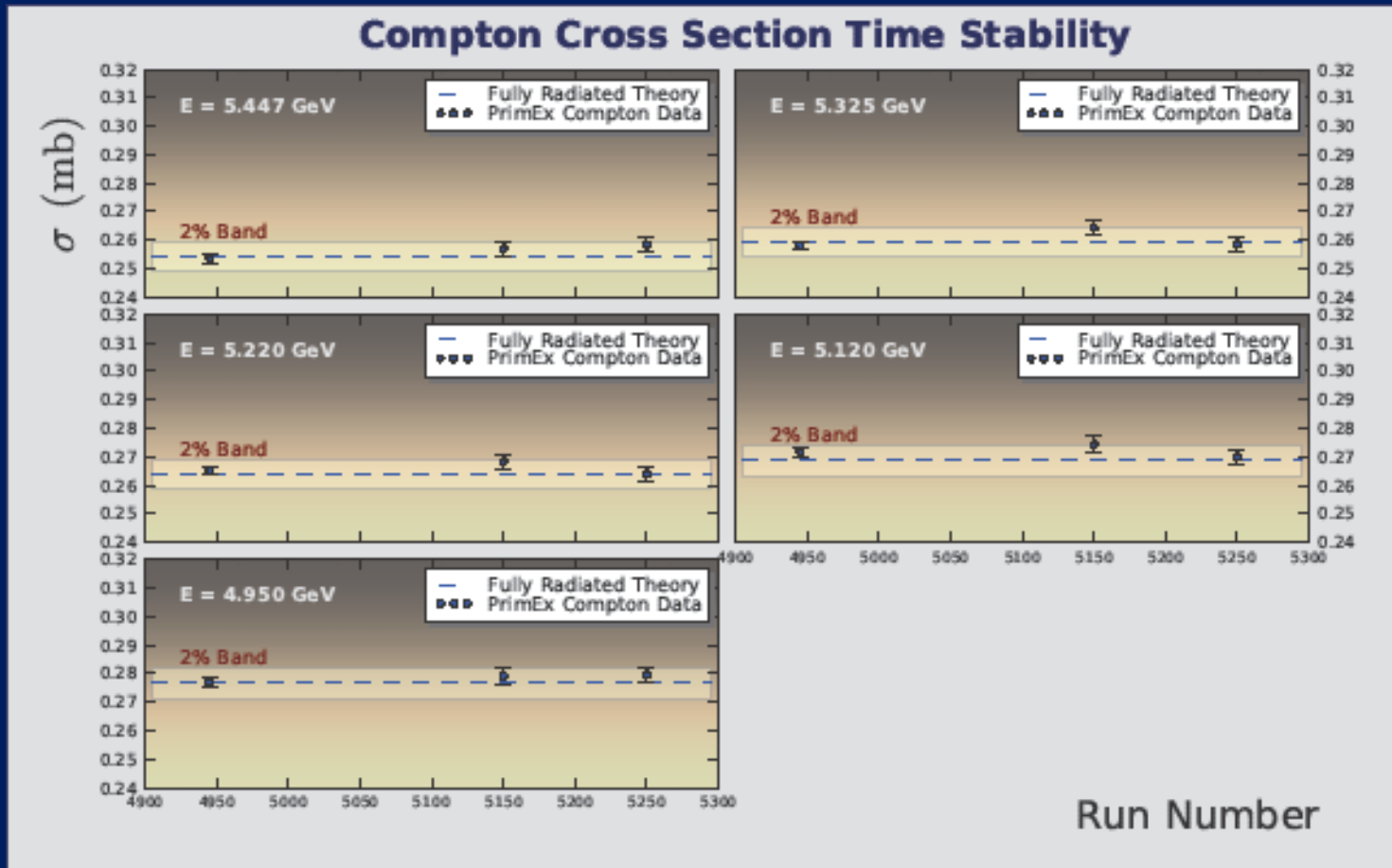
FORWARD SOLID ANGLE CROSS SECTION

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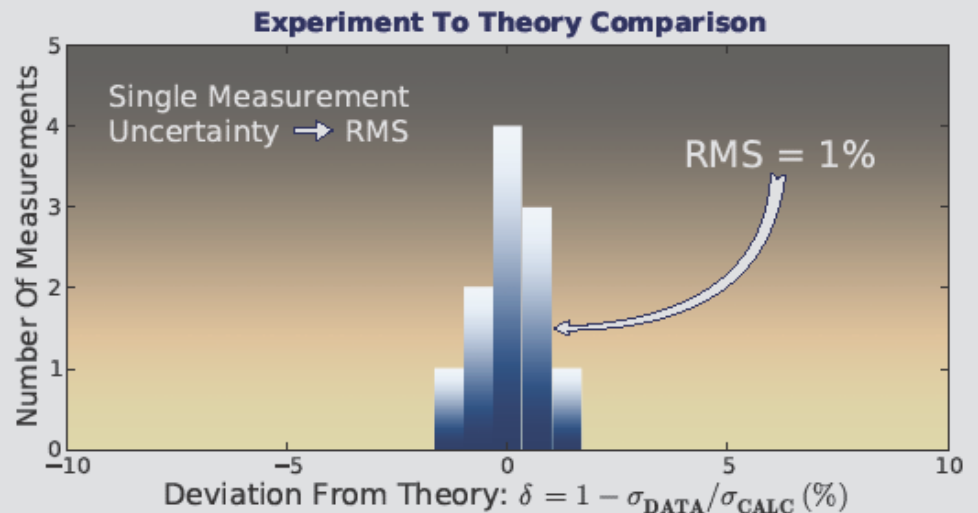
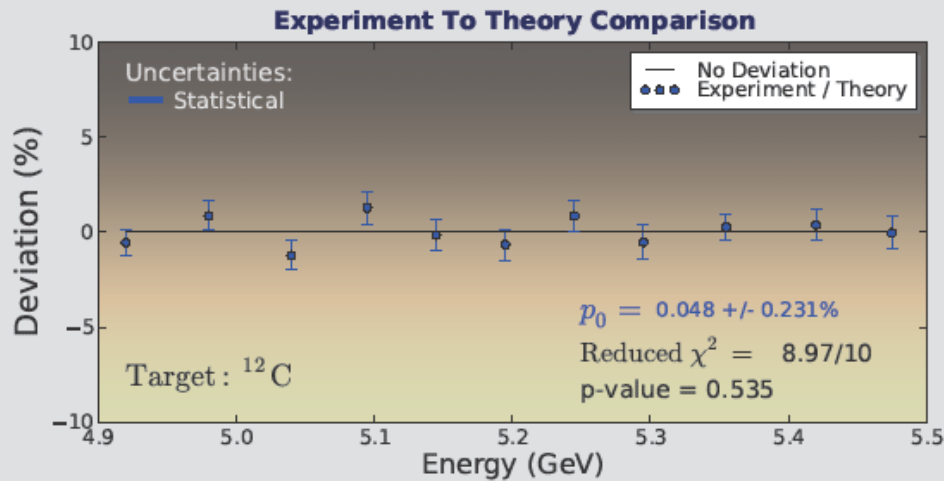
TIME STABILITY

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COMPARISON WITH THEORY

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UNCERTAINTIES

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TCtr	Flux	Tgt	Selection Cuts					Fit	HyCal Res.Fn.	Errors		
			ΔT_{coin}	$\Delta\phi$	Rad. Tail	Sg/Bg	Geom.			Syst.	Stat.	Total
1	1.0	0.05	0.09	0.07	0.045	0.81	0.64	0.063	0.5	1.53	0.88	1.77
2	1.0	0.05	0.01	0.08	0.045	0.68	0.67	0.063	0.5	1.47	0.82	1.68
3	1.0	0.05	0.01	0.09	0.045	0.82	0.59	0.063	0.5	1.51	0.71	1.67
4	1.0	0.05	0.03	0.08	0.045	0.69	0.62	0.063	0.5	1.46	0.89	1.71
5	1.0	0.05	0.13	0.10	0.045	0.72	0.76	0.063	0.5	1.54	0.84	1.76
6	1.0	0.05	0.08	0.07	0.045	0.66	0.53	0.063	0.5	1.41	0.83	1.64
7	1.0	0.05	0.03	0.07	0.045	0.70	0.65	0.063	0.5	1.48	0.85	1.70
8	1.0	0.05	0.03	0.06	0.045	0.62	0.66	0.063	0.5	1.44	0.84	1.67
9	1.0	0.05	0.08	0.07	0.045	0.76	0.40	0.063	0.5	1.42	0.78	1.62
10	1.0	0.05	0.03	0.08	0.045	0.77	0.57	0.063	0.5	1.48	0.77	1.67
11	1.0	0.05	0.06	0.09	0.045	0.63	0.59	0.063	0.5	1.42	0.72	1.59

Table 4.1: Systematic uncertainties. All values are in %. Statistical error accounts for yield and photon flux fluctuations.

UNCERTAINTIES

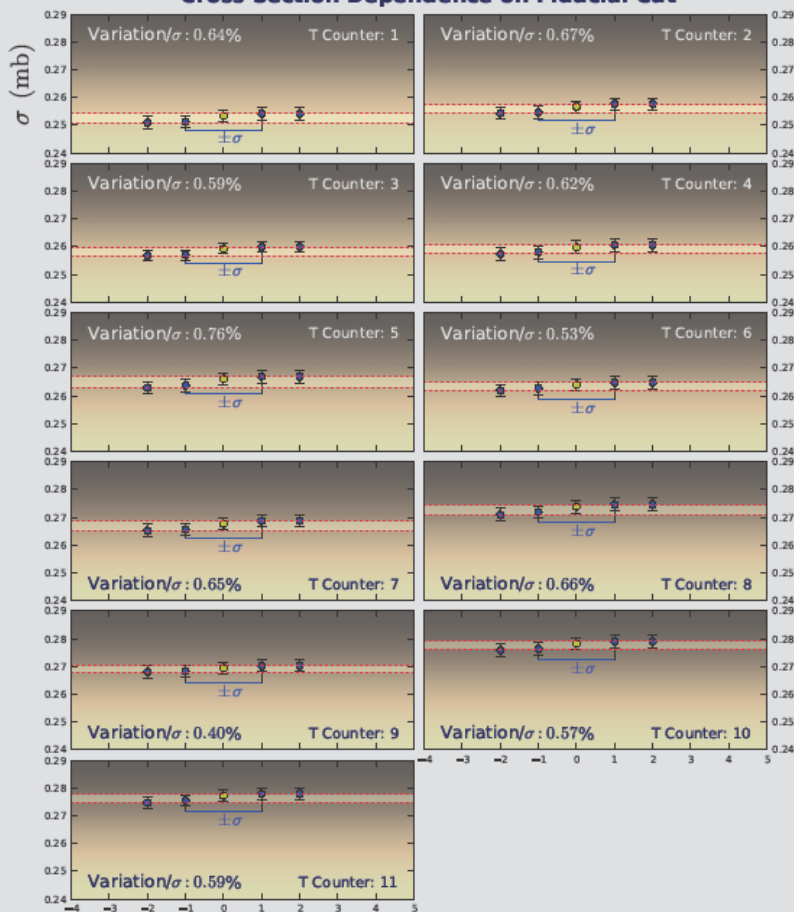
TCtr	Flux	Tgt	Selection Cuts					Fit	HyCal Res.Fn.	Errors		
			ΔT_{min}	$\Delta\phi$	RC Tail	Sg/Bg	Geom.			Syst.	Stat.	Total
1-2	1.0	0.05	0.03	0.065	0.098	0.91	0.46	0.063	0.5	1.52	0.61	1.64
3-4	1.0	0.05	0.03	0.065	0.098	0.68	0.42	0.063	0.5	1.38	0.57	1.50
5-6	1.0	0.05	0.03	0.065	0.098	0.46	0.40	0.063	0.5	1.28	0.60	1.42
7-8	1.0	0.05	0.03	0.065	0.098	0.33	0.37	0.063	0.5	1.23	0.61	1.37
10-11	1.0	0.05	0.03	0.065	0.098	0.85	0.36	0.063	0.5	1.46	0.54	1.55

Table 4.2: Experimental uncertainties. All values are in %. Statistical error accounts for yield and photon flux fluctuations.

UNCERTAINTIES

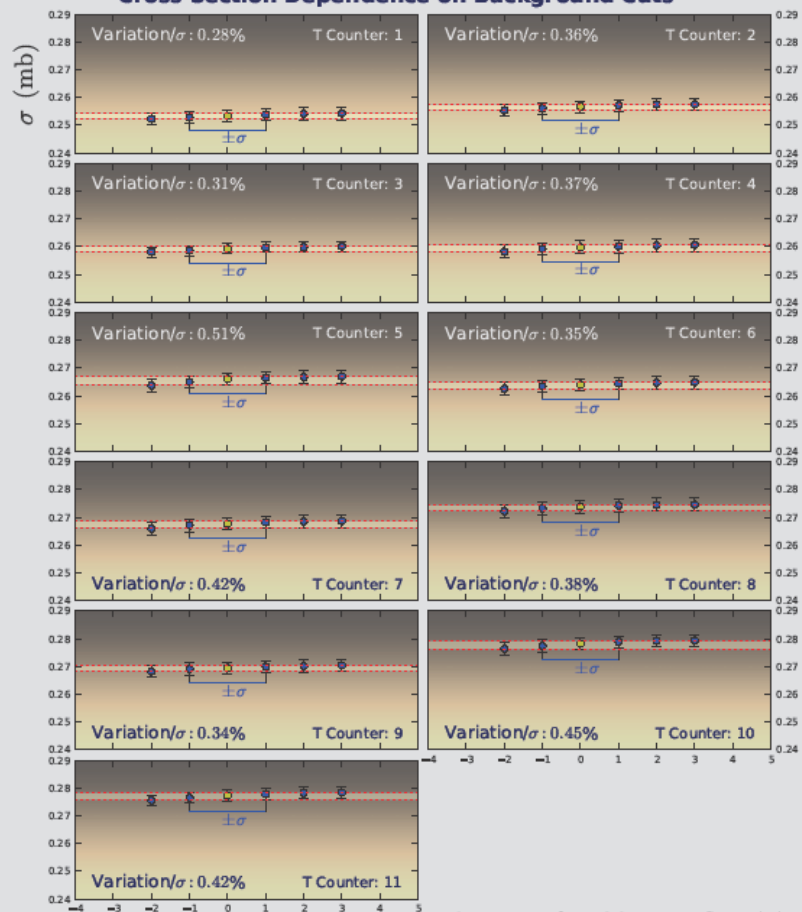
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Cross Section Dependence on Fiducial Cut



Fiducial Region Cut (σ)

Cross Section Dependence on Background Cuts



Interaction Vertex Cut (σ)

SUMMARY

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- **Good control of systematics**
- **Simulation of the background would help reduce systematic uncertainties**
- **Differential cross section needs serious work**