Pion-LT/Kaon-LT Collaboration Meeting

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LTSep Pre-Analysis

- **Working on physics setting:** Q2 = 3.85, W = 2.62, t = 0.21 (2 epsilons)

- **Finalized the following studies before the LTSep analysis:**

  - Missing mass offset and cut determination
  - Diamond cut determination
  - t-resolution check
  - t-binning
  - phi-binning
  - Data yields
  - SIMC yields
  - Data/SIMC comparison and ratios
  - Average kinematics and ratios calculation

LTSep Analysis

- **Next steps are listed as follows:**
  - **Unseparated cross-section calculations**
  - **Model iterations**
  - **Rosenbluth equation fitting**
  - **L/T separated cross-section calculations**
  - **Pion Form Factor measurements**

LTSep Analysis

- Calculated kinematic variables for each t-bin for both data and SIMC.
  - Error weighted average of Q2 for high and low epsilon (combined – low and epsilon settings)
  - Error weighted average of W for high and low epsilon (combined – low and epsilon settings)
  - Error weighted average of epsilon for high and low epsilon (combined – low and epsilon settings)
  - Error weighted average of theta for high and low epsilon (combined – low and epsilon settings)
  - Average t-central for high and low epsilon (combined – low and epsilon settings)
  - Average phi-central for high and low epsilon (combined – low and epsilon settings)

- Calculated ratios (DATA/SIMC) for each t & phi-bin setting-by-setting, separately.
- Calculated error weighted average of ratios for t & phi-bin for both high and low epsilon (combined - center, right, and left settings)
- Error-weighted average calculations:

$$w_i = \frac{1}{\boldsymbol{e}_i{}^2}$$

$$\bar{x} = \frac{\sum(x_i \cdot w_i)}{\sum \omega_i}$$

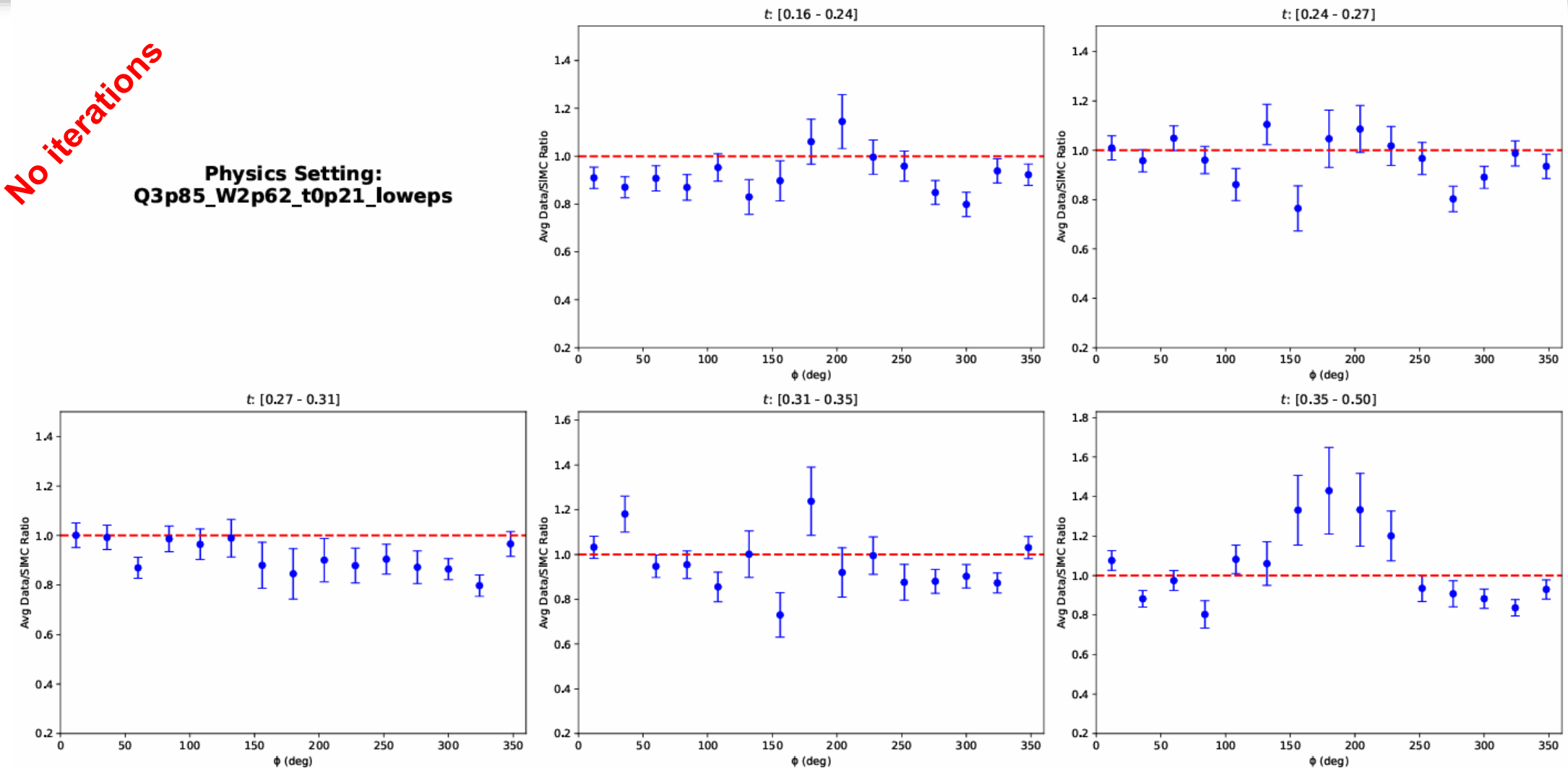
$$\sigma_{\bar{x}} = \sqrt{\frac{1}{\Sigma w_i}}$$

Iteration 0

Physics Ratios

No iterations

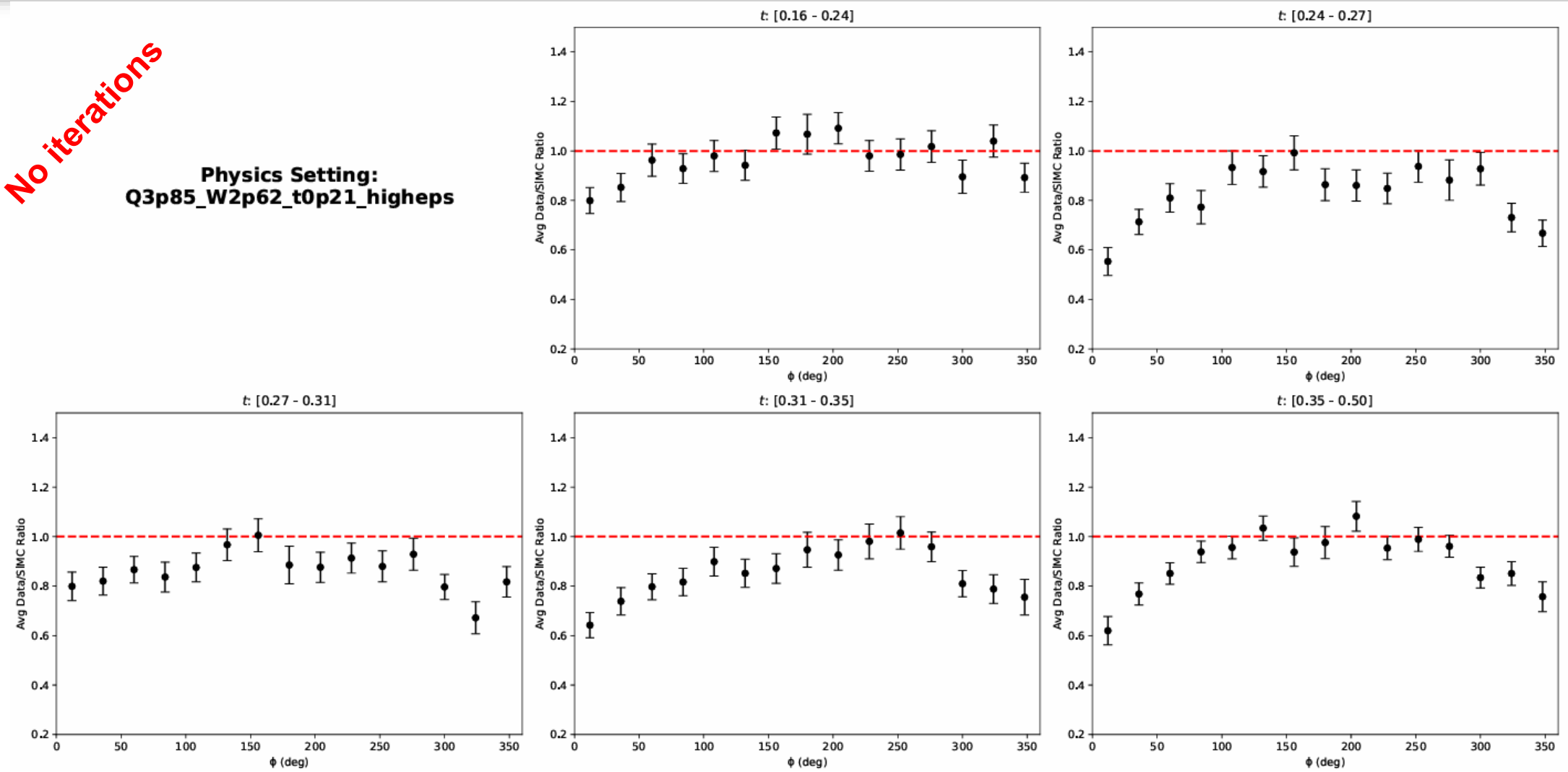
Physics Setting:
Q3p85_W2p62_t0p21_loweps



Physics Ratios

No iterations

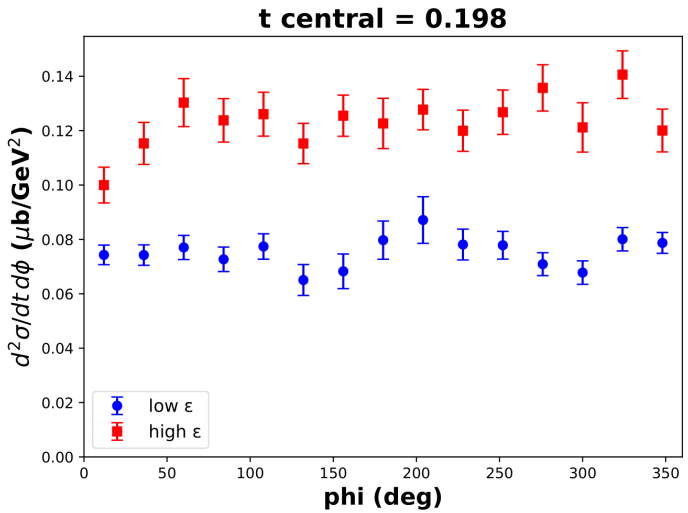
Physics Setting:
Q3p85_W2p62_t0p21_higheps

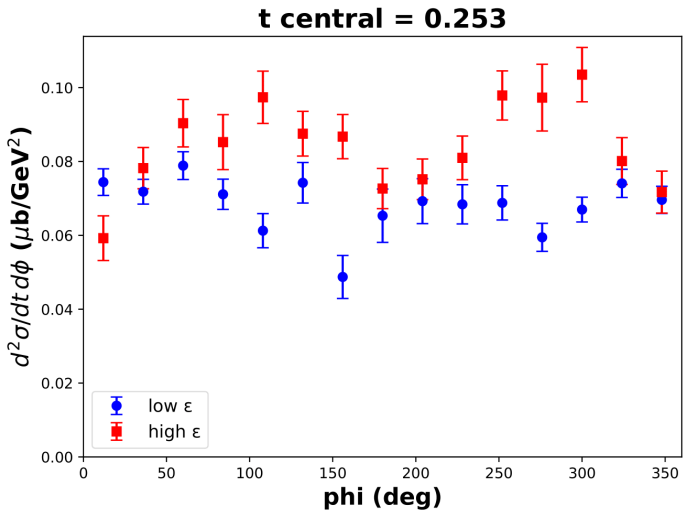


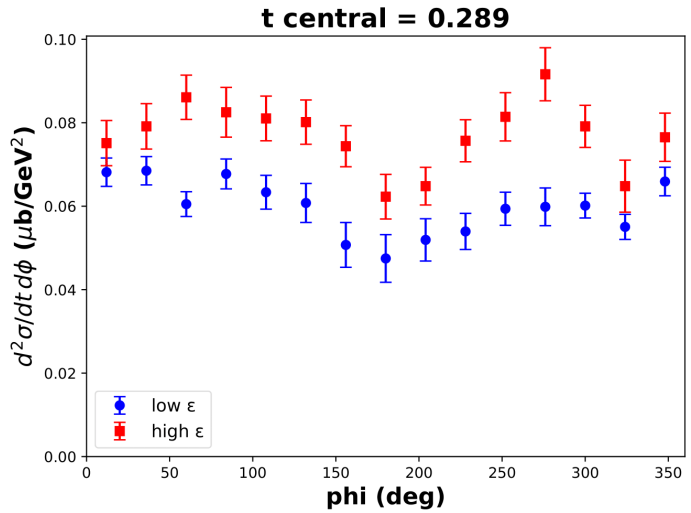
Un-separated Cross-sections

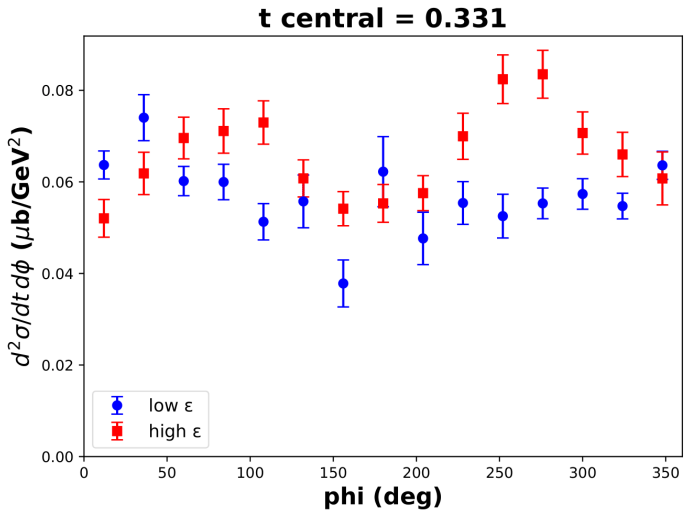
No iterations

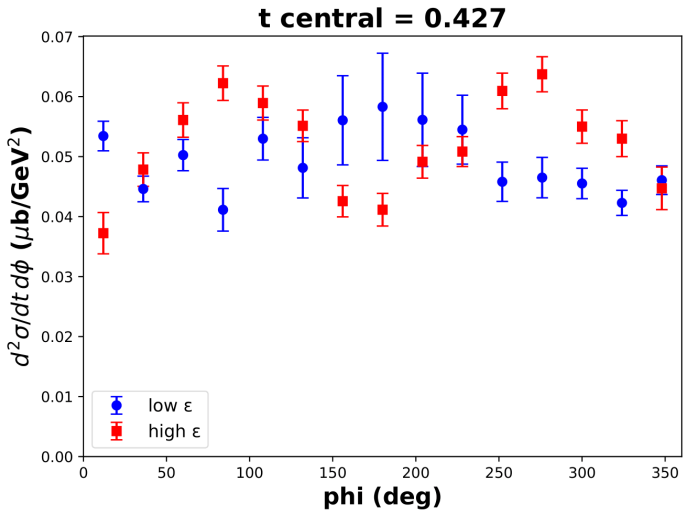
Physics Setting:
Q3p85_W2p62_t0p21
Iteration: 0







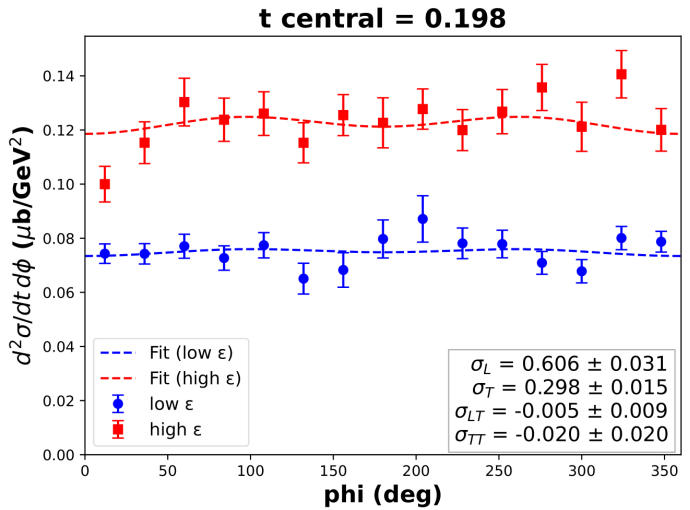


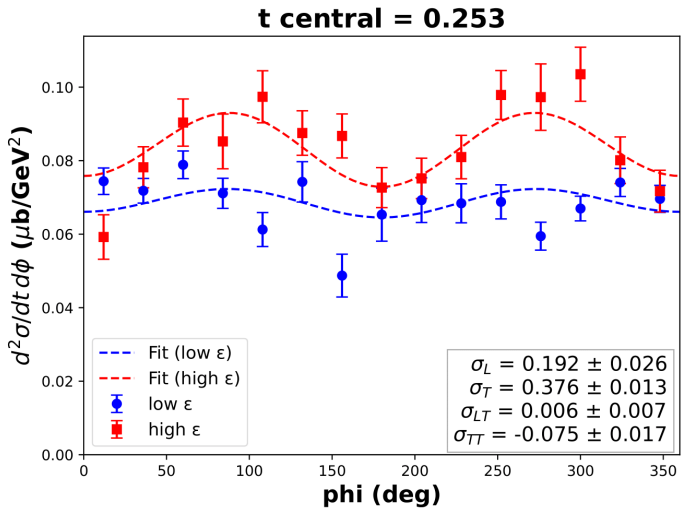


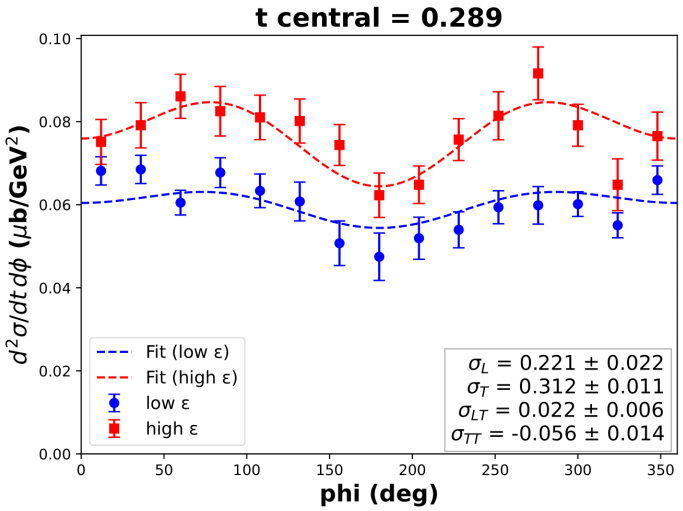
LT-separated Cross-sections

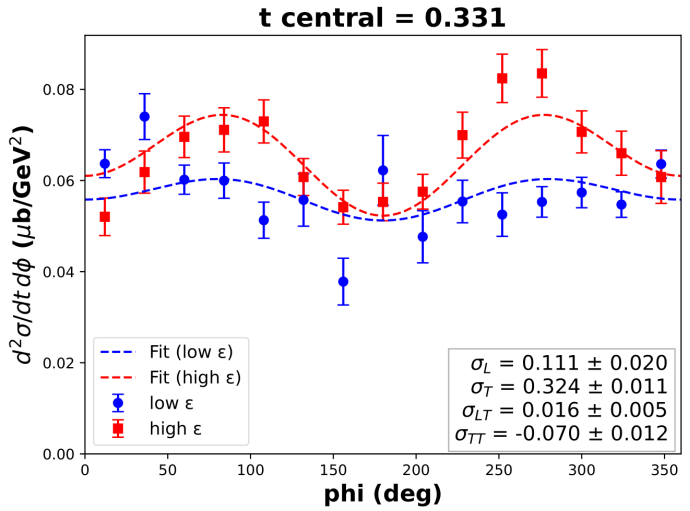
No iterations

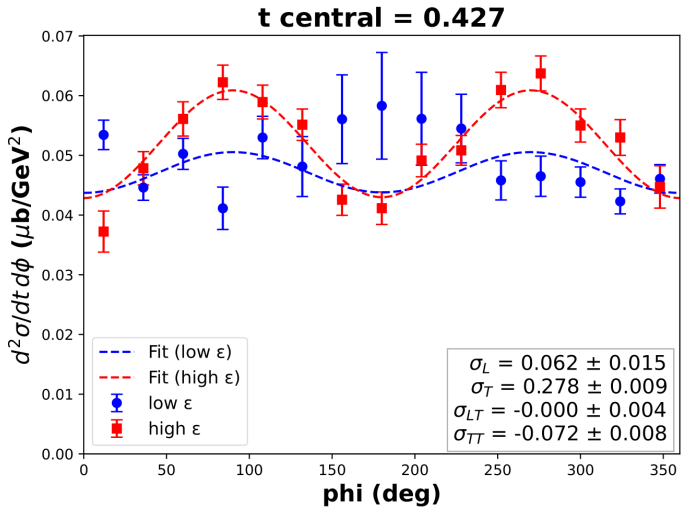
Physics Setting:
Q3p85_W2p62_t0p21
Iteration: 0





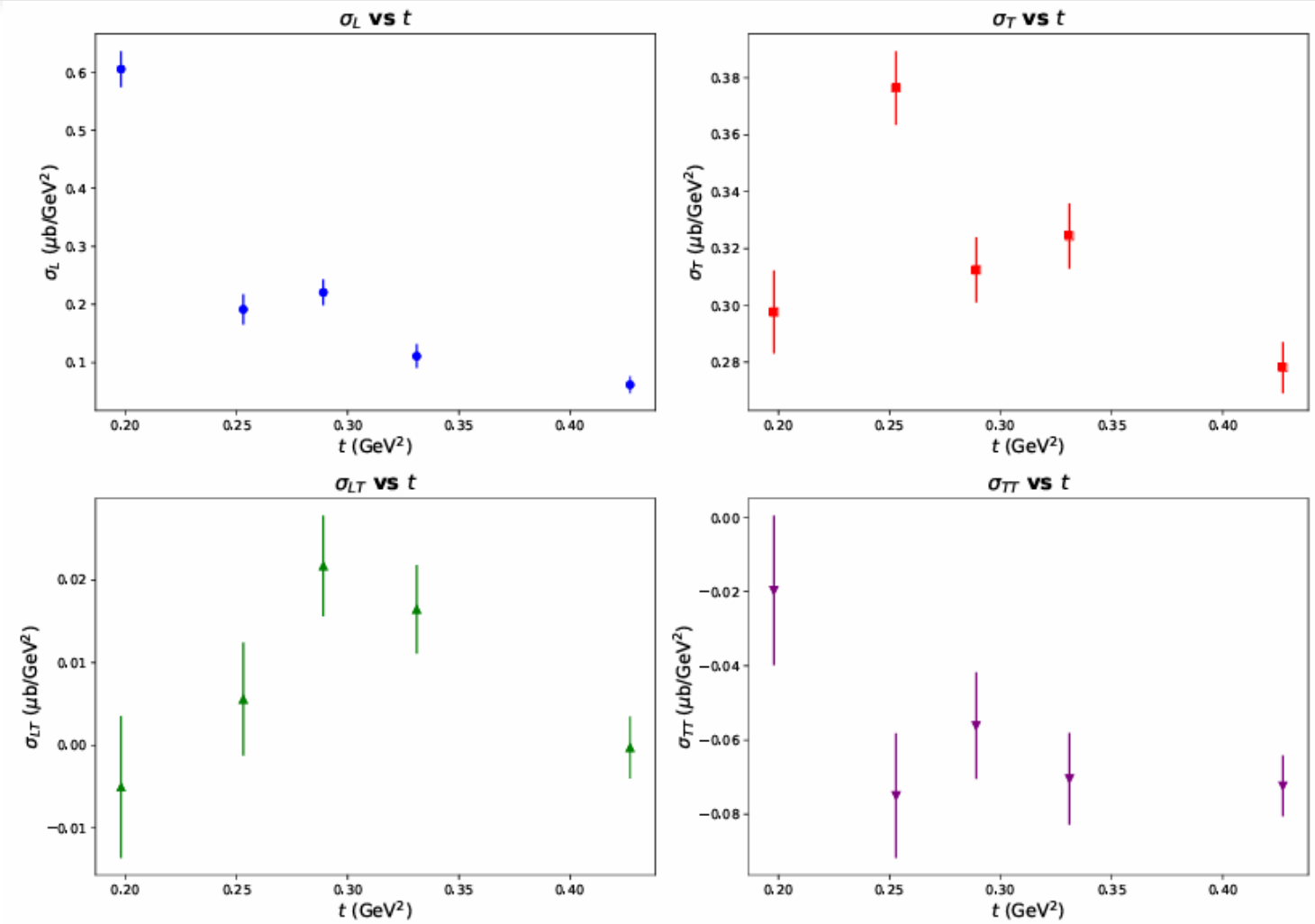






LT-separated Cross-sections

No iterations



Iteration 1

LTSep Funtions

- **Started with Tanja's functional forms:**

$$\frac{d\sigma_T}{dt} = \frac{A}{Q^2} + \frac{B}{Q^4}$$

$$\frac{d\sigma_L}{dt} = E\,\frac{Q^2}{(1 + \mathrm{H}\cdot Q^2 + I\cdot Q^4)^2}\,\mathrm{e}^{(\mathrm{F}+\mathrm{G}\cdot\ln(Q^2))\cdot|-t|}$$

$$\frac{d\sigma_{LT}}{dt} = \left(\mathrm{e}^{J+\frac{K}{\sqrt{Q^2}}\cdot|-t|} + L + \frac{M}{Q^4}\right)\cdot\sin(\theta^*)$$

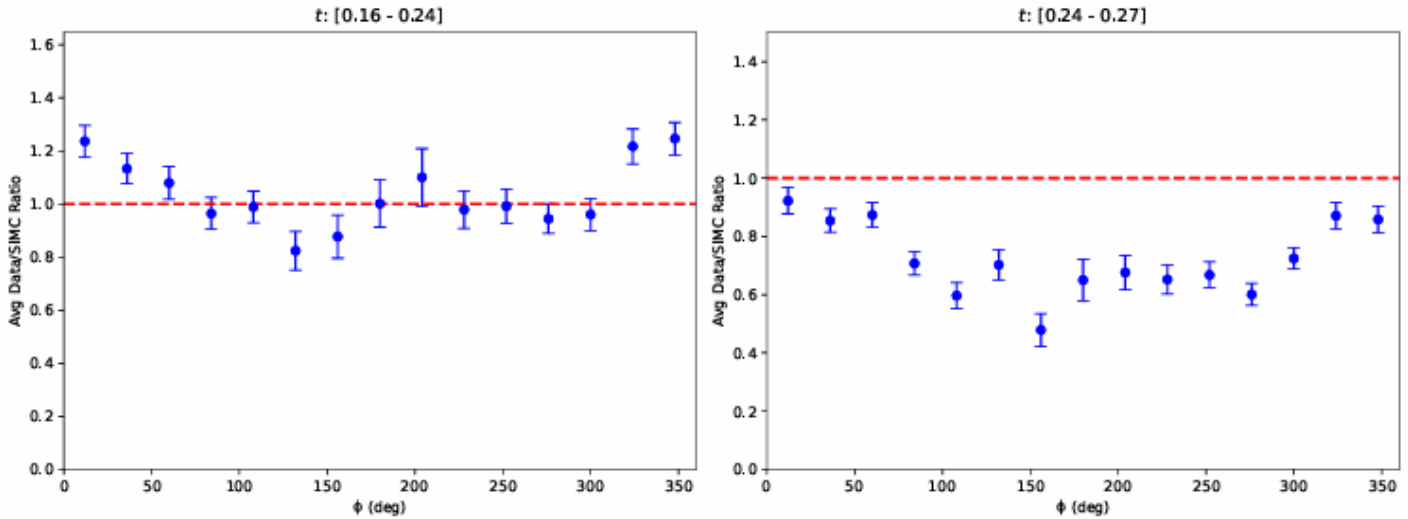
$$\frac{d\sigma_{TT}}{dt} = \frac{N}{Q^4}\cdot\frac{|-t|}{(|-t| + m_\pi^2)^2}\cdot\sin(\theta^*)^2$$

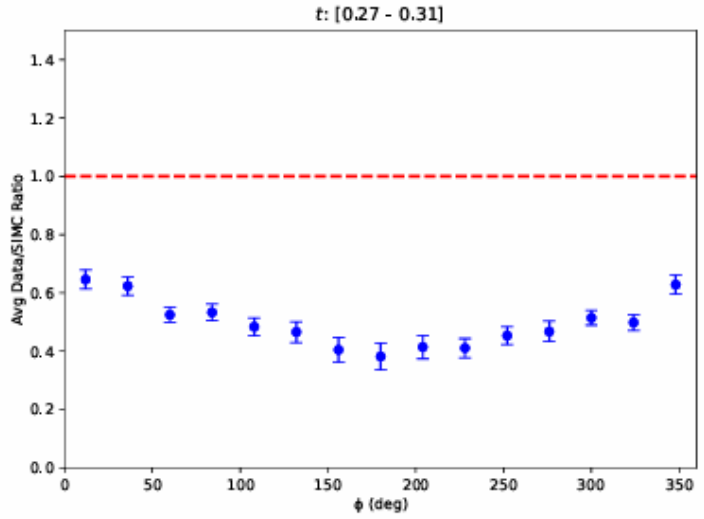
Variable Number (F)	Parameter	Initial Value (Fpi2)
1	A	4.5
2	B	2.0
5	E	350
6	F	16
7	G	-7.5
8	H	1.77
9	I	0.05
10	J	0.79
11	K	3.4
12	L	1.1
13	M	-3.6
14	N	-5.0

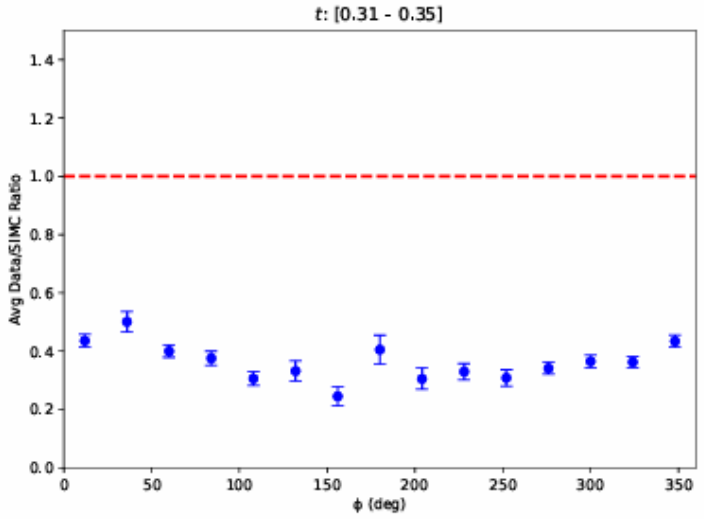
Physics Ratios

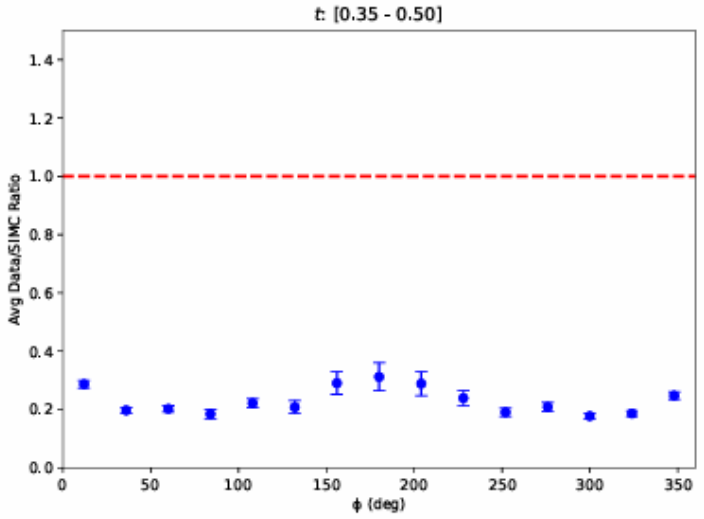
1st iterations

Physics Setting:
Q3p85_W2p62_t0p21_loweps





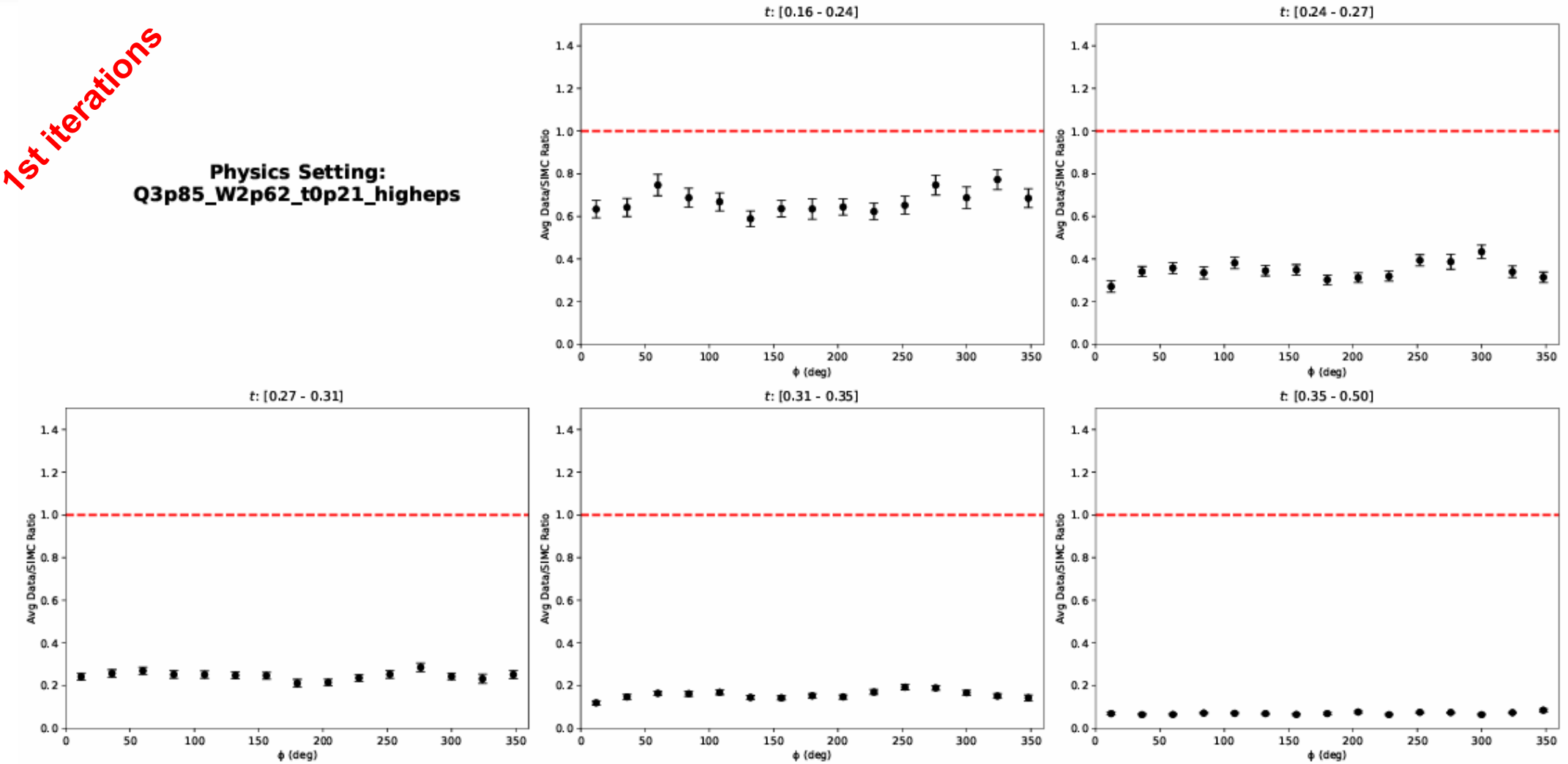




Physics Ratios

1st iterations

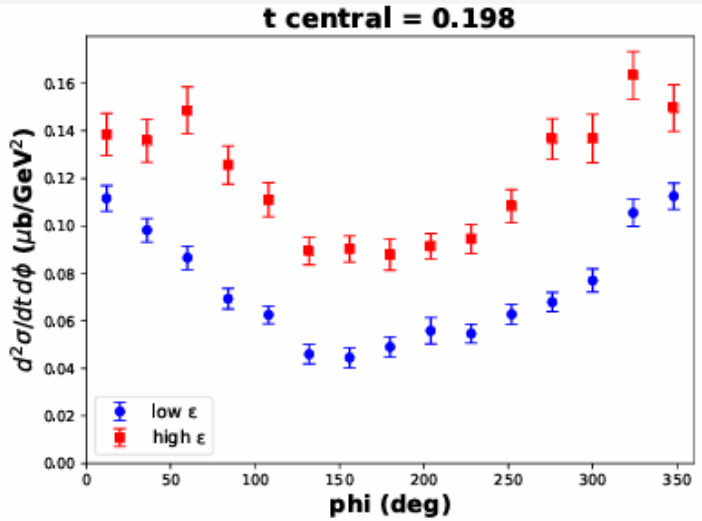
Physics Setting:
Q3p85_W2p62_t0p21_higheps

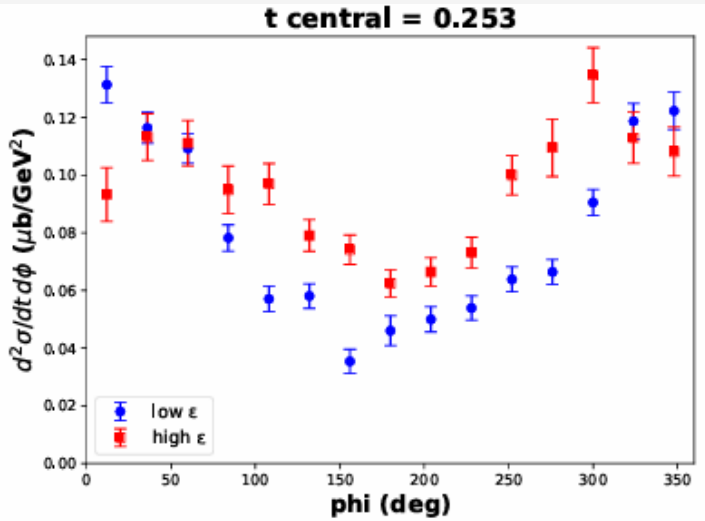


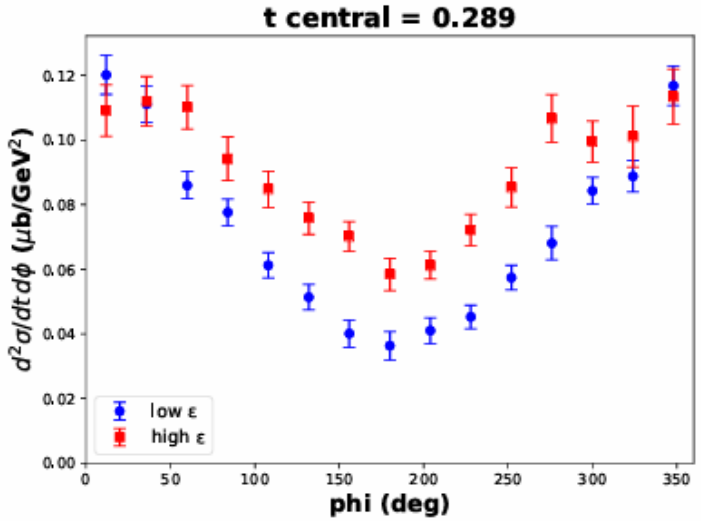
Un-separated Cross-sections

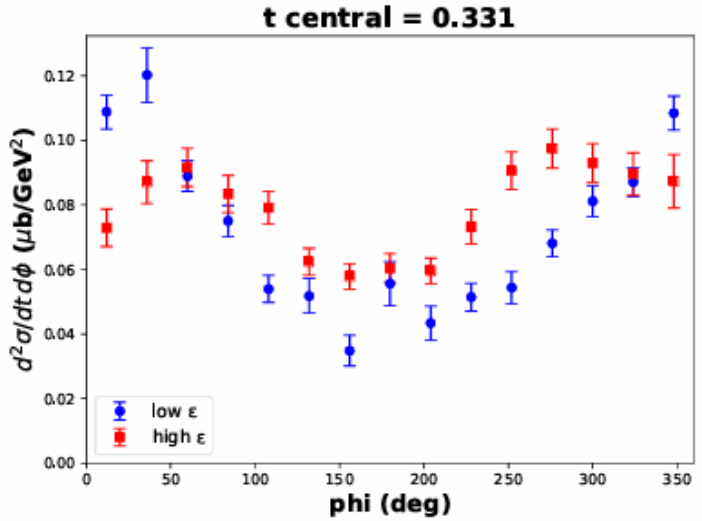
1st iterations

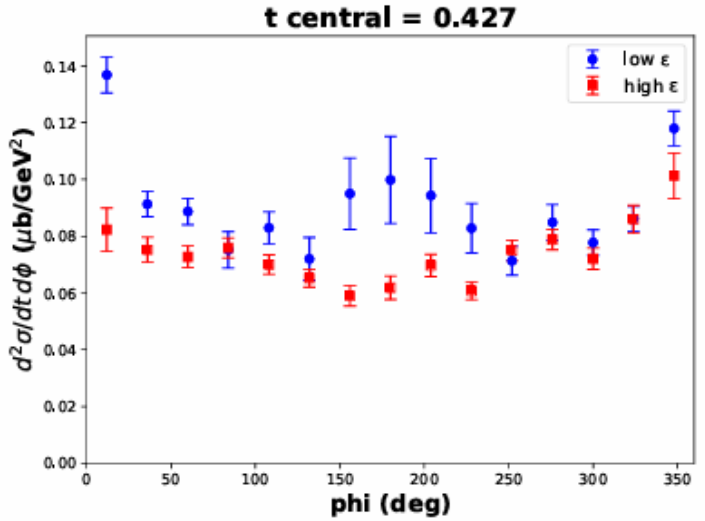
Physics Setting:
Q3p85_W2p62_t0p21
Iteration: 1







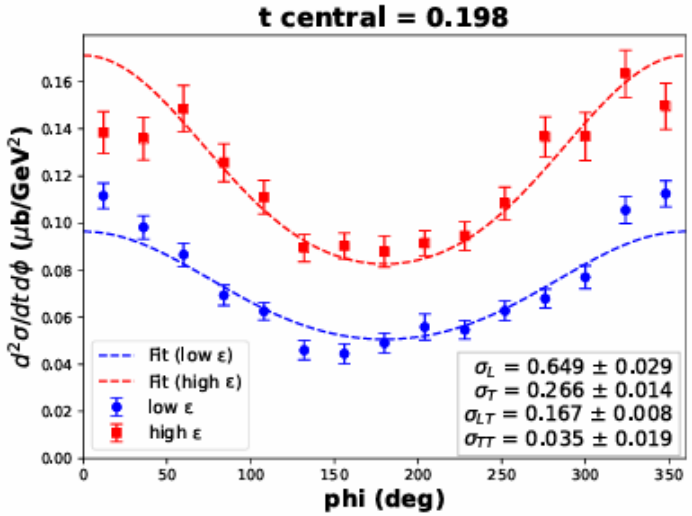


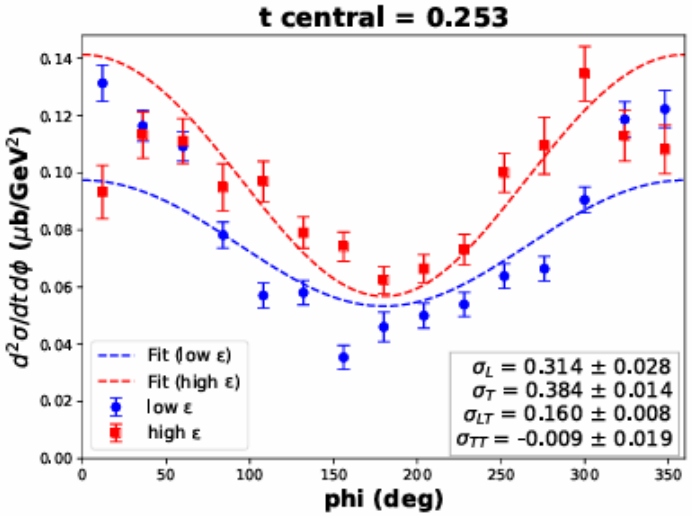


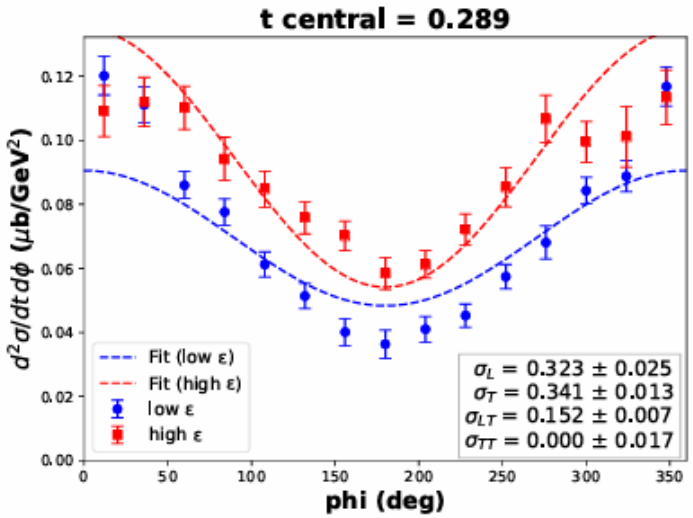
LT-separated Cross-sections

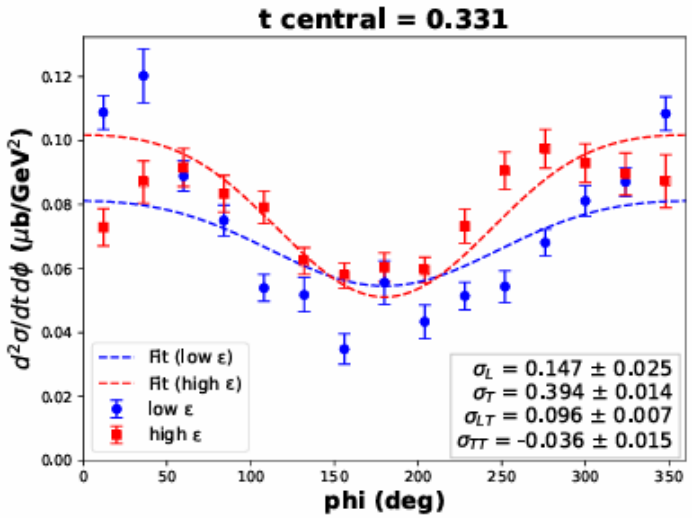
1st iterations

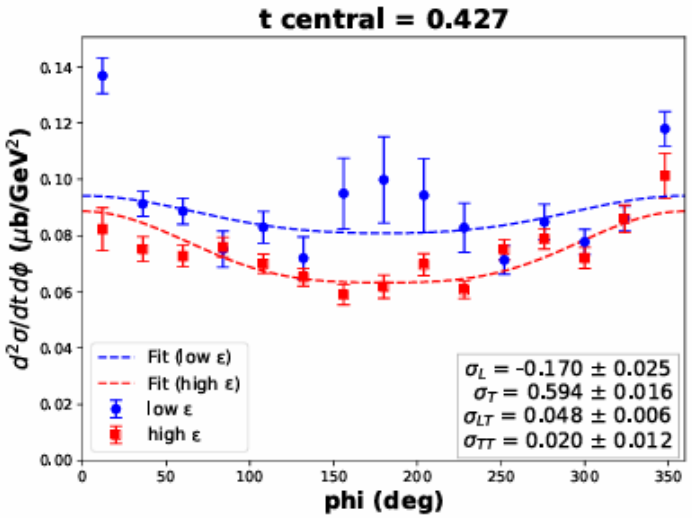
Physics Setting:
Q3p85_W2p62_t0p21
Iteration: 1





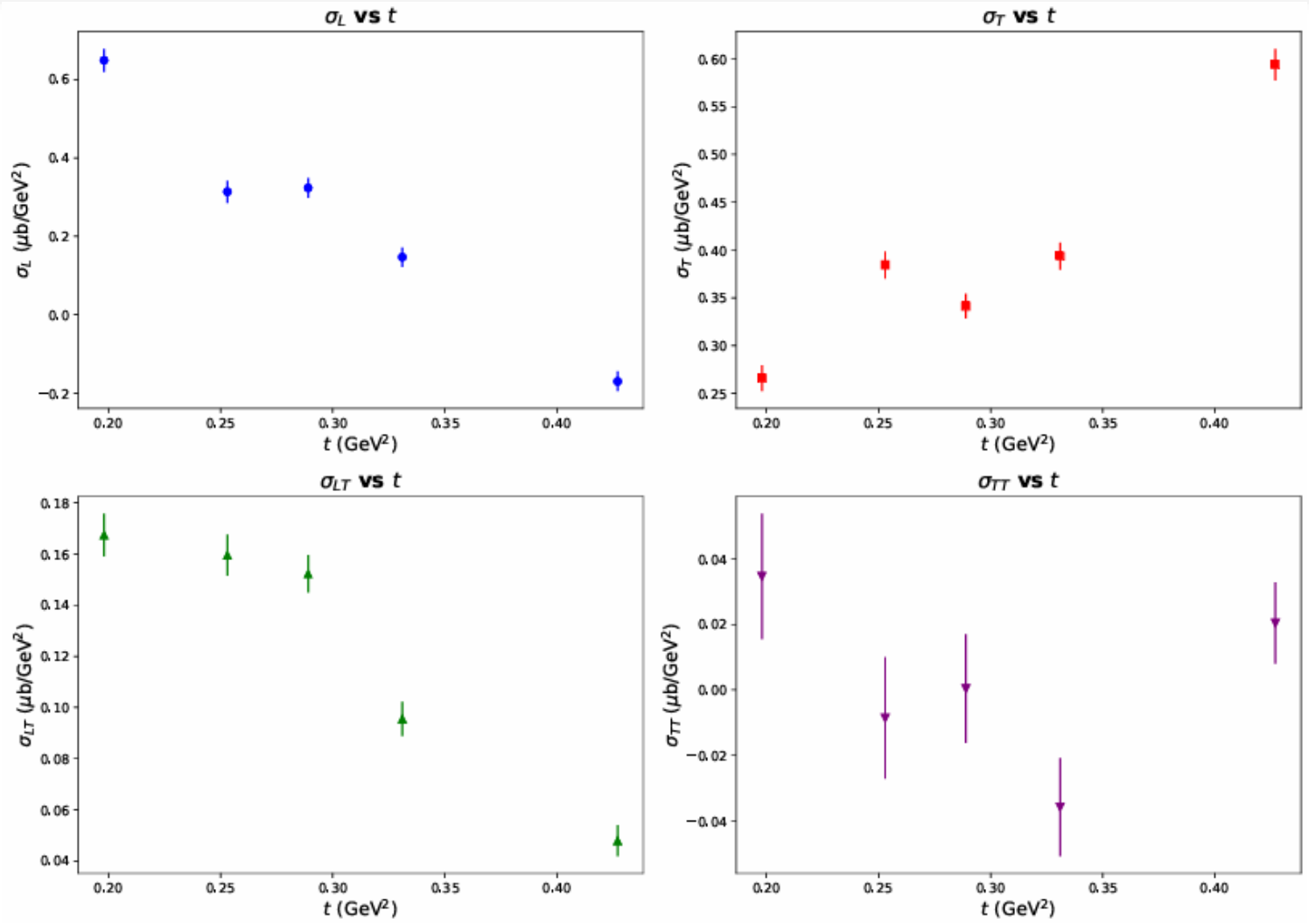






LT-separated Cross-sections

1st iterations



LTSep Analysis

- **Working on physics setting: "Q2 = 3.85, W = 2.62, t = 0.21 (2 epsilons)"**

- **The following studies have been finalized for Pion Form Factor measurement:**
  - **Unseparated cross-section calculations**
  - **Model iterations**
  - **Rosenbluth equation fitting**
  - **L/T separated cross-section calculations**

- **In progress:**
  - Implementing the correct error calculation method
  - Implementing functional fits to LT-separated cross-sections.
  - Looking into the weight re-calculation script.
  - Will start doing model iterations.