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9/1/11

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- Method
- Nitrogen Data
- <sup>3</sup>He Data



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Method Nitrogen Data <sup>3</sup>He Data

### Description

- To model our experimental data, we fit it using the QFS program
- Contributing processes in QFS:
  - Quasi-elastic
  - 2 Delta resonance
  - W = 1500, 1700 MeV resonances
  - The 'dip' region
  - OIS
- We (arbitrarily) weight each process by some multiplicative factor(s) so that QFS accurately describes both the 4- and 5-pass data

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Method Nitrogen Data <sup>3</sup>He Data

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#### QFS Modeling of Nitrogen Data (1) The Fit Parameters

• In the following,  $E_s$ ,  $E_p$ ,  $Q^2$  and  $\nu$  have been converted to GeV when used as multiplicative factors

• 
$$\sigma_{\rm qe} \rightarrow \frac{E_s}{4} \frac{E_s}{1.178} \sigma_{\rm qe}$$

• 
$$\sigma_{\Delta} \to \left(2 + \frac{3}{4}E_p\right)\sigma_{\Delta}$$

• 
$$\sigma_{1500} \rightarrow \sigma_{1500}$$
  
•  $\sigma_{1700} \rightarrow \frac{Q^2}{2} \frac{E_s}{\nu} \sigma_{1700}$   
•  $\sigma_{2N} \rightarrow \frac{1}{5} E_p \left(1 + \frac{E_s}{\nu}\right) \sigma_{2N}$   
•  $\sigma_{\text{DIS}} \rightarrow \frac{1}{\sin(\theta/2)} \frac{1}{16.5} \frac{E_s}{E_p} \sigma_{\text{DIS}}$ 

Summary

Nitrogen Data

#### QFS Modeling of Nitrogen Data (2) $E_{s} = 4730 \text{ MeV}$



Nitrogen, 4-pass

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# QFS Modeling of Nitrogen Data (3) $E_s = 4730 \text{ MeV}$



Method Nitrogen Data <sup>3</sup>He Data

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#### QFS Modeling of Nitrogen Data (4) E<sub>s</sub> = 5890 MeV



Nitrogen Data

#### QFS Modeling of Nitrogen Data (5) $E_{s} = 5890 \text{ MeV}$



Percent Difference Between Data and QFS

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Method Nitrogen Data <sup>3</sup>He Data

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#### QFS Modeling of <sup>3</sup>He Data (1) The Fit Parameters

• In the following,  $E_s$ ,  $E_p$ ,  $Q^2$  and  $\nu$  have been converted to GeV when used as multiplicative factors

• 
$$\sigma_{qe} \rightarrow \frac{E_s}{\nu} \frac{E_s}{4} \sigma_{qe}$$
  
•  $\sigma_{\Delta} \rightarrow \frac{1}{\nu} \left( 10^{-3}E + E_p \right) \sigma_{\Delta}$   
•  $\sigma_{1500} \rightarrow \frac{4}{E_s} \sigma_{1500}$   
•  $\sigma_{1700} \rightarrow \frac{Q^2}{10} \sigma_{1700}$   
•  $\sigma_{2N} \rightarrow \frac{9}{10} E_p \left( 1 + \frac{E_s}{\nu} \right) \sigma_{2N}$   
•  $\sigma_{DIS} \rightarrow \frac{3}{5\sin(\theta/2)} \frac{1}{4.73} \sigma_{DIS}$ 

Method Nitrogen Data <sup>3</sup>He Data

#### QFS Modeling of <sup>3</sup>He Data (2) $E_s = 4730 \text{ MeV}$



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<sup>3</sup>He Data

#### QFS Modeling of <sup>3</sup>He Data (3) $E_{s} = 4730 \text{ MeV}$



Percent Difference Between Data and QFS

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Method Nitrogen Data <sup>3</sup>He Data

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# QFS Modeling of <sup>3</sup>He Data (4) $E_s = 5890 \text{ MeV}$



<sup>3</sup>He Data

#### QFS Modeling of <sup>3</sup>He Data (5) $E_{s} = 5890 \text{ MeV}$



Percent Difference Between Data and QFS

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- QFS models do a decent job fitting the data:
  - Nitrogen: Better than ~6% for most data points
  - <sup>3</sup>He: Better than  $\sim$ 5% for most data points
- The model doesn't do as well at high E<sub>p</sub> values: 10–30%

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### What's Next?

- Radiative Corrections:
  - · Get radcor working at our kinematics
- Cross Sections:
  - Double-check nitrogen dilutions (using QFS fit)
  - Finite acceptance correction
  - Loose ends on systematic errors (LT, VDC and Q)

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