LHRS Analysis for d_2^n Updated Cross Sections and Radiative Corrections

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- Updated Spectra
- 2 Radiative Corrections
 - Sample Hydrogen Spectra at $\theta = 15^{\circ}$
 - Sample Hydrogen Spectra at $\theta = 45^{\circ}$

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Summary

Updated Spectra

Updated Spectra (1) E = 4.73 GeV Data Set





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Summary

Updated Spectra

Updated Spectra (2) E = 5.89 GeV Data Set





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Sample Hydrogen Spectra at $\theta = 15^{\circ}$ Sample Hydrogen Spectra at $\theta = 45^{\circ}$

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Sample Spectra

Some definitions:

- $E_s = \text{Incident electron energy}$
- 2 $E_p =$ Scattered electron energy
- To test radcor, we consider *ep* scattering for a few different kinematics:
 - $\theta = 15^{\circ}$ and 45°
 - $E_s = 1.0, 1.5, 2.0$ and 2.5 GeV
- Review of the procedure:
 - Radiate QFS to obtain each spectra
 - Subtract off the elastic tail (obtained from rosetail.f)
 - Input these spectra into the radcor.f code to unfold $\sigma_{\rm Born}$ for each of our data sets

Sample Hydrogen Spectra at $\theta = 15^{\circ}$ Sample Hydrogen Spectra at $\theta = 45^{\circ}$

Subtracting the Elastic Radiative Tail (1) $E_s = 1500 \text{ MeV}, \theta = 15^{\circ}$



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Sample Hydrogen Spectra at $\theta = 15^{\circ}$ Sample Hydrogen Spectra at $\theta = 45^{\circ}$

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Subtracting the Elastic Radiative Tail (2) $E_s = 2500 \text{ MeV}, \theta = 15^{\circ}$





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Sample Hydrogen Spectra at $\theta = 15^{\circ}$

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Unfolded Result $E_s = 2500 \text{ MeV}, \theta = 15^{\circ}$



Sample Hydrogen Spectra at $\theta = 15^{\circ}$ Sample Hydrogen Spectra at $\theta = 45^{\circ}$

Subtracting the Elastic Radiative Tail (1) $E_s = 1500 \text{ MeV}, \theta = 45^{\circ}$

QFS with Elastic Tail Subtraction [1PS2, θ = 45°, exact]



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Sample Hydrogen Spectra at $\theta = 15^{\circ}$ Sample Hydrogen Spectra at $\theta = 45^{\circ}$

Subtracting the Elastic Radiative Tail (2) $E_s = 2500 \text{ MeV}, \theta = 45^{\circ}$

QFS with Elastic Tail Subtraction [2PS2, θ = 45°, exact]



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Sample Hydrogen Spectra at $\theta = 45^{\circ}$

Unfolded Result $E_s = 2500 \text{ MeV}, \theta = 45^{\circ}$



Internal Radiative Corrections at 2-pass (E = 2500 MeV, θ = 45°)

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Summary

- Cross sections:
 - Backgrounds have been subtracted to obtain σ_{\exp} at all E_p using the fit of $f(x) = e^{(a_0 + a_1 x)}/x^2$ to each spectrum
- Radiative corrections:
 - radcor works well for intermediate E_p for ep scattering
 - $\bullet\,$ Smaller than $1\%\,$ percent difference with the Born result from QFS

• At low E_p , disagreement is $\sim 15-20\%$ for $\theta = 15^{\circ}$ and $\sim 5\%$ at $\theta = 45^{\circ}$

What's Next?

- Radiative Corrections:
 - Investigate disagreement of elastic tail from rosetail with QFS curve at low E_{p}
 - Obtain corrections for ³He in our kinematic range
 - Determine model for corrected cross section data using QFS (as input to radcor.f)
- I will not be here next week (PANIC), and the second week of August (7th-14th)