Unpolarized Radiative Corrections Update for d_2^n

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Outline

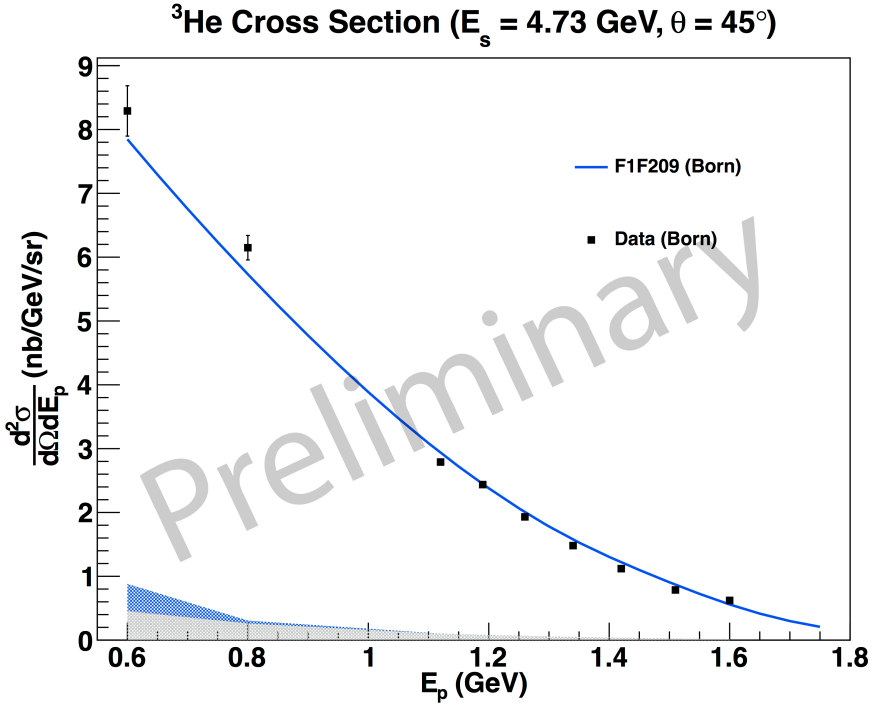
Handling of the Quasi-Elastic Tail (1)

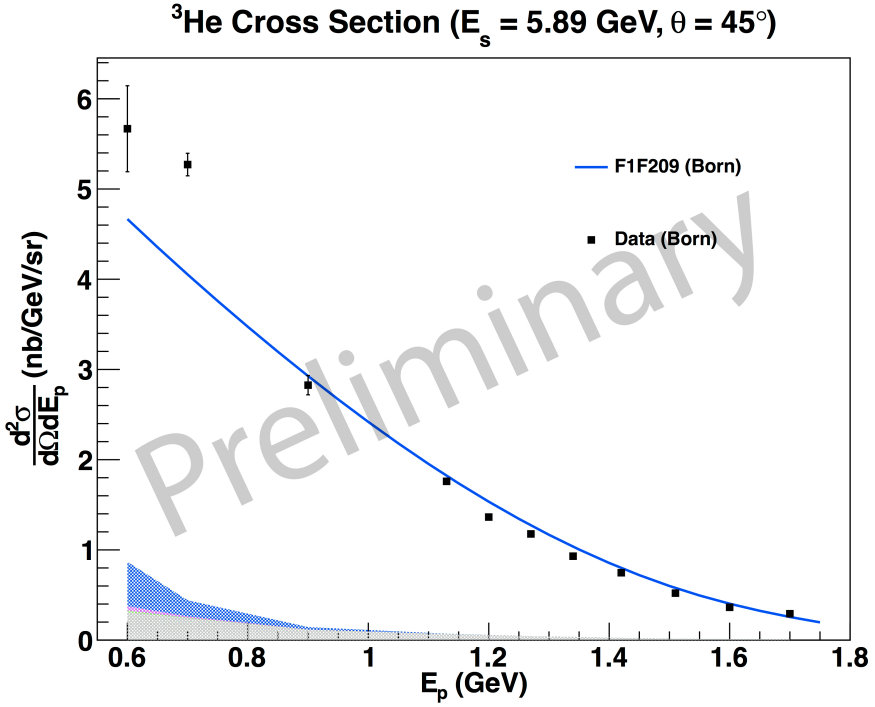
Method

- When we apply the radiative corrections to the data, the following procedure has been used:
  1. Subtract the elastic tail (if necessary)
  2. Subtract the quasi-elastic tail
  3. Unfold the data using RADCOR (we integrate from the π production threshold
- In theory, we should be able to do no QE tail subtraction and integrate from the QE threshold and obtain the same result

Handling of the Quasi-Elastic Tail (2)

Review of Results from RADCOR: E_s = 4.73 and 5.89 GeV data

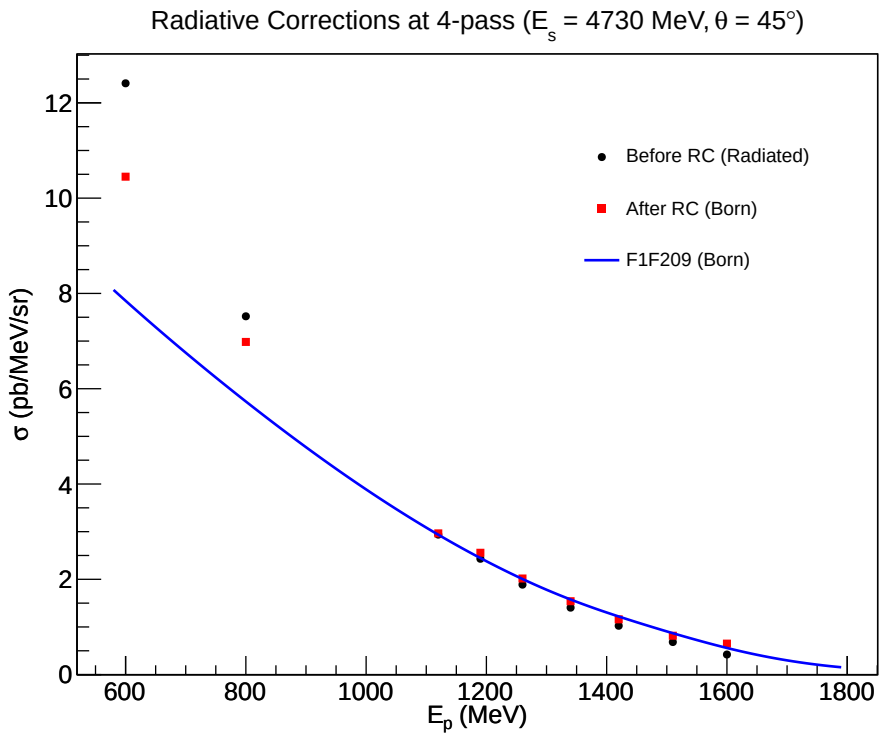


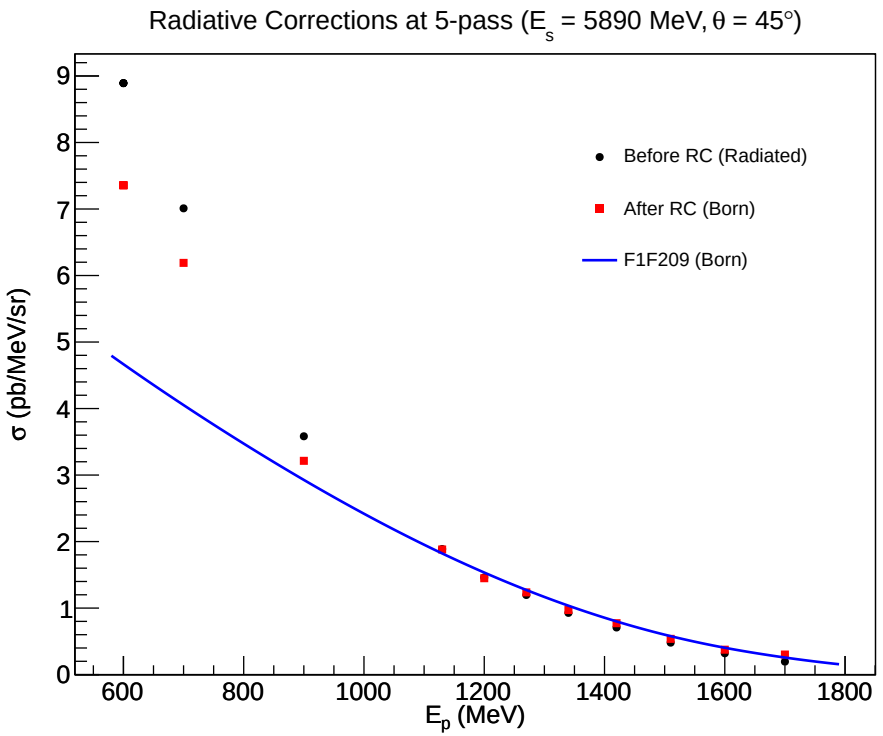


- Error bars: statistical only
- Error bands:
  - Grey: cuts, beam charge, target density
  - Green: Grey + $\sigma_{N_2}^{e-}$ fit
  - Magenta: Green + $\sigma_{N_2}^{e+}$ fit
  - Blue: Magenta + σ_{e+} fit
  - Red: Blue + RCs

Handling of the Quasi-Elastic Tail (3)

Alternate Method: Integrate from QE Threshold





Energy Peaking Approximation (1)

Method

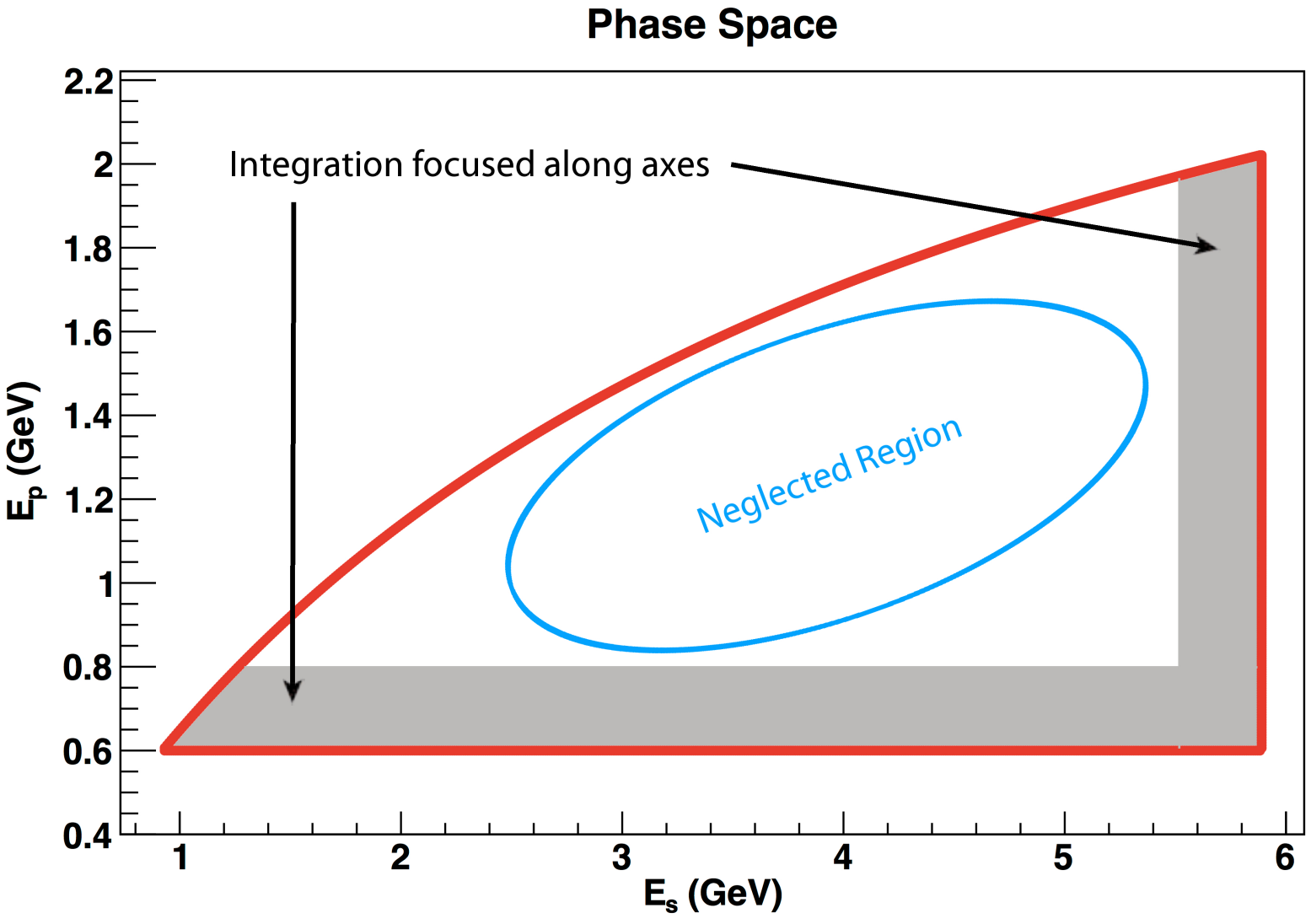
- In RADCOR, the energy peaking approximation is utilized, resulting in the calculation of:

$$\sigma_b^i = \frac{1}{\mathrm{C}} \left[\sigma_{\mathrm{rad}} - \int (\ldots)\, \sigma_b^{i-1} dE'_s - \int (\ldots)\, \sigma_b^{i-1} dE'_p \right]$$

- In this approximation, the integration along the axes of the E_p vs. E_s plot are considered
  - The neglected 'middle region' is considered to contribute a small amount

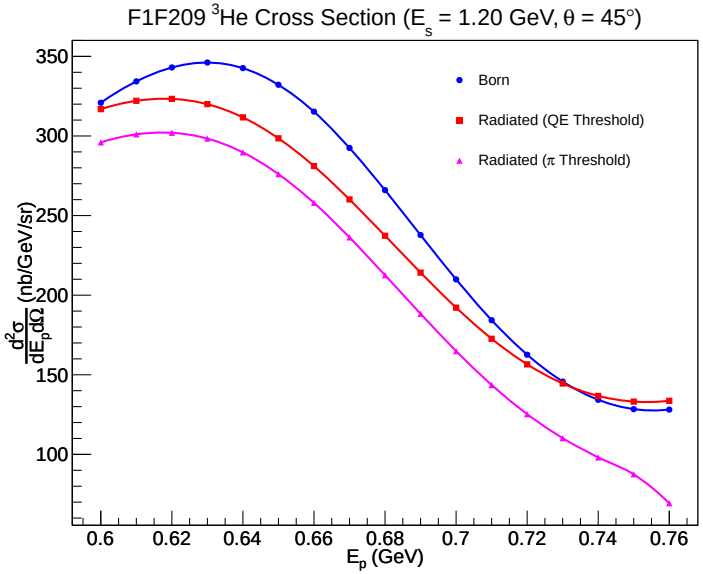
Energy Peaking Approximation (2)

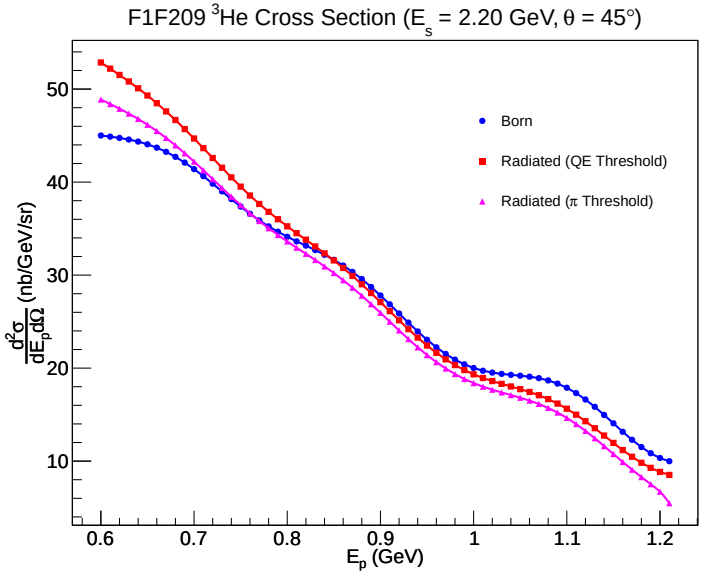
Integration Phase Space

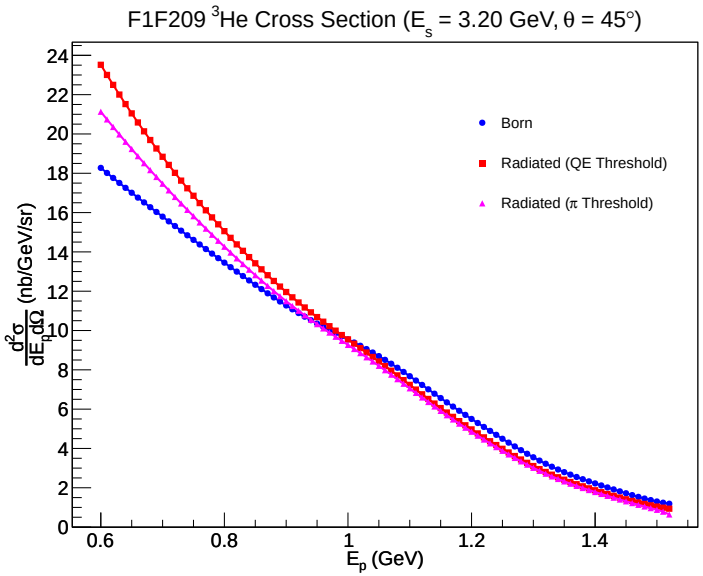


Energy Peaking Approximation (3)

Example Spectra



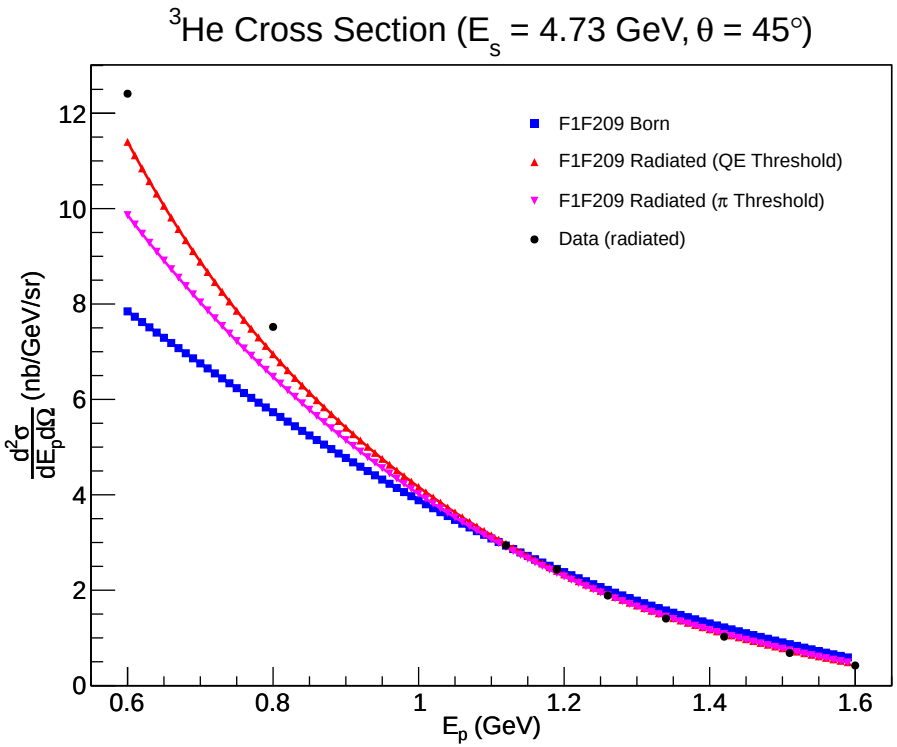


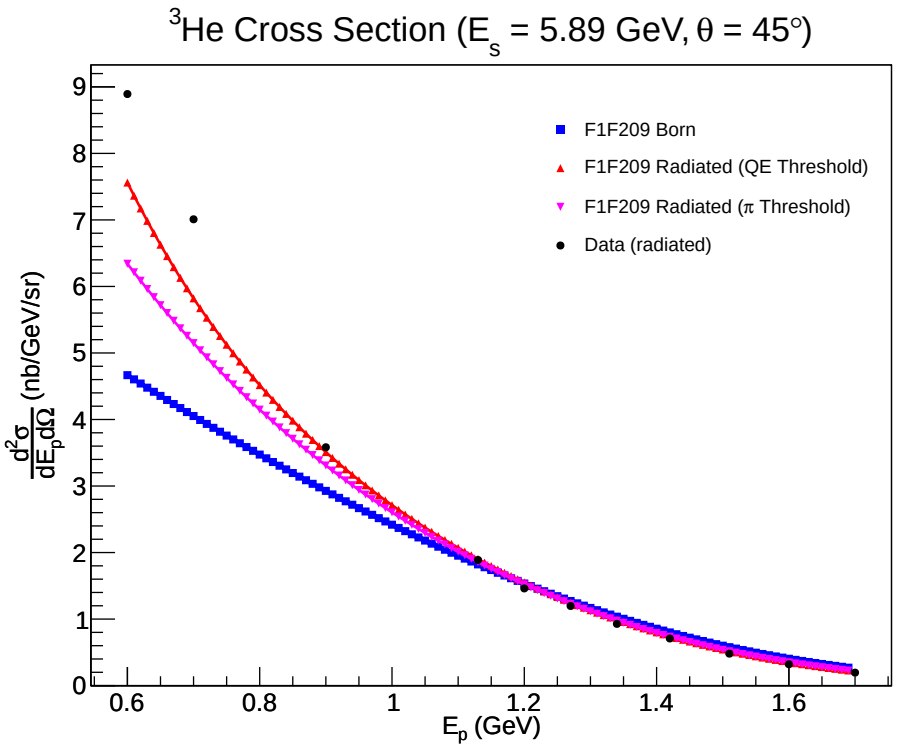


- Towards higher beam energies, the two integration limits start to yield similar results
  - Still noticeable differences

Energy Peaking Approximation (4)

Example Spectra: Compare to Data





Summary

- Radiative Corrections
  - Unpolarized: The peaking approximation may be an issue for the QE region
  - Polarized: Still debugging...

What's Next?

- Radiative Corrections
  - Continue development of POLRAD++
    - ★ Debugging, etc.
  - Exact integrals for unpolarized RCs
  - External effects for asymmetries from RADCOR

Backup

^{3}He Quasi-Elastic Tail