Bosted Model Comparison

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8/6/14
IDEA

- Generate nitrogen XS using ’09 Bosted model
  - SAGDH kinematics:
    - 6°/2135 MeV
    - 6°/2845 MeV
    - 9°/1147 MeV
    - 9°/2234 MeV
    - 9°/3319 MeV
- Results of SAGDH multi-track study now applied to raw cross-section
- Run and radiate Bosted model for each reconstructed scattering angle within acceptance
  - -3mrad to 3mrad in phi and 0 to 45 mrad in theta
- Average over scattering angles and compare to SAGDH data with elastic tail removed (tail also averaged over scattering angle)
- Use Reduce Chi Squared to find best scaling factors for data
  - For error add statistical and systematic in quadrature
  - Use 2 for DOF (XS-scale factor and nu-shift factor)

\[
\chi^2_{\text{red}} = \frac{\chi^2}{\nu} = \frac{1}{\nu} \sum \frac{(O - E)^2}{\sigma^2}
\]
Elastic Tail Monte-Carlo

• Vince gave me results for elastic tail Monte Carlo to simulate the acceptance
  – 2135 MeV data set
  – Acceptance cuts: -8 mrad to 8 mrad in phi and -15 to 15 mrad in theta
    • Can’t apply directly to older SAGDH N2 analysis
    • But can compare my method to his
  – Also has punch-through correction
Comparing Elastic Tail Calculations

\[ \frac{d^2 \sigma}{d\Omega dE} \] (nb/MeV/Sr)

\( W \) (MeV)
Comparing Elastic Tail Calculations

Conclude that my method is consistent with Monte-Carlo and the small difference (max 5% in tail, is only ~1% in subtracted XS) doesn’t necessitate Vince redoing study for all kinematics and with the older cuts.
$6^\circ/2135$ MeV

- SAGDH Tail Sub
- Busted Inelastic Rad AVG: Scaled/Shifted

Scale: 23%; Shift: 12 MeV; Reduced ChiSQ: 1.9
$6^\circ/2845$ MeV

Scale: 29% ; Shift: 16 MeV ; Reduced ChiSQ: 4.855
$9°/1147$ MeV
$9^\circ/2234$ MeV

- SAGDH Tail Sub
- Bosted Inelastic Rad AVG: Scaled/Shifted

Scale: 20% ; Shift: 12 MeV ; Reduced ChiSQ: 2.009
9°/3319 MeV

- SAGDH Tail Sub
- Bosted Inelastic Rad AVG: Scaled/Shifted

Scale: 28%; Shift: 8 MeV; Reduced ChiSQ: 3.376
GOING FORWARD

- Do full inelastic radiative corrections on SAGDH data to extract Born XS from experimental data

- Compare experimental Born XS to Bosted model

- Suggestions from meeting?
BACK UP
Systematic Uncertainty