Uniqueness Tracking
Event Counting

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- Avoid multiple counts per event.
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Not quite sufficient: modify DSelector

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- Loop 1: count unique Final State Combos that pass all cuts AND γ_{beam} is prompt
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- Loop 2: modify Weight $W = w_{reg} \cdot \frac{1}{N_u}$
- Compare Loop1 hist to loop2 hist to size effect.
- Current uniqueness tests for "+,-,neutral" particles
- Accidental subtraction included

Reminder

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- Beam photon intensity distribution is the same for all!
- Same for prompt true!
- Same for prompt accidental!
- Same for out out of time accidentals!
- ALL are defined by the initial beam intensity distribution.

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Example 1: ONE unique Final State

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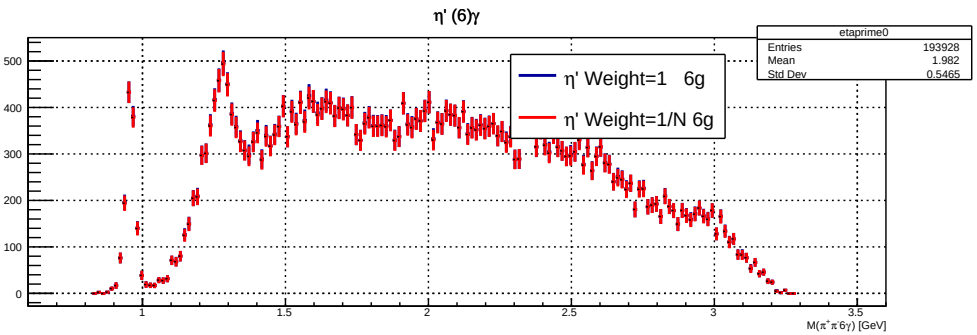
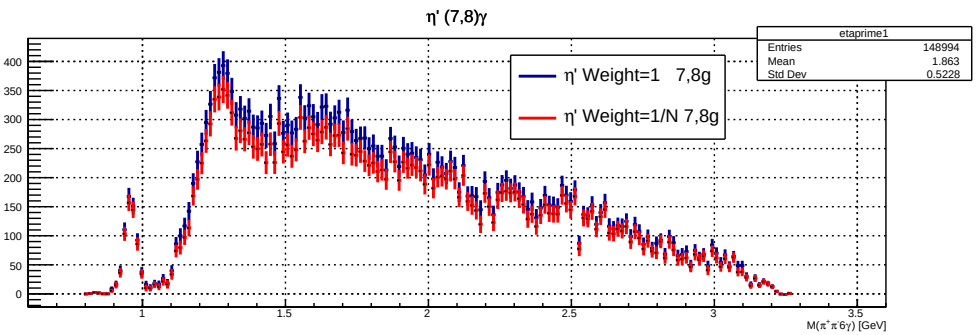
Example 2: MORE THAN ONE unique Final State

- Number of Prompt Beam Photons: 0, 1, 2, ...
- Which one is the true Beam Photon? NOT KNOWN! Could be NONE!
- Which one is the true FS? NOT KNOWN!
- Which Combo: FS + Beam Photon is true? NOT KNOWN!
- All are on equal footing! $\rightarrow N_u$

Example (DATA): $\eta\prime$ Final State

$$\gamma + p \to p + \eta\prime \to p + \pi^+ + \pi^- + \eta \to p + \pi^+ + \pi^- + 6\gamma$$





- 6γ FS: 0.5% reduced yield
- $7,8\gamma$ FS: 7.6% reduced yield around η' mass
- $7,8\gamma$ FS: 11.3% reduced yield 1.2-1.4GeV

Limitations

Current limitations of new branch:

- Distinction between $+$ and $-$ charged particles only.
- No distinction between Proton, Pion and Kaon.
- Assigning a particle type is a Mass-Constraint!
- Using "locUsedSoFar_MissingMass" does NOT account for switching particle types.