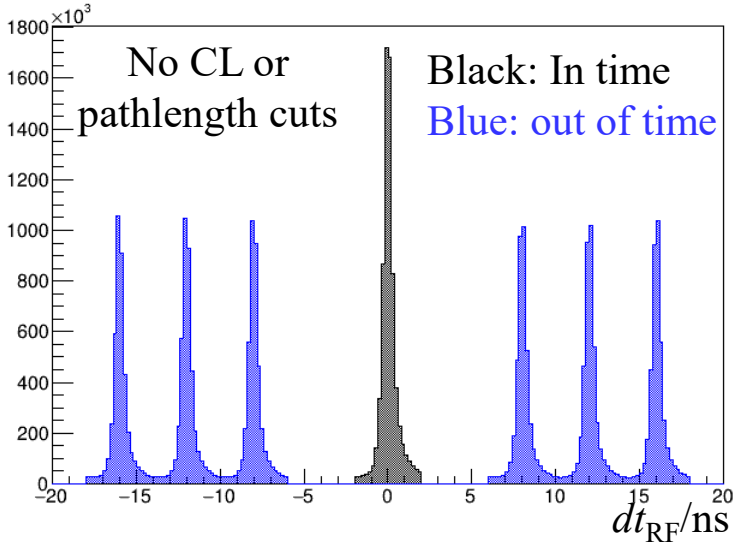
$\Xi^* \rightarrow \Xi\pi^0$ update

Ξ^* Analysis

- Requested studies:
  - Refine MC generator distributions
    - Status: Latest attempt Will be shown today
  - Show mass[$\Xi\pi$] for best $\chi 2$ in central peak along with hybrid method
    - Status: Will be shown today
  - Mass fit Ξ for each bin in Ξ^*
    - Status: First attempt first attempt shown last time
  - t-cut dependence on Ξ^* spectrum
    - Status: In progress
  - Vertex dependence on π^0 mass with real and MC data
    - Status: Need to work on
  - Vertex angle between momentum and path of Ξ
    - Status: Not started yet
  - Explore sidebands as background shape under Ξ*
    - Status: Not started yet

$\Xi^* \rightarrow \Xi\pi^0$ hybrid subtraction

Each photon is associated only with best combo for that photon



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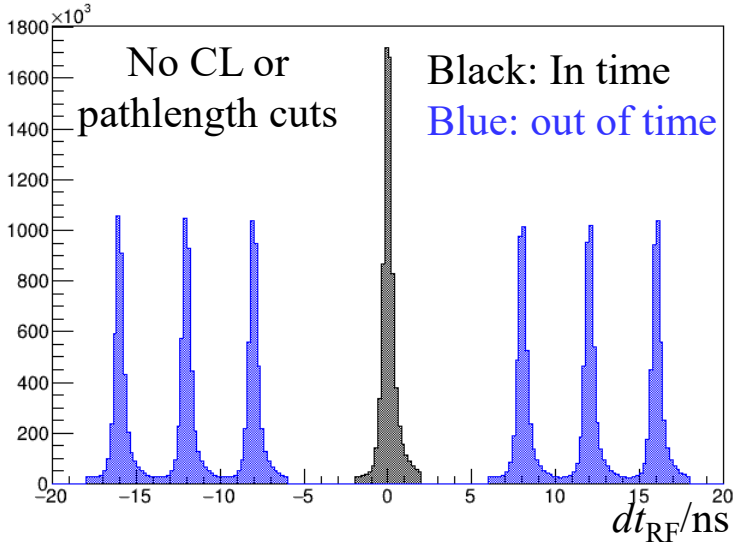

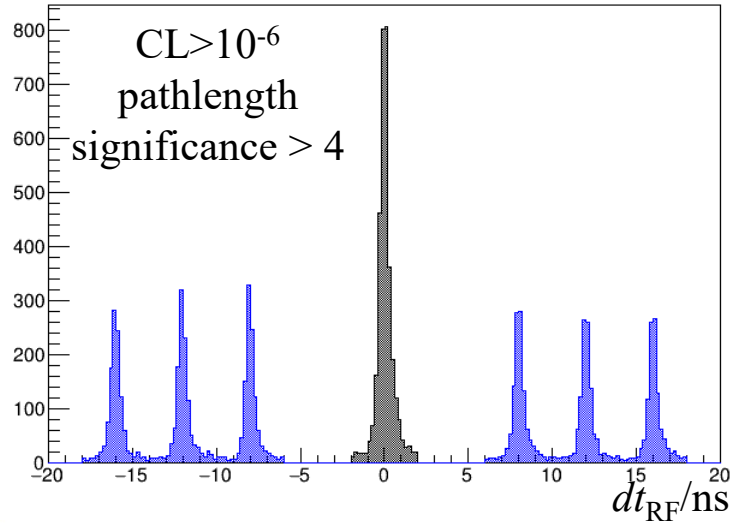

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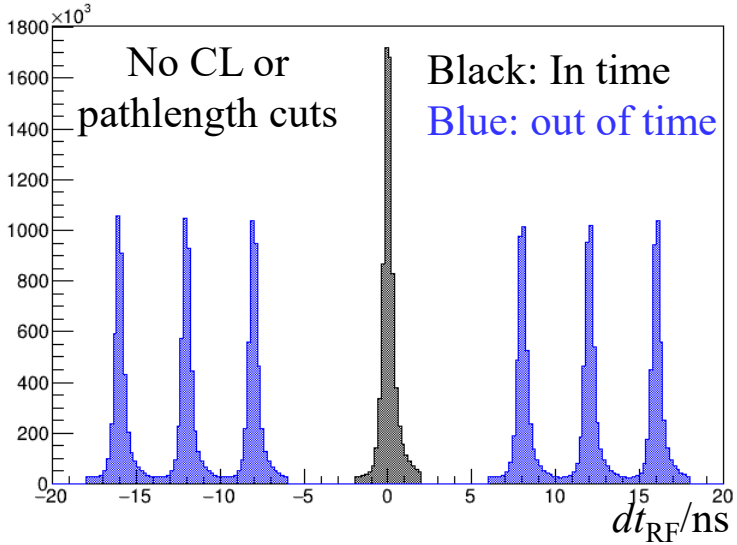

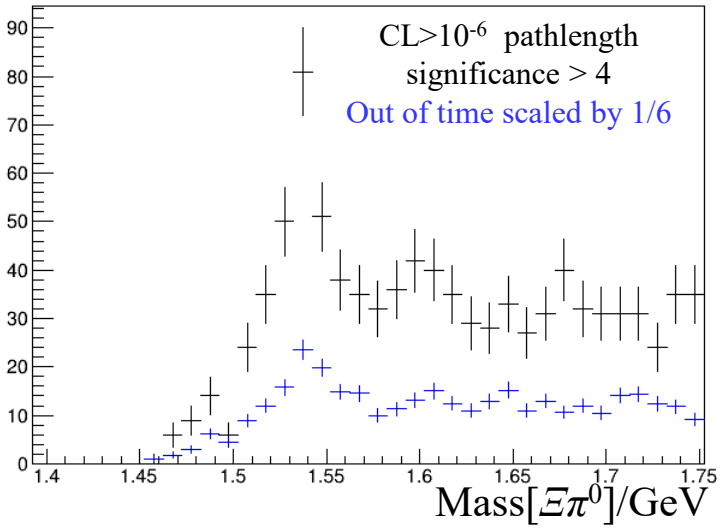

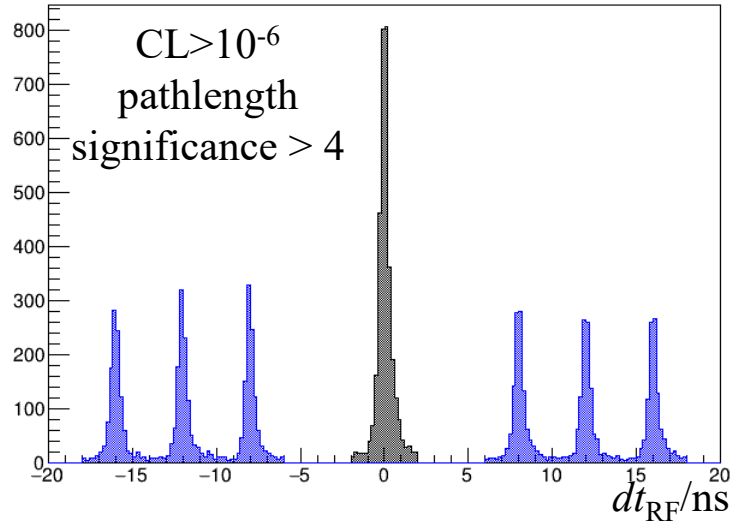

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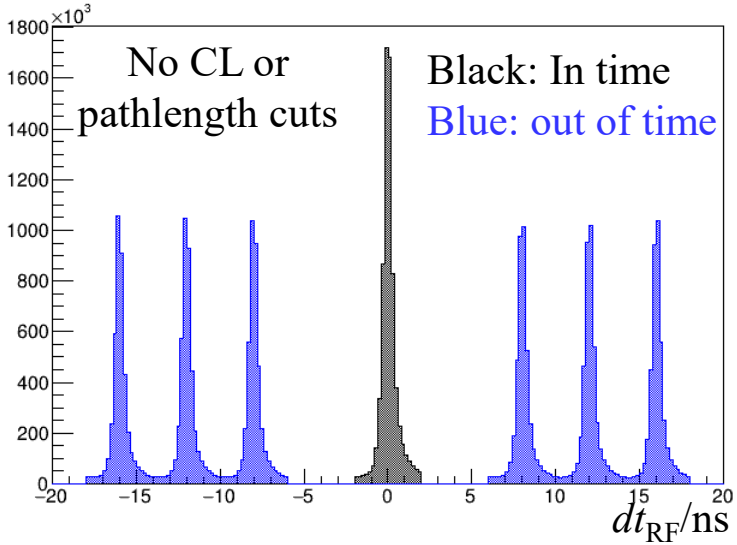
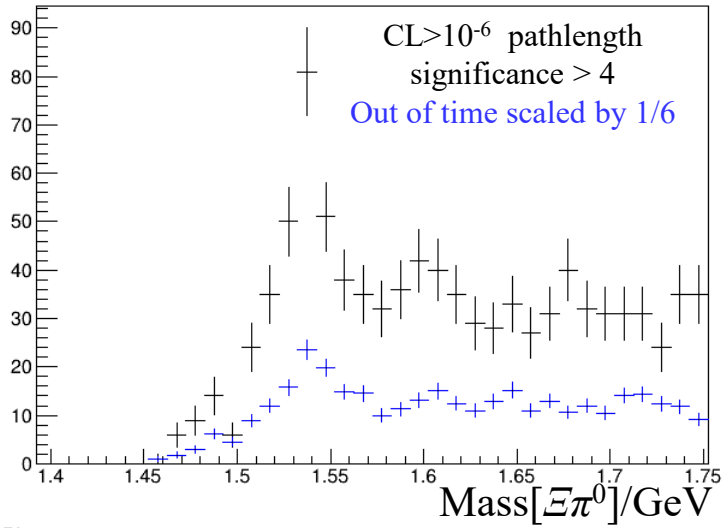
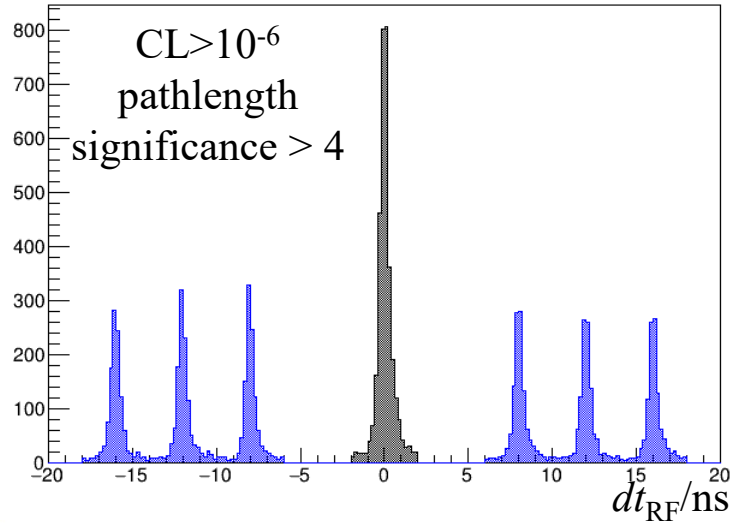
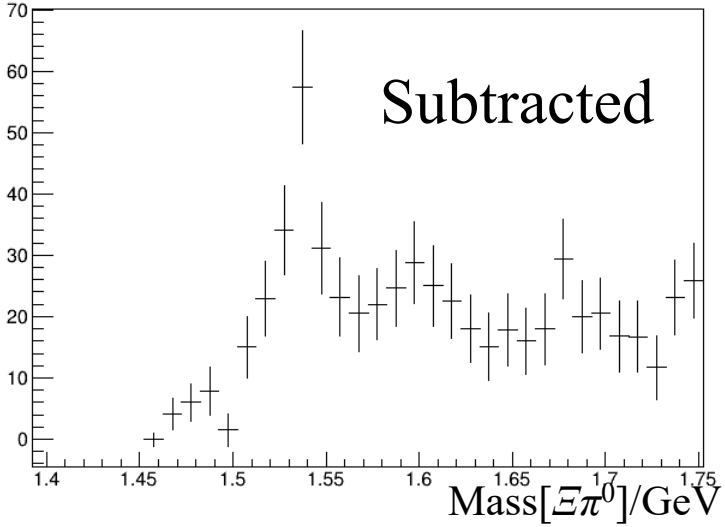








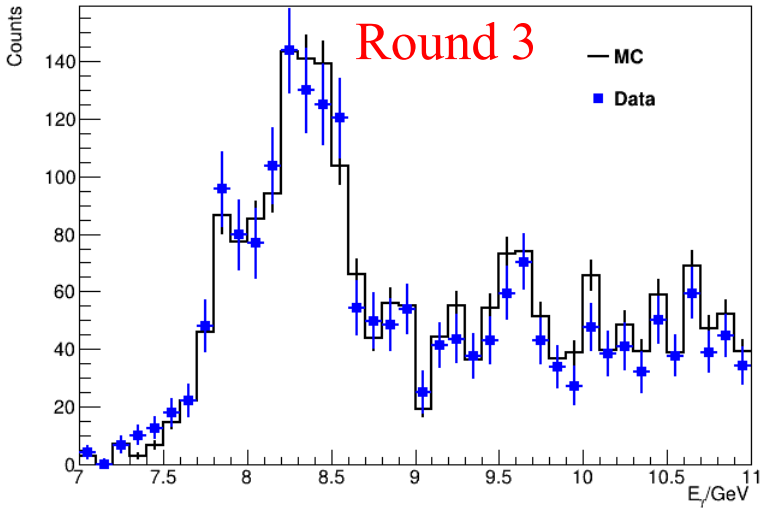
Ξ^* Generator Refinement

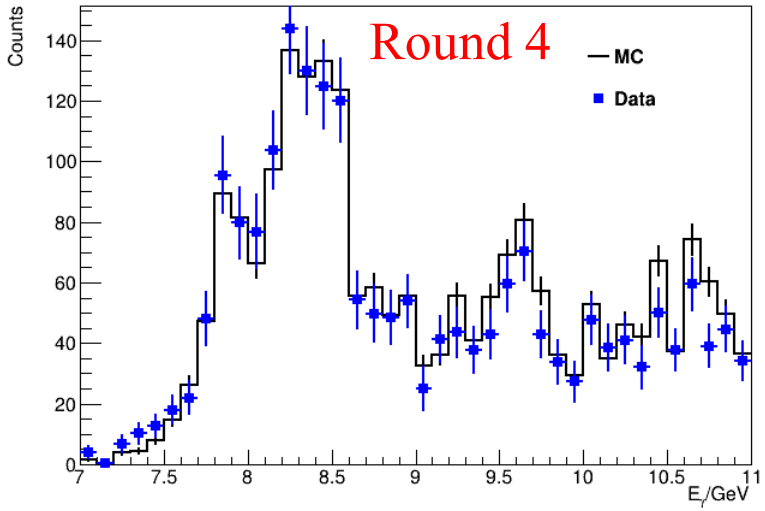
- Starting with code from Brandon build for $\Xi(1530)$ and modifying for general Ξ^*
- Taking the initial reaction as $\gamma\, p \rightarrow K\, Y^*$
- Mandelstam variables have relationship:
  - $s+t+u = m_\gamma^2 + m_p^2 + m_K^2 + m_{Y*}^2$
- We can lock down the kinematics of the initial reaction by specifying s, t and m_{Y*}
- Started with Mandelstam s and t

Ξ^* Comparison of Reconstructed MC to Actual Data

- Three rounds of MC to set *t*-slope (parameter *b* in $Ae^{-b|t|}$) to $1.138/\text{GeV}^2$
- Should have shaped mass[Y^*] before worrying too much about the *t*-slope since mass[Y^*] is set before the *t*-slope in the generator
- Fourth round: First pass at shaping mass[Y^*]

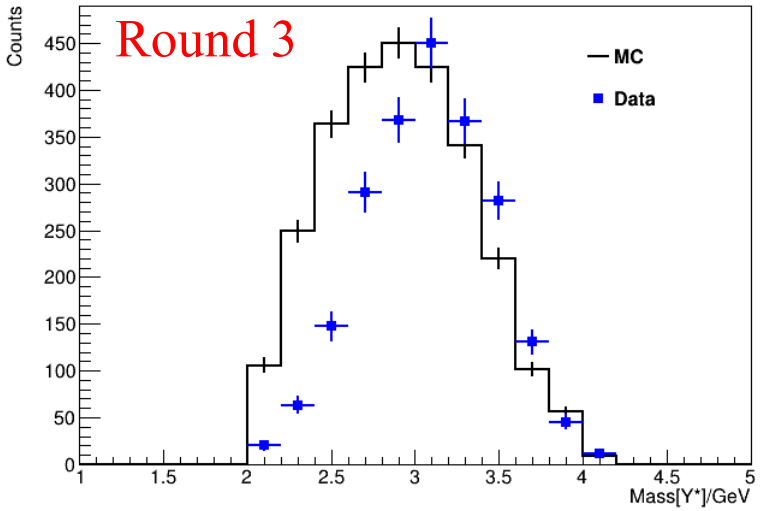
Ξ^* Comparison of Reconstructed MC to Actual Data

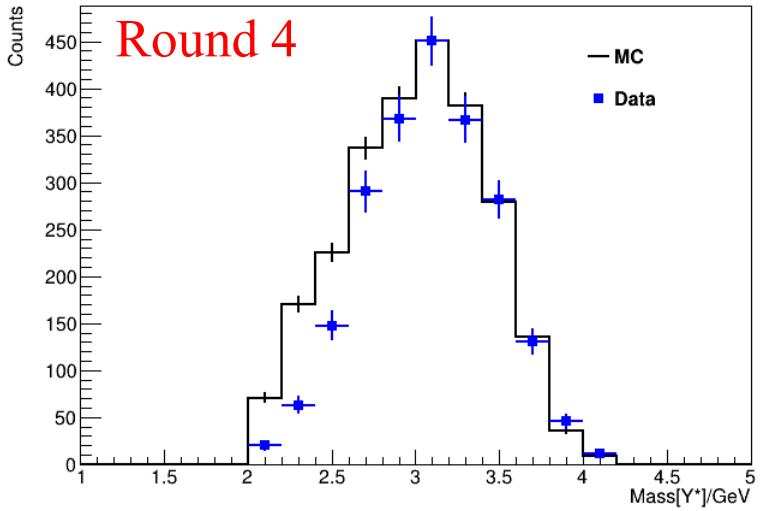




- Distribution in E_γ distribution is good for each round $\rightarrow$ s is good for each round $(s = 2E_\gamma m_p + m_p^2)$.

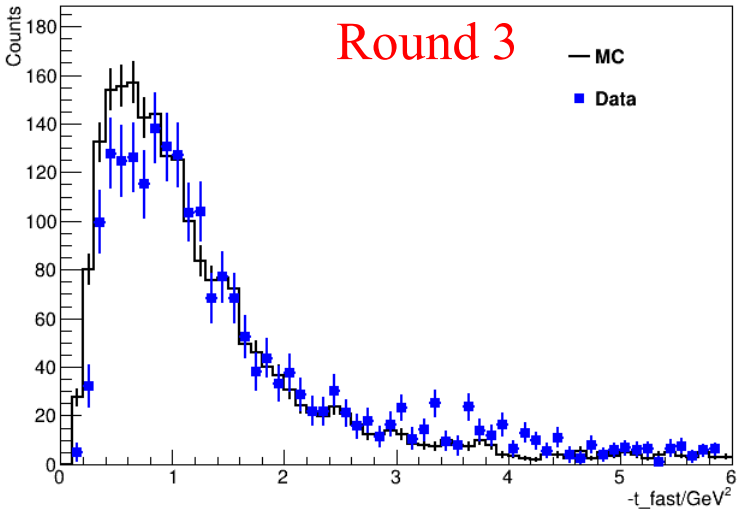
Ξ^* Comparison of Reconstructed MC to Actual Data

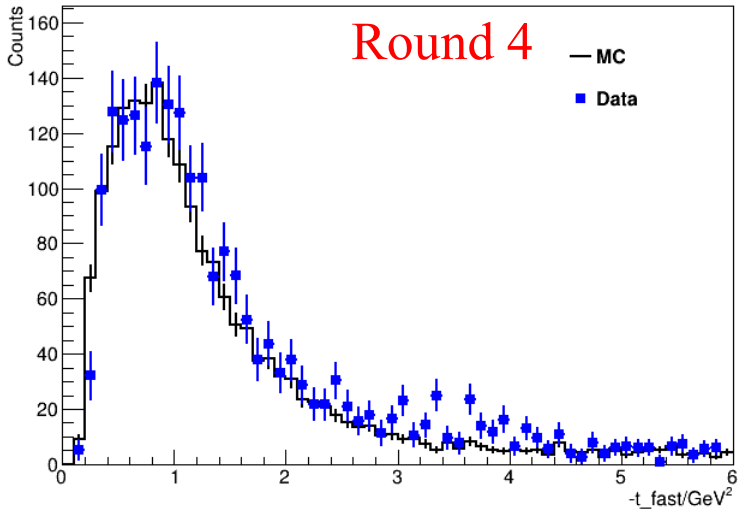




- Mass[Y^*] is getting better, but still needs another round

Ξ^* Comparison of Reconstructed MC to Actual Data





- t_{fast} looks better after shaping mass[Y^*] ☺
- After final shaping of mass[Y^*] is complete, I will have to change the *t*-slope at least one more time

Title