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

Reaction

$$\gamma\, p \rightarrow K^{+}K^{+}\Xi^{-}\pi^{0}$$

Reaction

$$\gamma\, p \rightarrow K^{+}K^{+}\Xi^{-}\pi^{0},$$

where $\Xi^{-} \rightarrow \Lambda\pi^{-}$

Reaction

$$\gamma\, p \rightarrow K^{+}K^{+}\Xi^{-}\pi^{0},$$

where $\Xi^{-} \rightarrow \Lambda\pi^{-}$

and $\Lambda \rightarrow p\pi^{-}$

Reaction

$$\gamma\, p \rightarrow K^{+}K^{+}\Xi^{-}\pi^{0},$$

where $\Xi^{-} \rightarrow \Lambda\pi^{-}$

and $\Lambda \rightarrow p\pi^{-}$

- Mass of Ξ^{-} not constrained

Reaction

$$\gamma p \rightarrow K^+ K^+ \Xi^- \pi^0,$$

where $\Xi^- \rightarrow \Lambda \pi^-$

and $\Lambda \rightarrow p \pi^-$

- Mass of Ξ^- not constrained

Requires 2 steps to obtain Ξ^* :

Reaction

$$\gamma p \rightarrow K^+ K^+ \Xi^- \pi^0,$$

where $\Xi^- \rightarrow \Lambda \pi^-$

and $\Lambda \rightarrow p \pi^-$

- Mass of Ξ^- not constrained

Requires 2 steps to obtain Ξ^* :

- Step 1: $\gamma p \rightarrow K Y^*$

Reaction

$$\gamma\, p \rightarrow K^{+}K^{+}\Xi^{-}\pi^{0},$$

where $\Xi^{-} \rightarrow \Lambda\pi^{-}$

and $\Lambda \rightarrow p\pi^{-}$

- Mass of Ξ^{-} not constrained

Requires 2 steps to obtain Ξ^{*} :

- Step 1: $\gamma\, p \rightarrow KY^{*}$
- Step 2: $Y^{*}K \rightarrow \Xi^{*}$

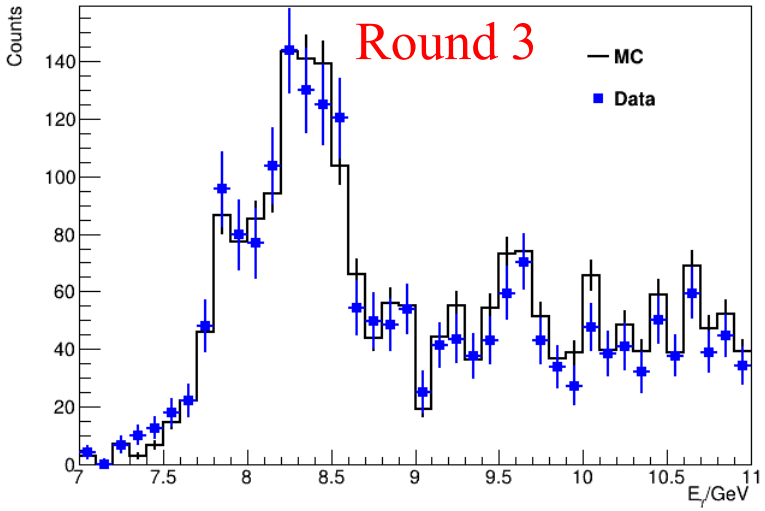
Ξ^* Generator Refinement

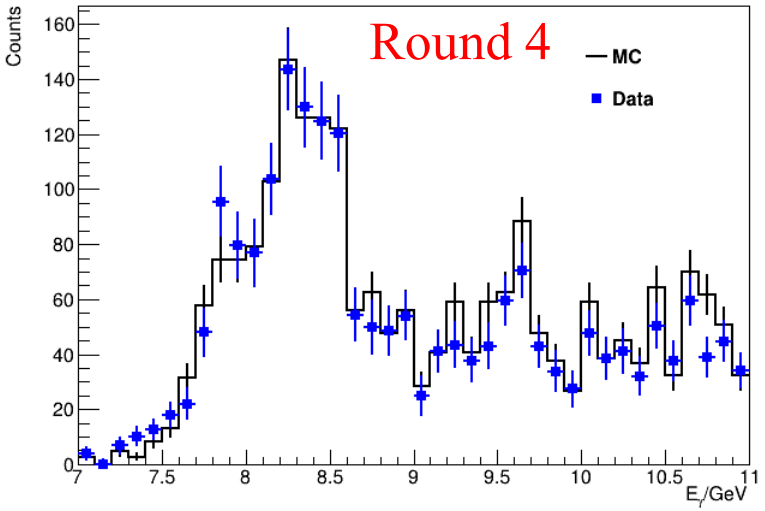
- Starting with code from Brandon build for $\Xi(1530)$ and modifying for general Ξ^*
- Taking the initial reaction as $\gamma\, p \rightarrow K\, Y^*$
- Mandelstam variables have relationship:
  - $s+t+u = m_\gamma^2 + m_p^2 + m_K^2 + m_{Y*}^2$
- We can lock down the kinematics of the initial reaction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

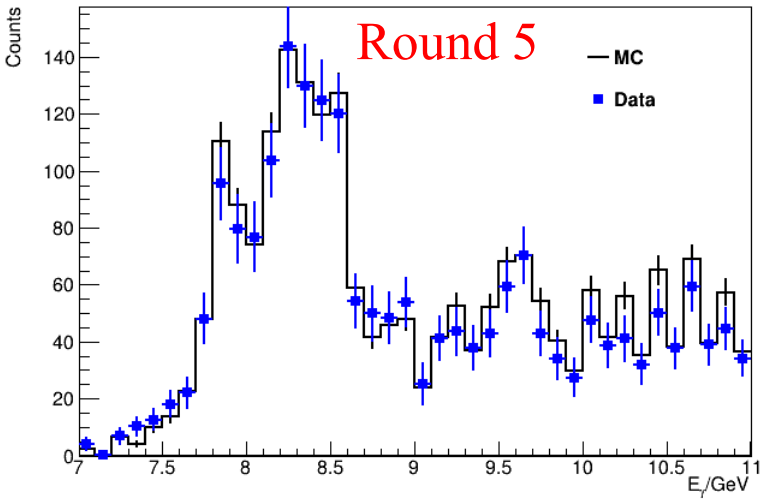
Ξ^* Comparison of Reconstructed MC to Actual Data

- Three rounds of MC to set *t*-slope (parameter *b* in $Ae^{-b|t|}$) to $1.138/\text{GeV}^2$
- Fourth round: First pass at shaping mass[*Y**]
- Fifth round: Second pass at shaping mass[*Y**]

Ξ^* Comparison of Reconstructed MC to Actual Data

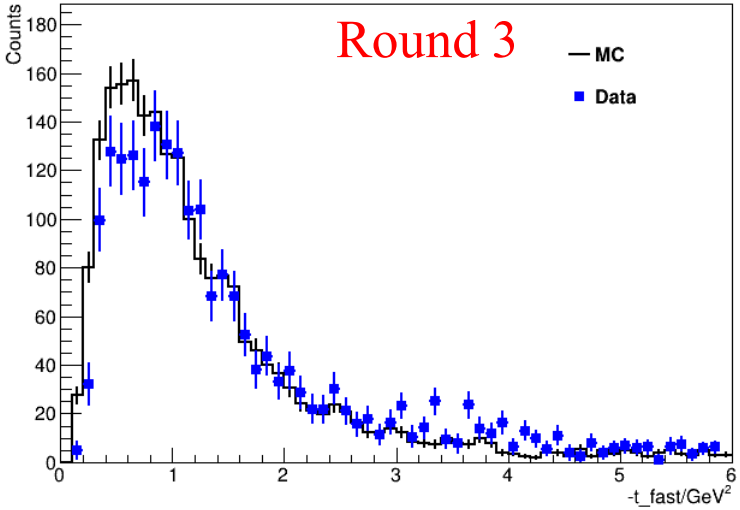


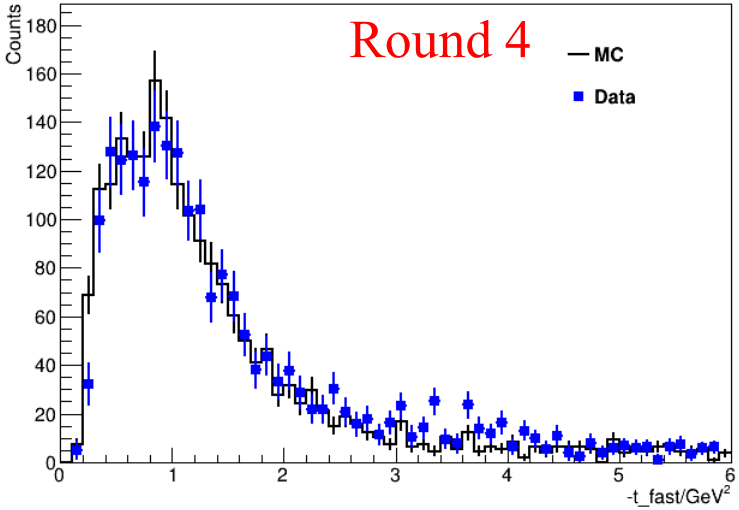


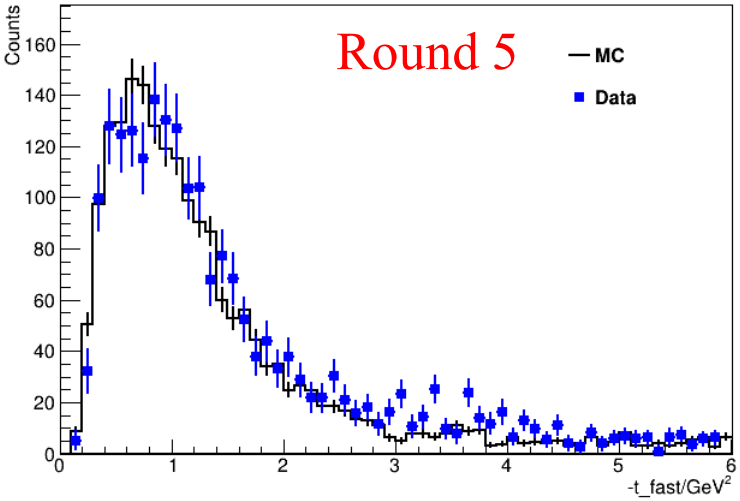


- Distribution in E_γ distribution is good for each round → s is good

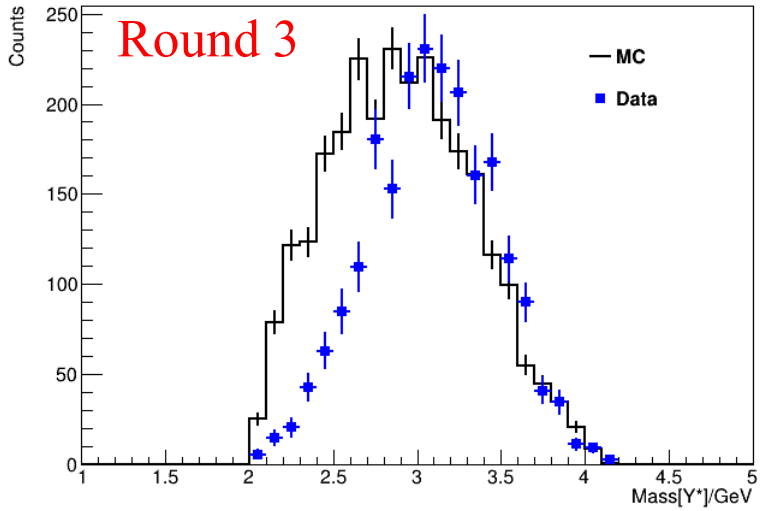
Ξ^* Comparison of Reconstructed MC to Actual Data

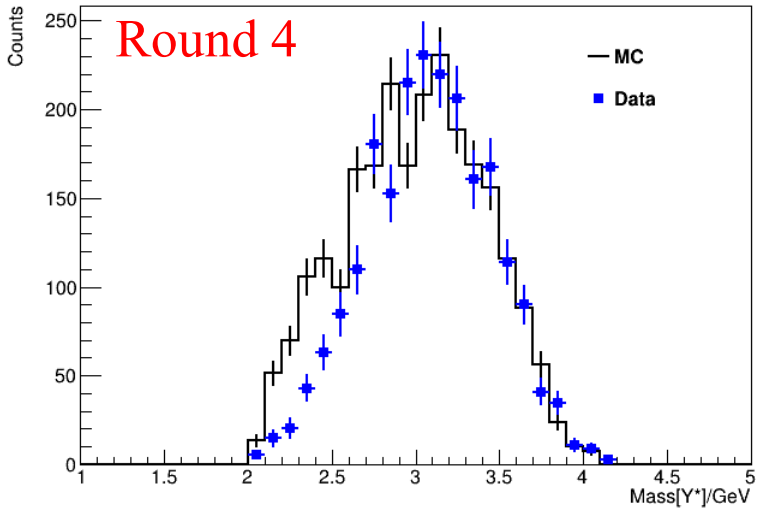


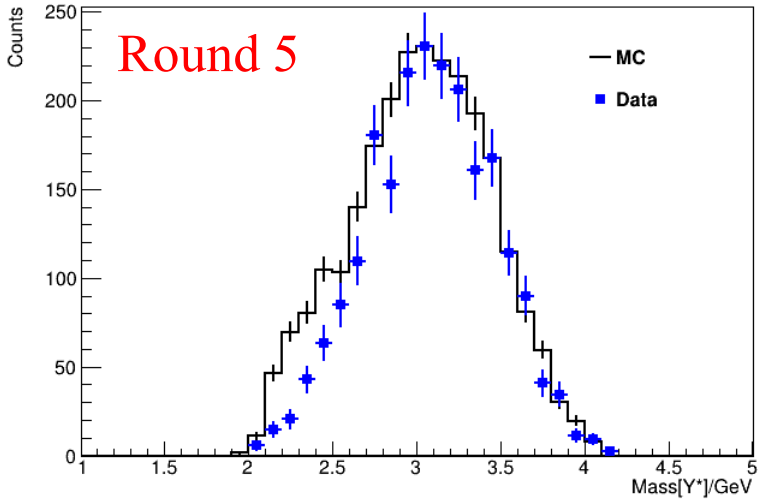




Ξ^* Comparison of Reconstructed MC to Actual Data

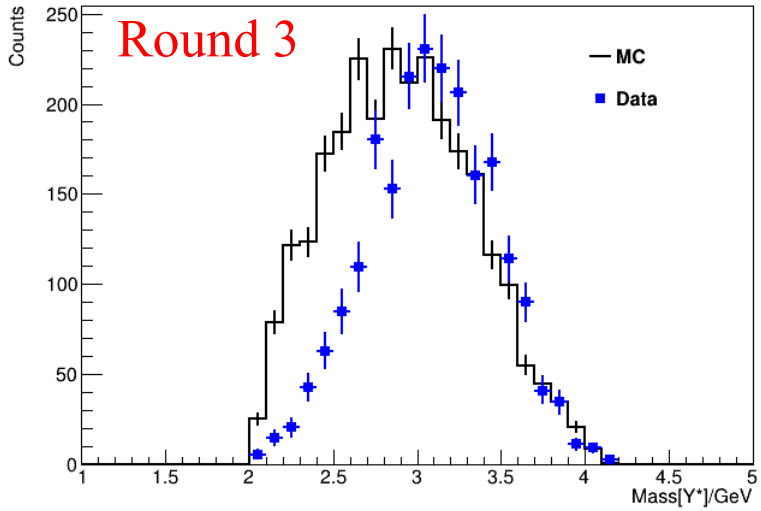


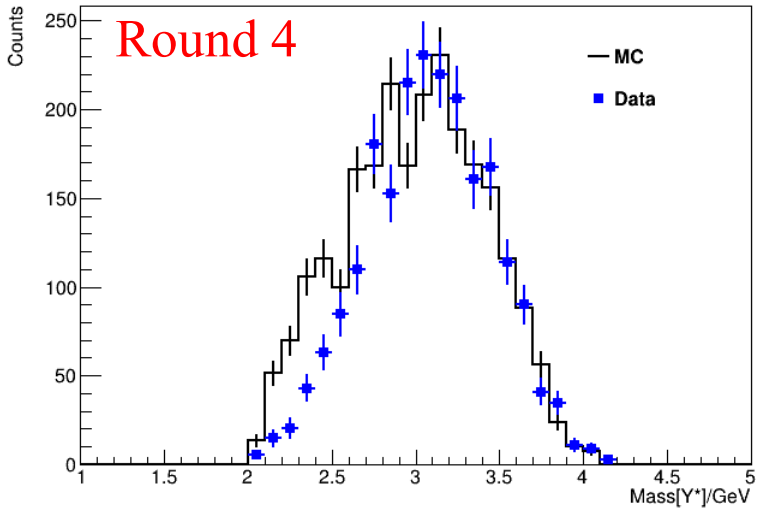


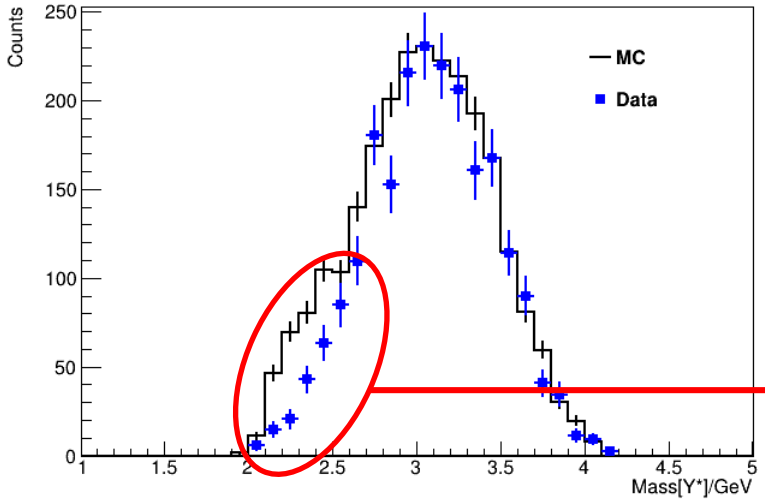


- Mass[Y^*] is not getting much better!

Ξ^* Comparison of Reconstructed MC to Actual Data



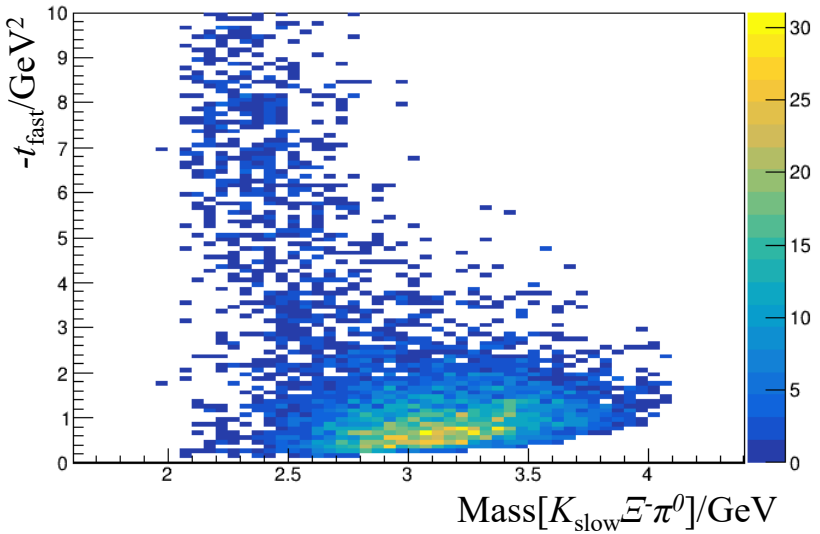




- Mass[Y^*] is not much getting better!

What is going on here?

$|t_{\text{fast}}|$ vs Mass Y^*

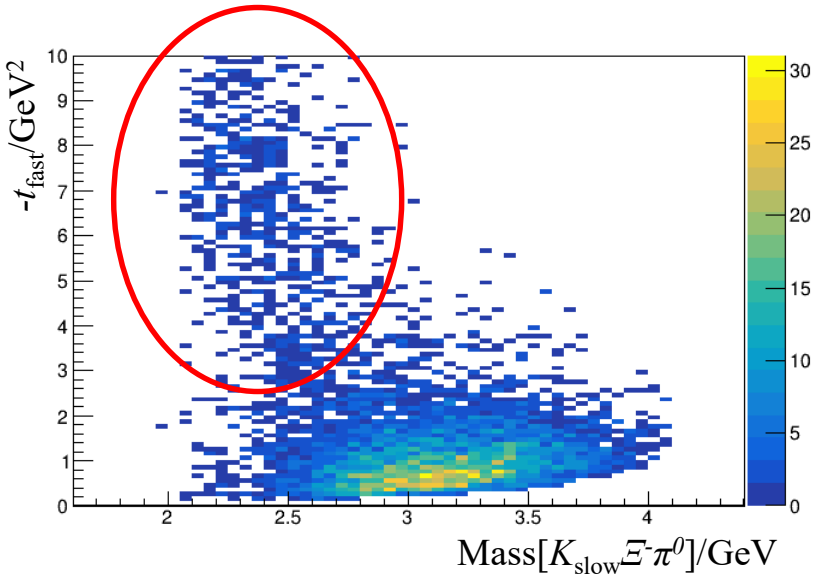


I assume

- $\gamma\, p \rightarrow K_{\text{fast}}\, Y^*$
- $Y^* \rightarrow K_{\text{slow}}\, \Xi^*$
- $\Xi^* \rightarrow \Xi\pi$

I take t_{fast} from exchange between γ and K_{fast}

$|t_{\text{fast}}|$ vs Mass Y^*



I assume

- $\gamma\, p \rightarrow K_{\text{fast}}\, Y^*$
- $Y^* \rightarrow K_{\text{slow}}\, \Xi^*$
- $\Xi^* \rightarrow \Xi\pi$

I take t_{fast} from exchange between γ and K_{fast}

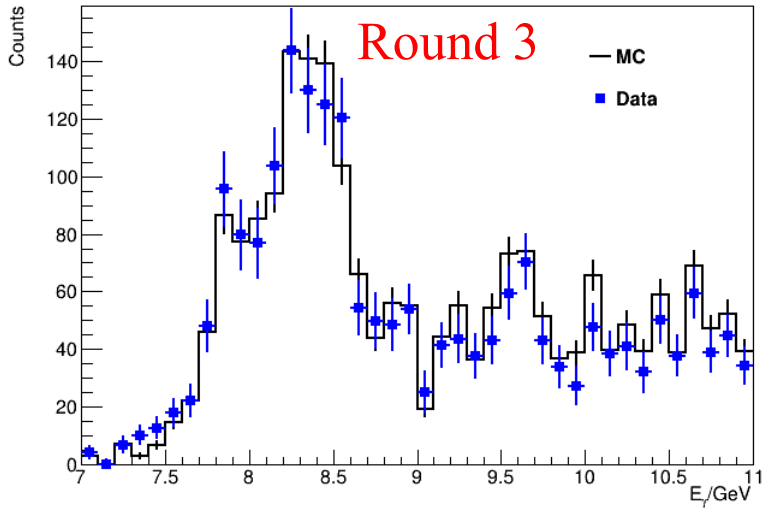
- Looks like $\gamma\, p \rightarrow K_{\text{fast}}\, Y^*$ is probably the wrong assumption for region in red circle. Perhaps not even t-channel process. Can cut out red circle events with simple cut on $|t|$

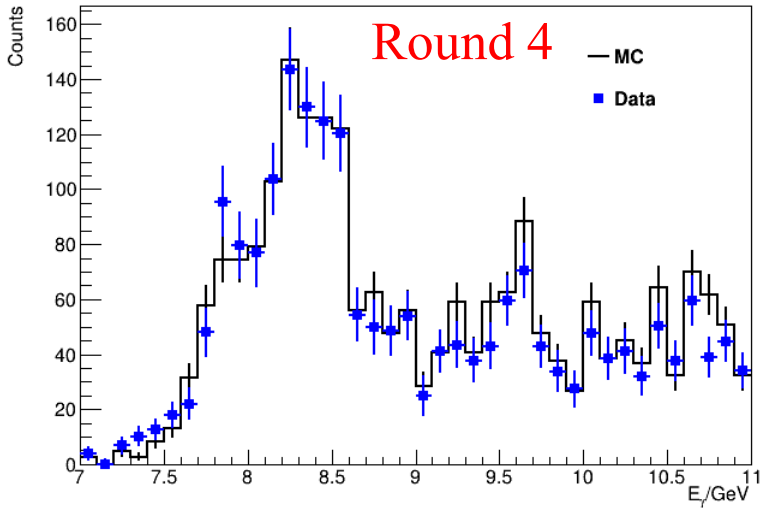
$\Xi^* \rightarrow \Xi\pi^0$ update

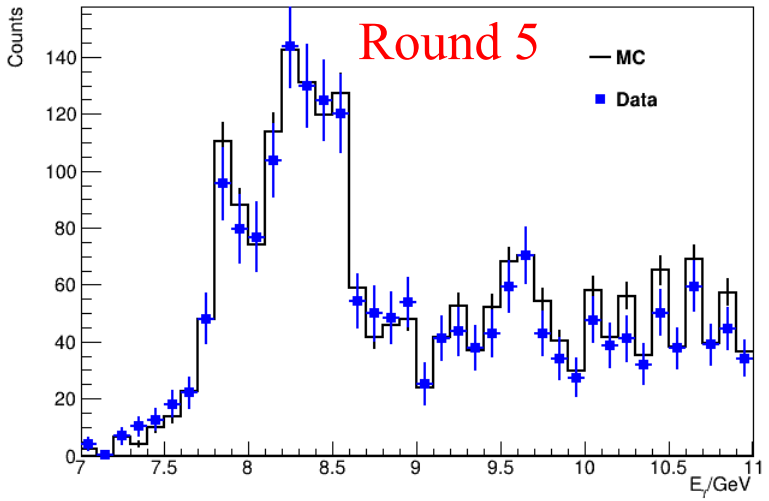
NEW: I went back to round 4 and cut out events with $|t_{\text{fast}}| > 3$ GeV^2

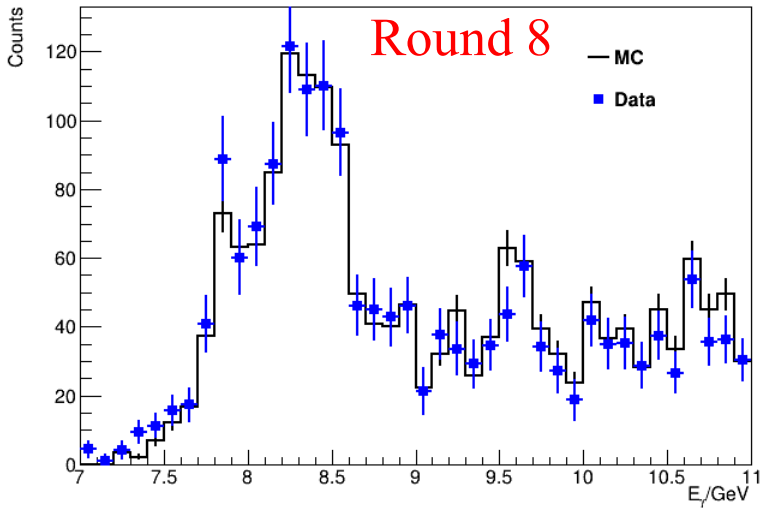
The above is what I am now calling round 8 (rounds 6 and 7 had various errors)

Ξ^* Comparison of Reconstructed MC to Actual Data

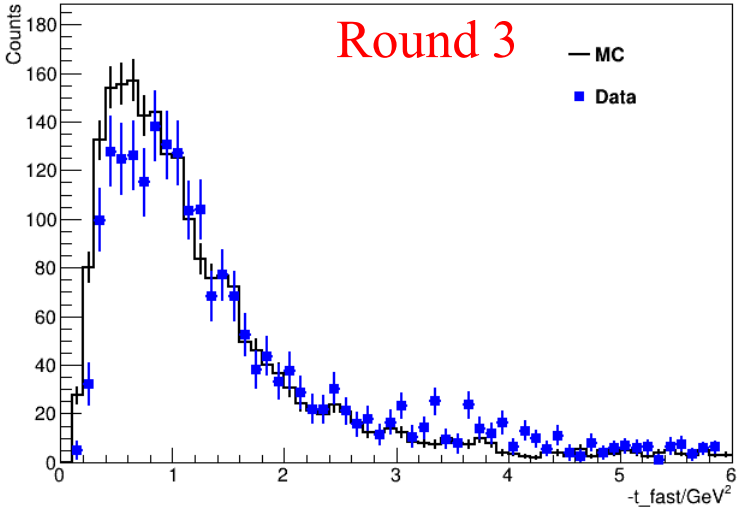


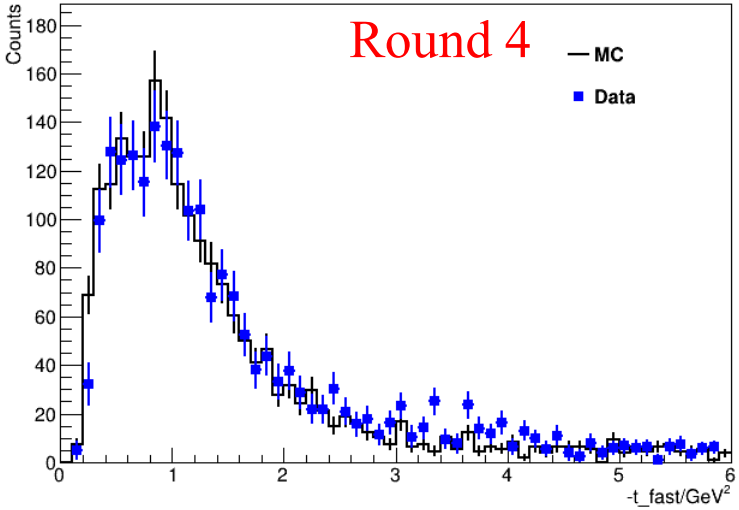


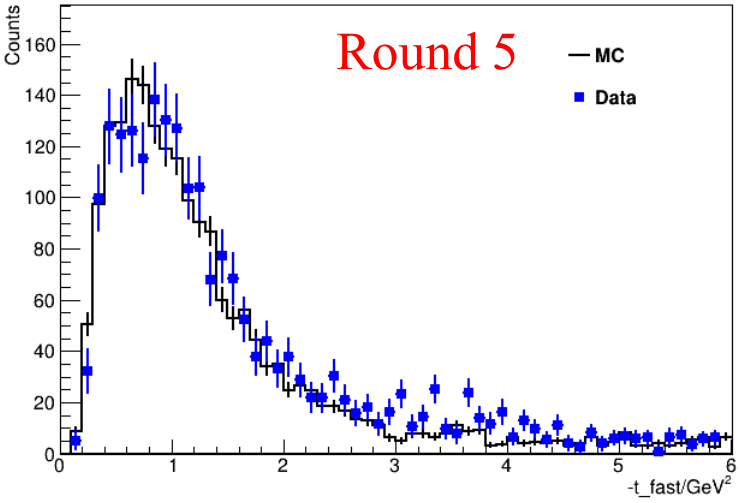


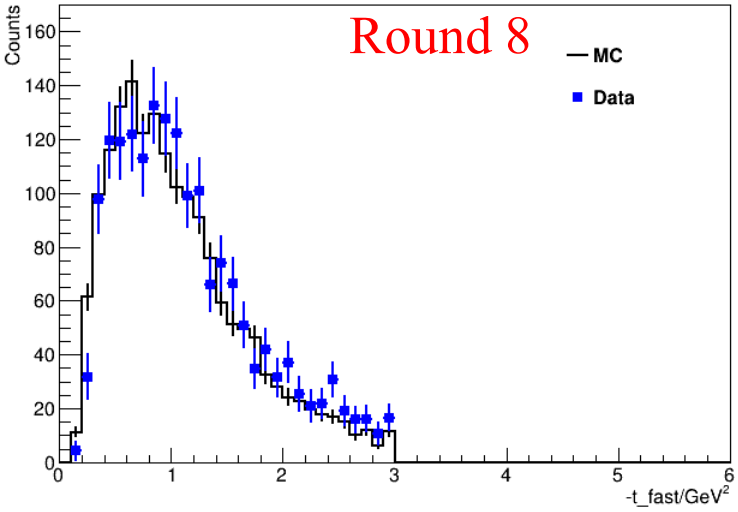


Ξ^* Comparison of Reconstructed MC to Actual Data

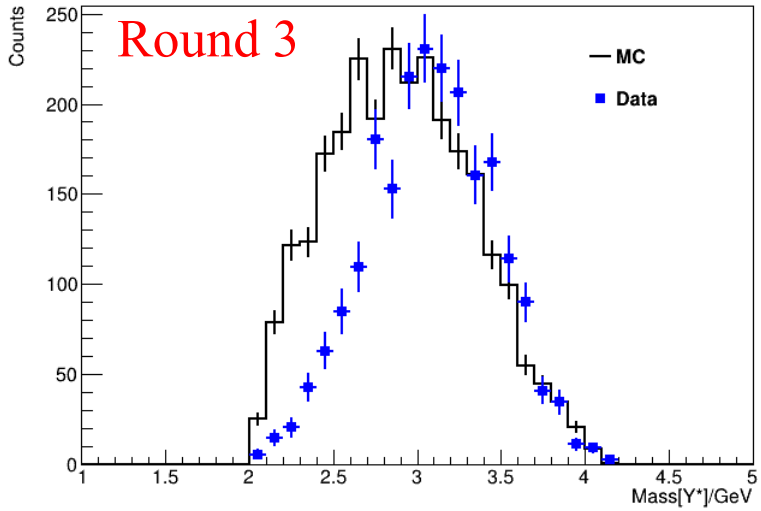


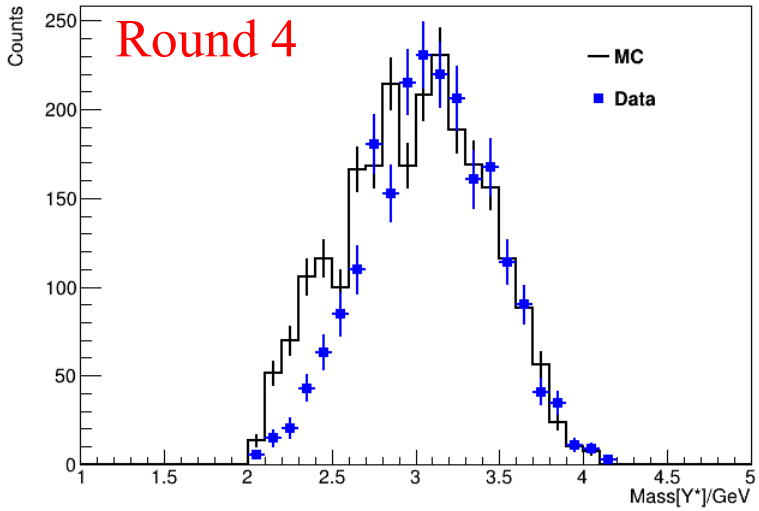


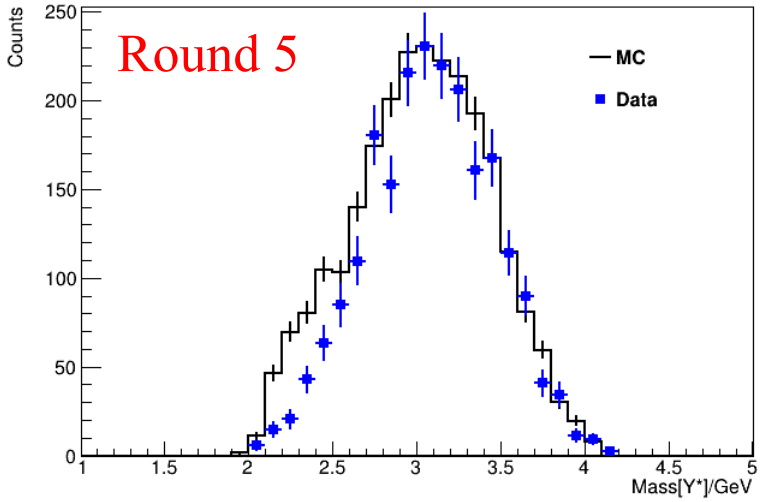


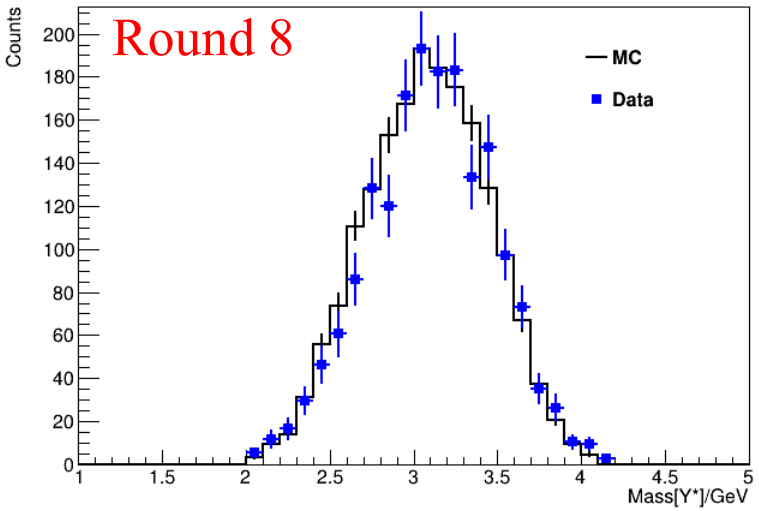


Ξ^* Comparison of Reconstructed MC to Actual Data









Next step

- Momentum comparisons are the next thing I will look at