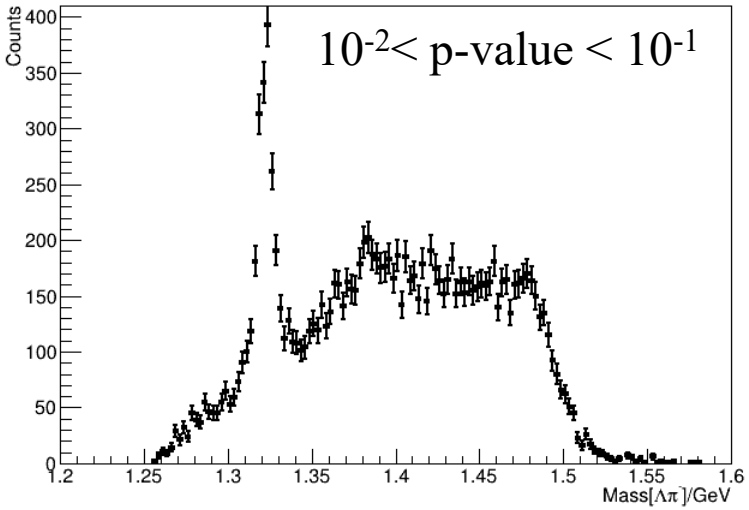
Update on Ξ^- pid

Michael Dugger
and
Katelyn Hernandez

Mass[$\Lambda\pi$] Analysis: p-value intervals



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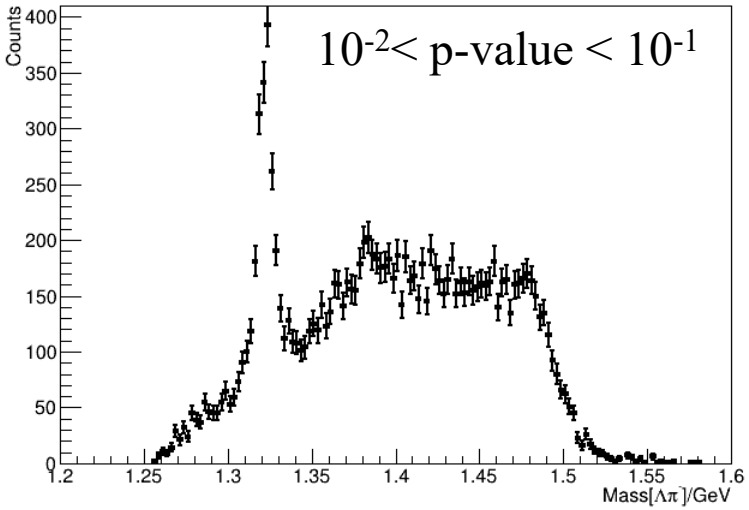

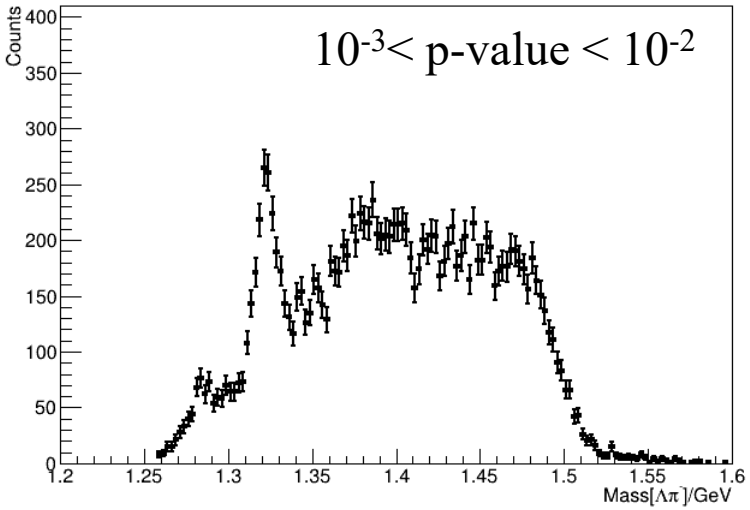

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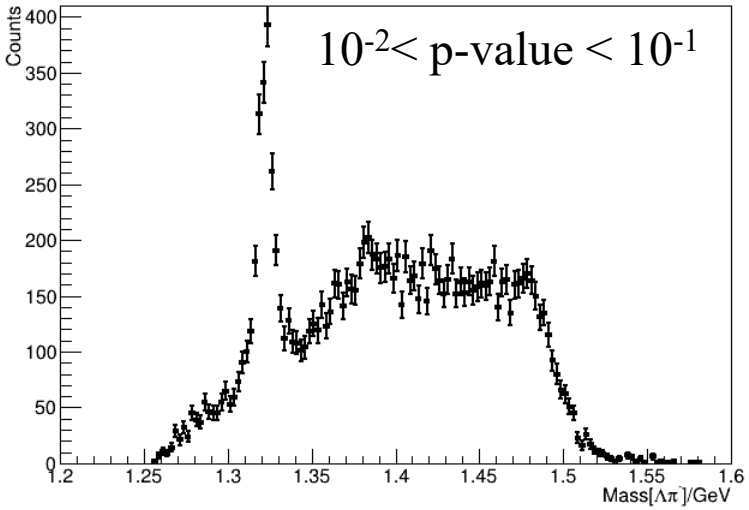

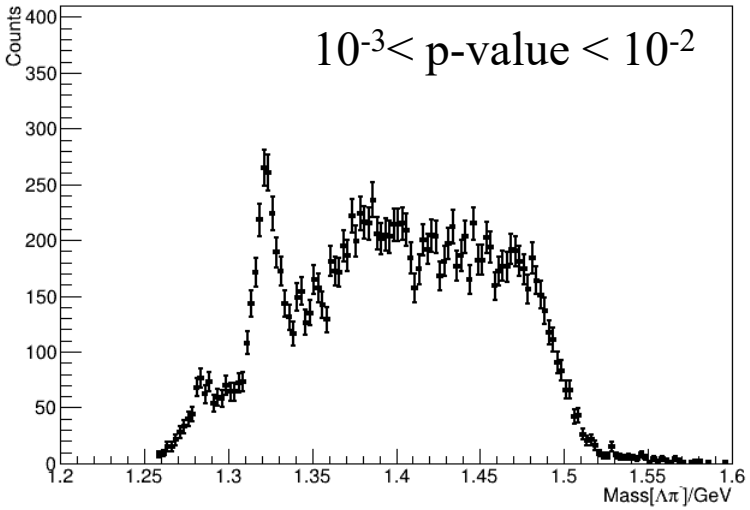

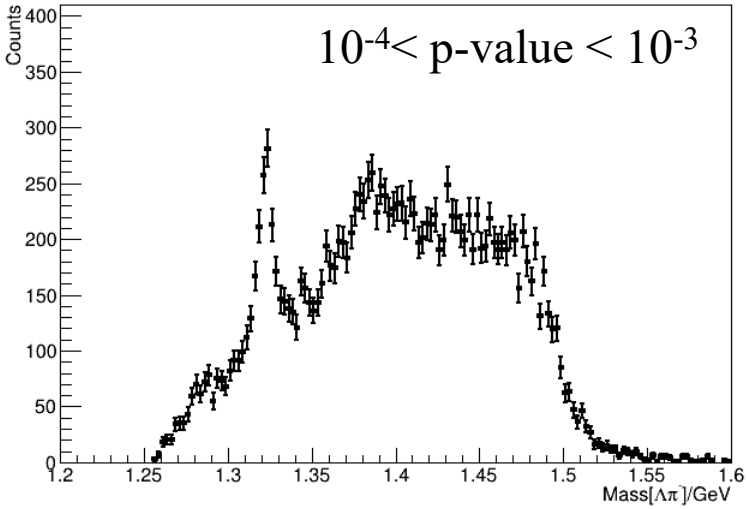

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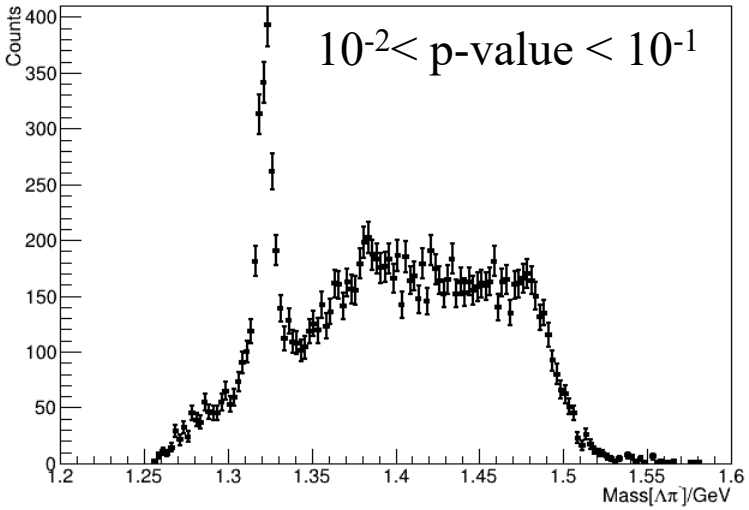

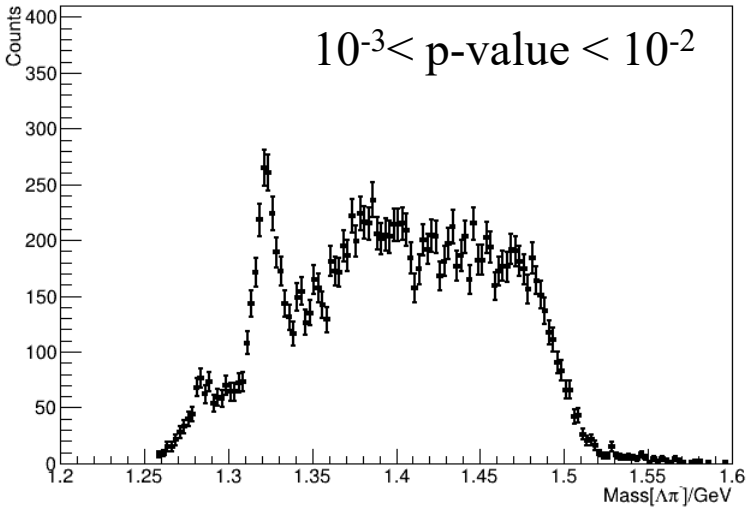

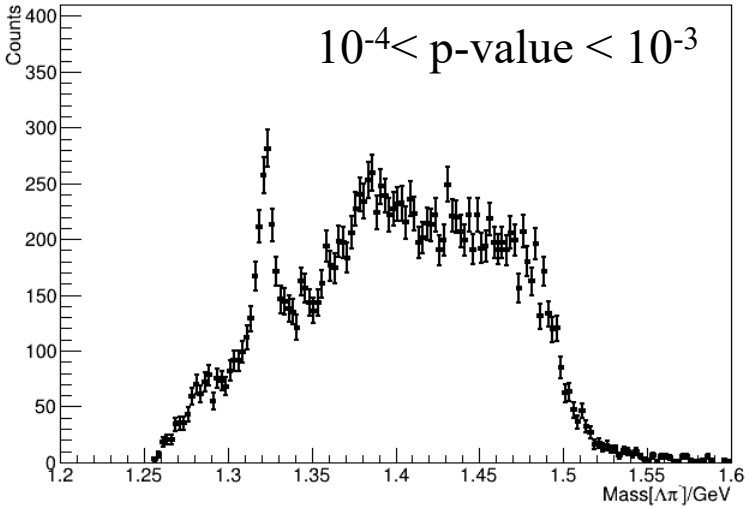

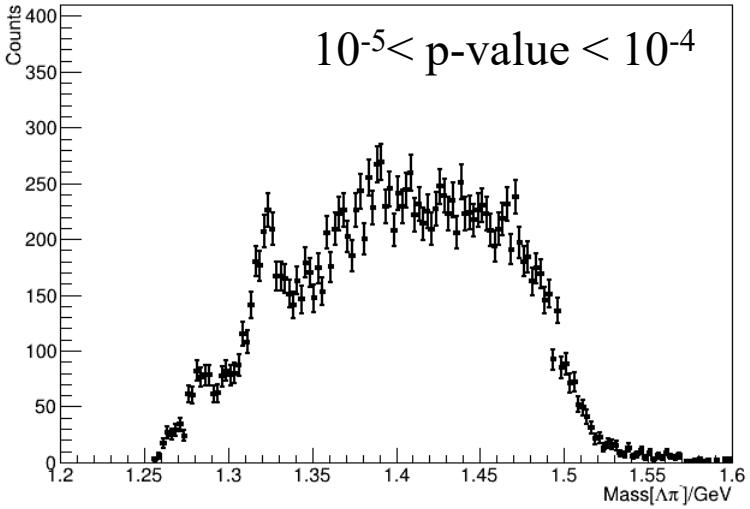

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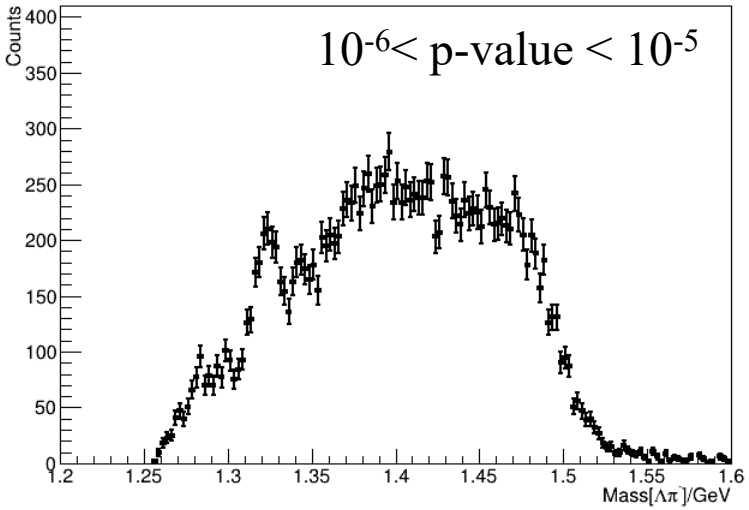
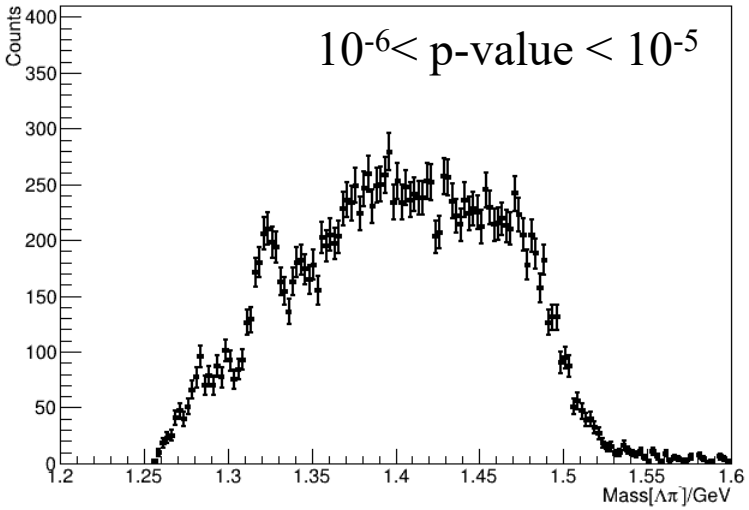
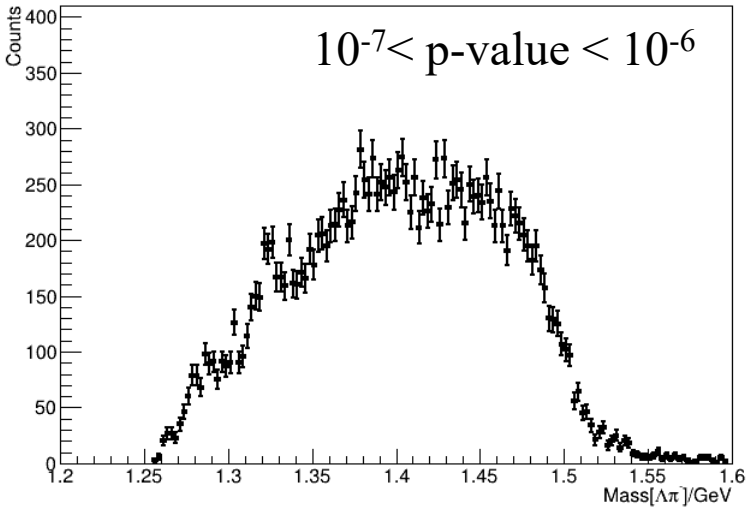


Mass[$\Lambda\pi$] Analysis: *p*-value intervals





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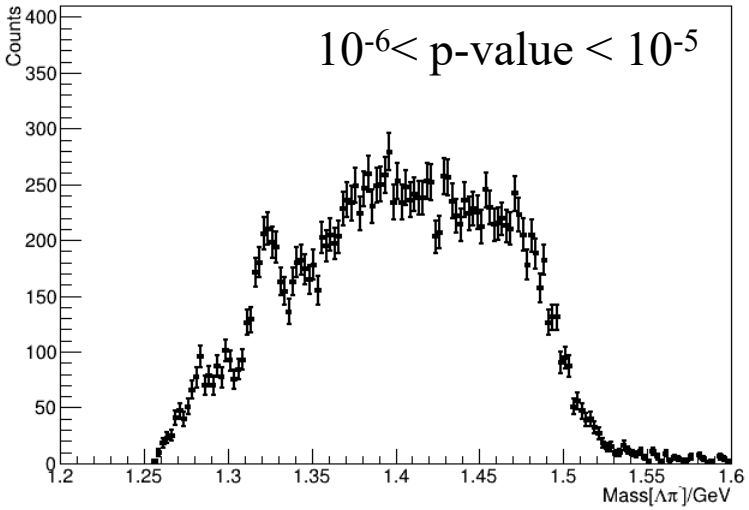

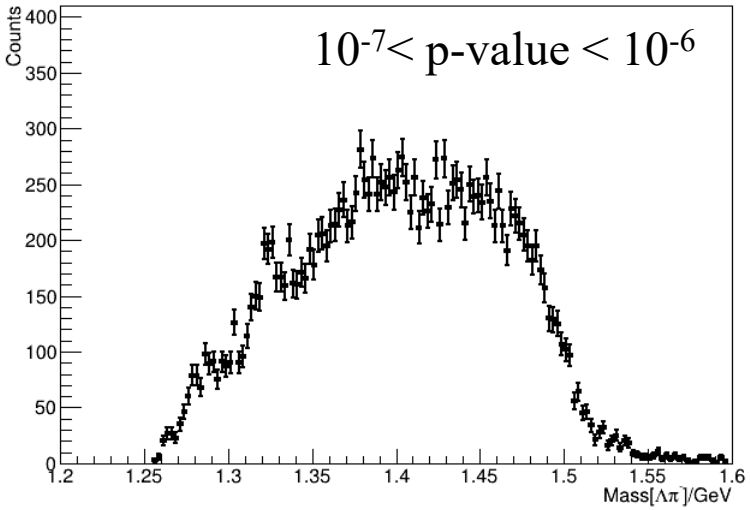

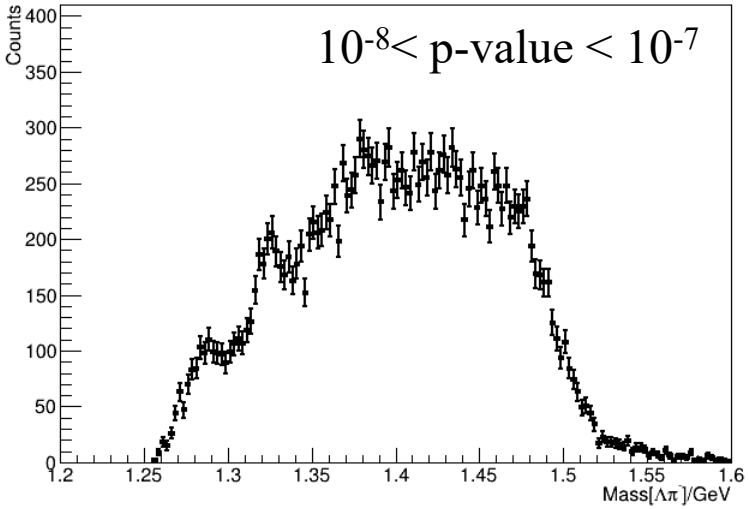

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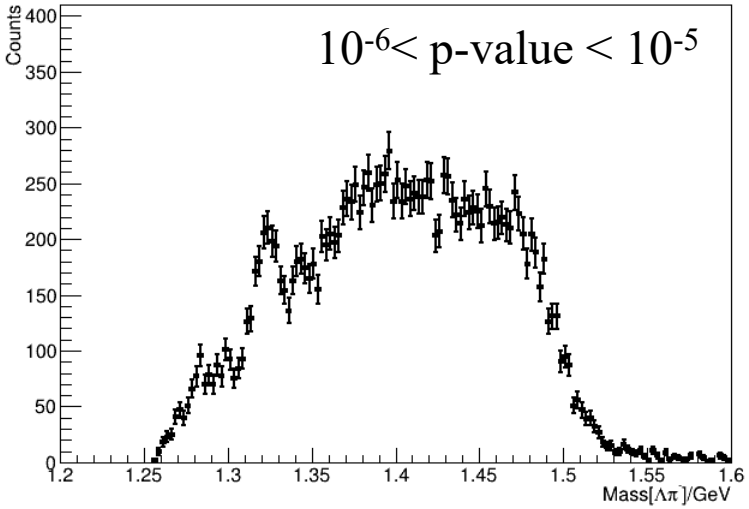
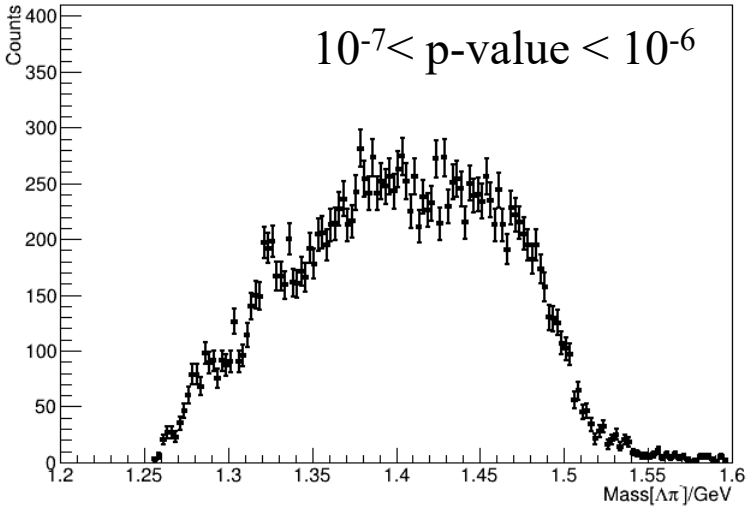
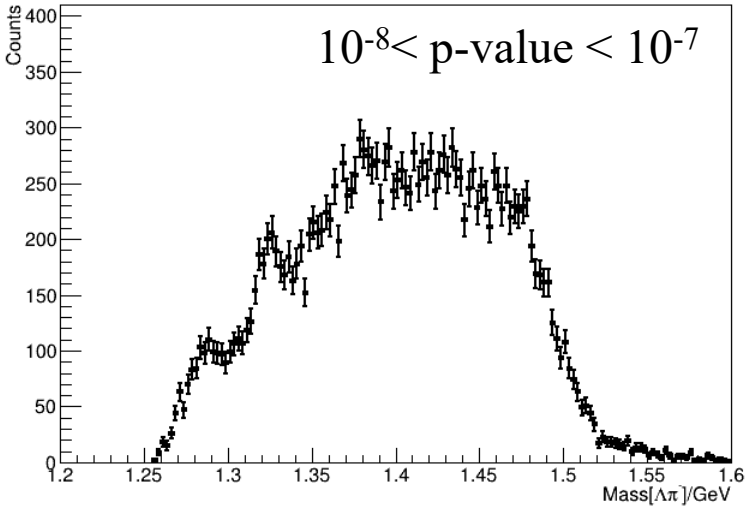
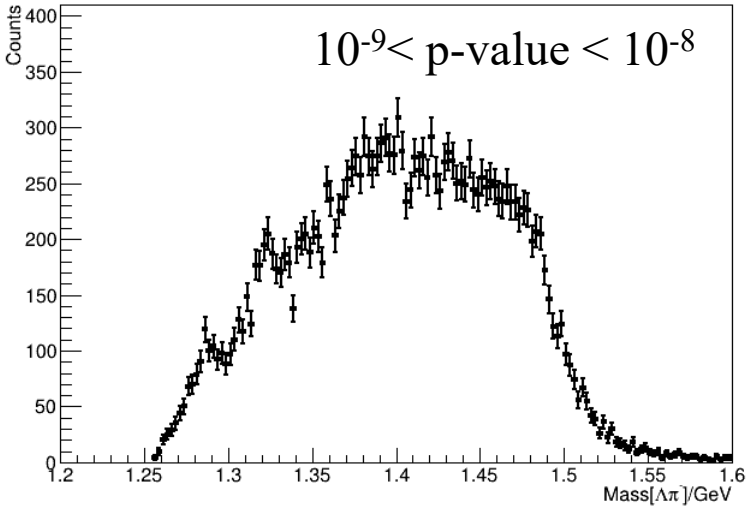




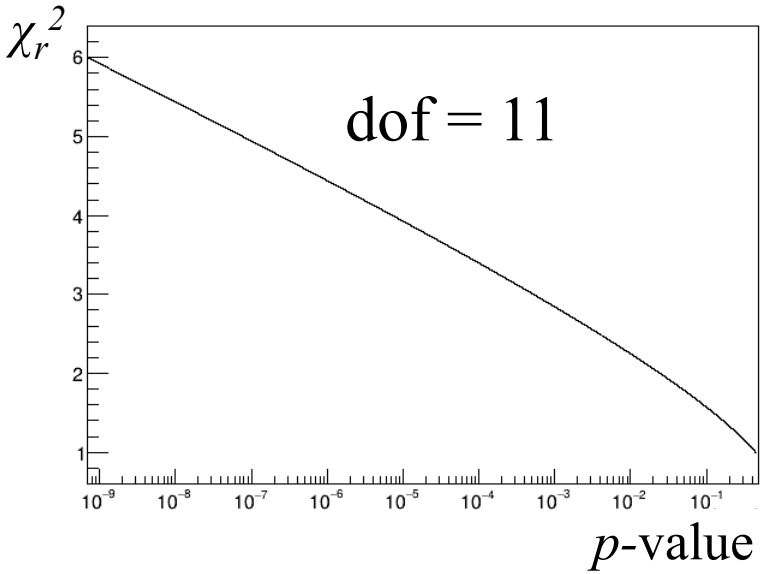




Reduced χ^2 vs. p-value for kinematic fit

- The kinematic fit:

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



Reduced χ^2 vs. p-value for kinematic fit

- The kinematic fit:

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

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

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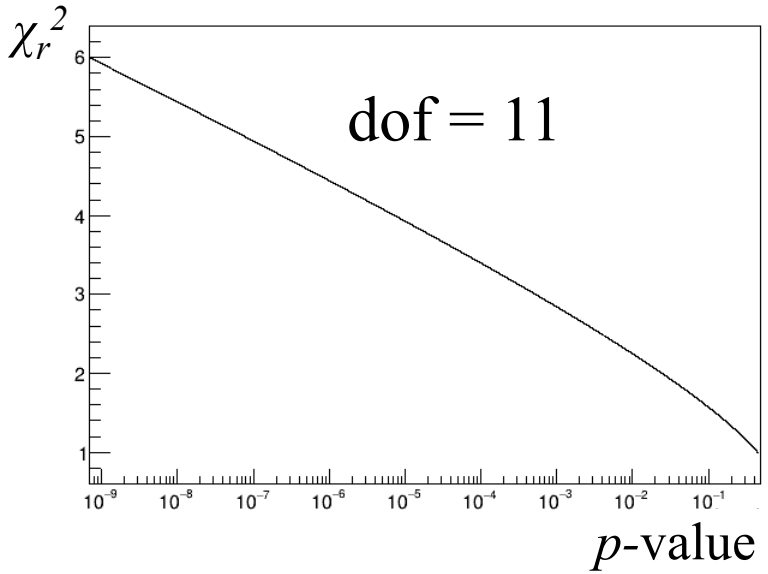

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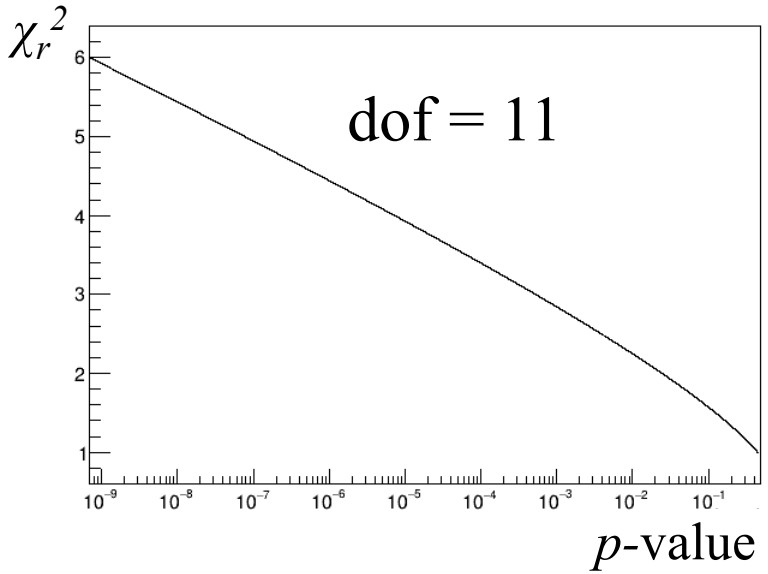
- Mass of Ξ^- not constrained



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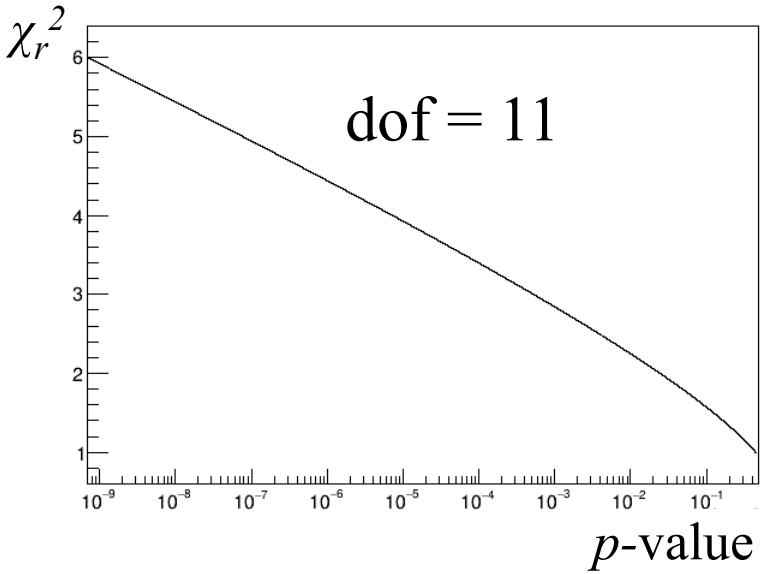

Note:

- p-value = 10^{-8} when $\chi_r^2 \sim 5.44$
- p-value = 10^{-1} when $\chi_r^2 \sim 1.57$
- p-value ~ 0.44 when $\chi_r^2 = 1.0$

ASU

Reduced χ^2 vs. p-value for kinematic fit

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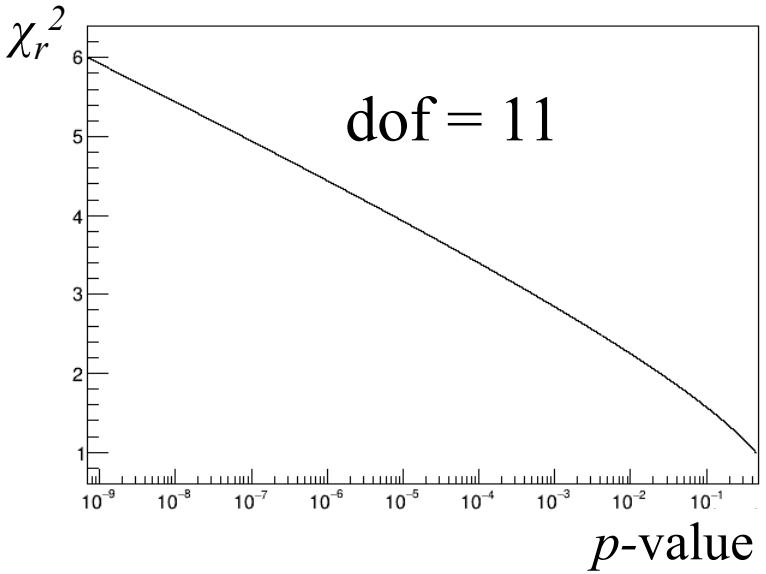

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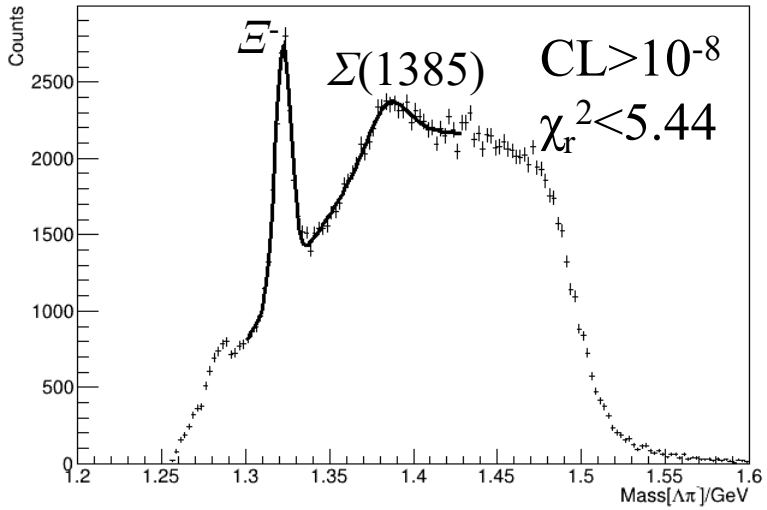
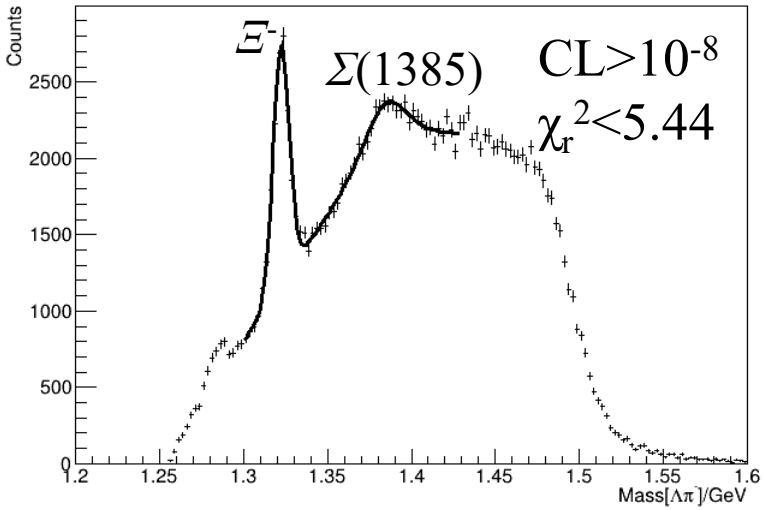
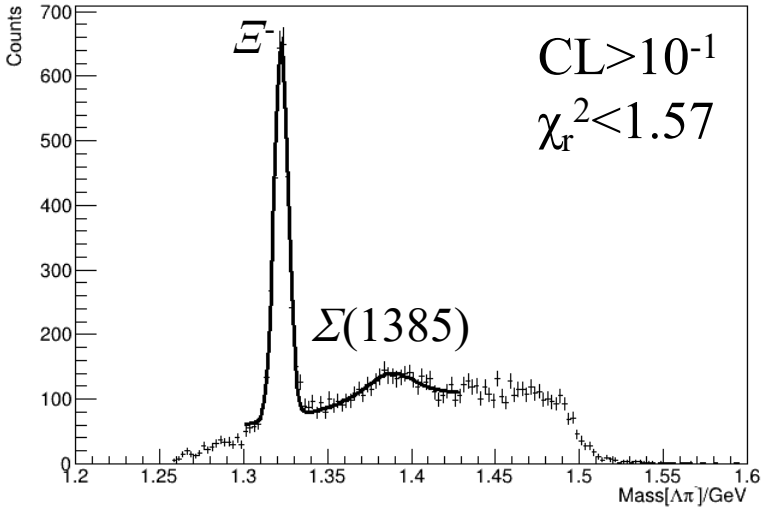
Probably about as extreme as we would ever want to go

Ξ^* Analysis: mass[$\Lambda\pi^-$]



Ξ^* Analysis: mass[$\Lambda\pi^-$]





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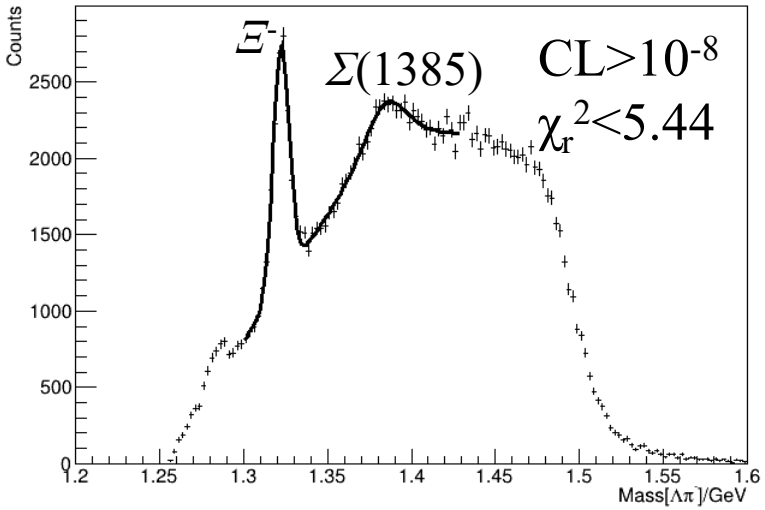

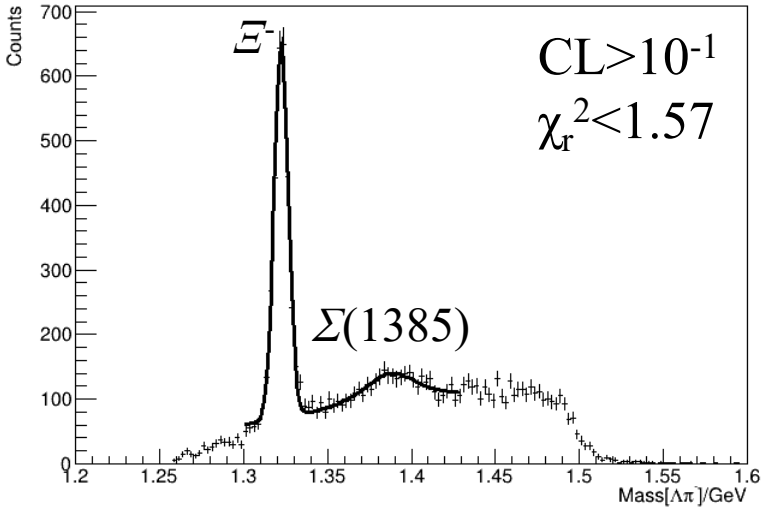

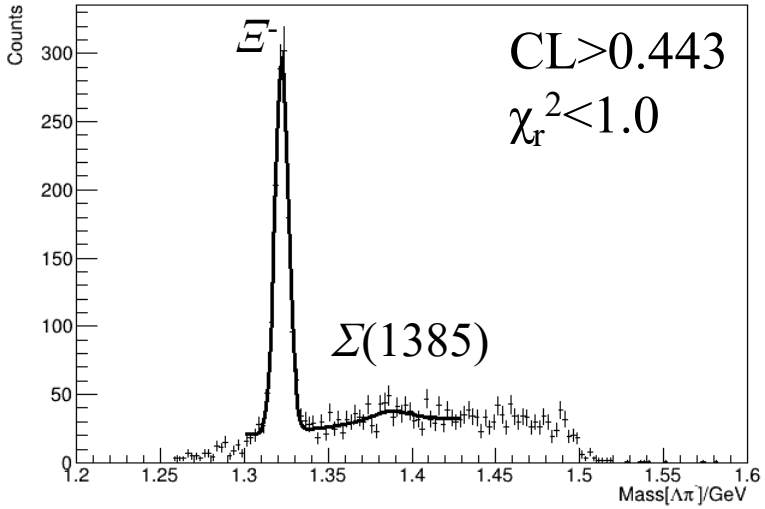

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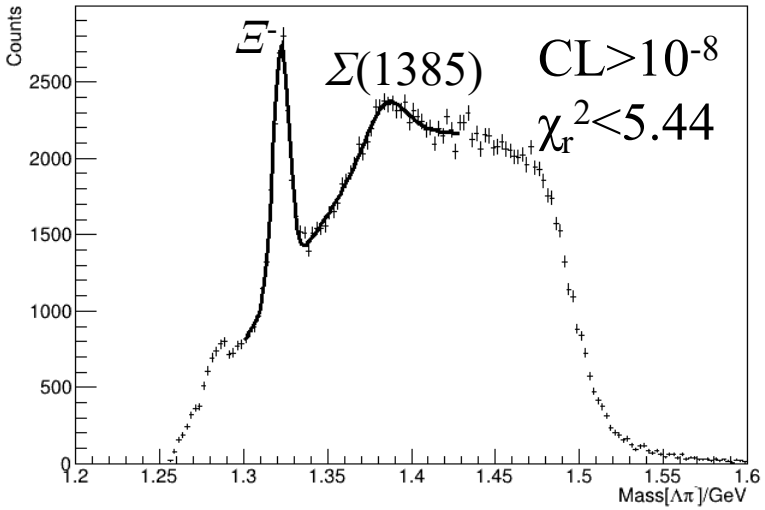
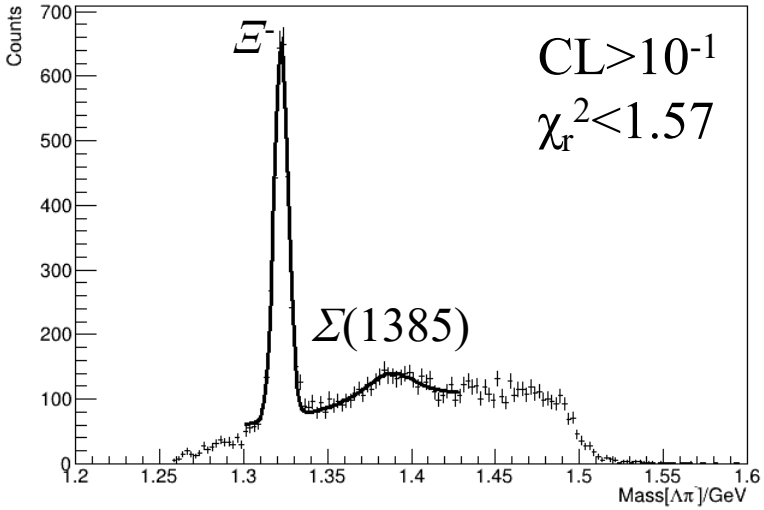
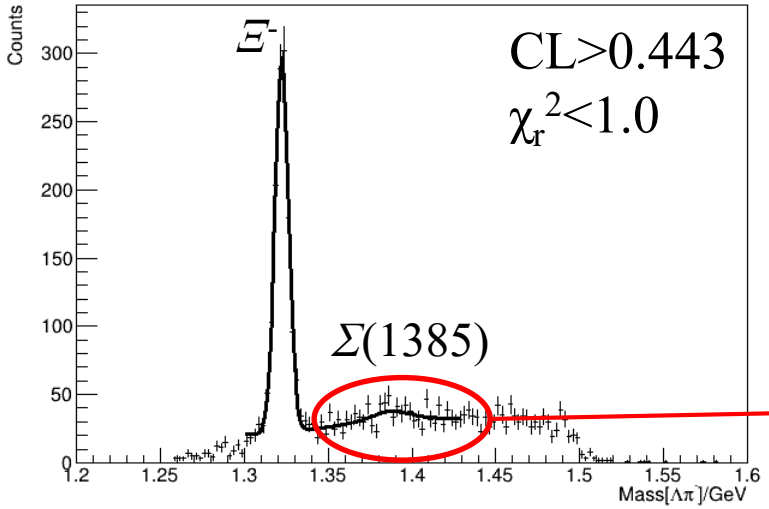
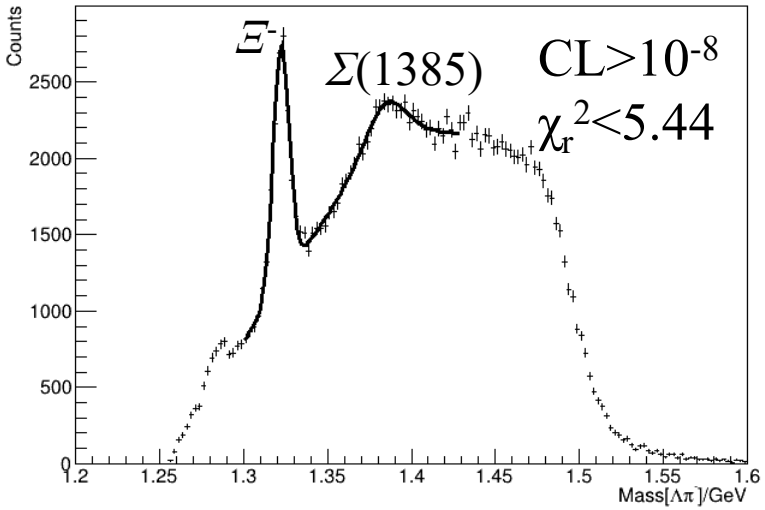


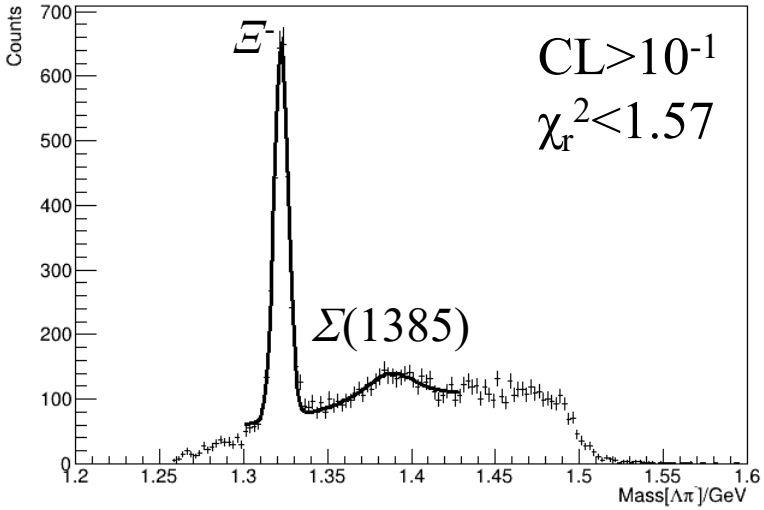


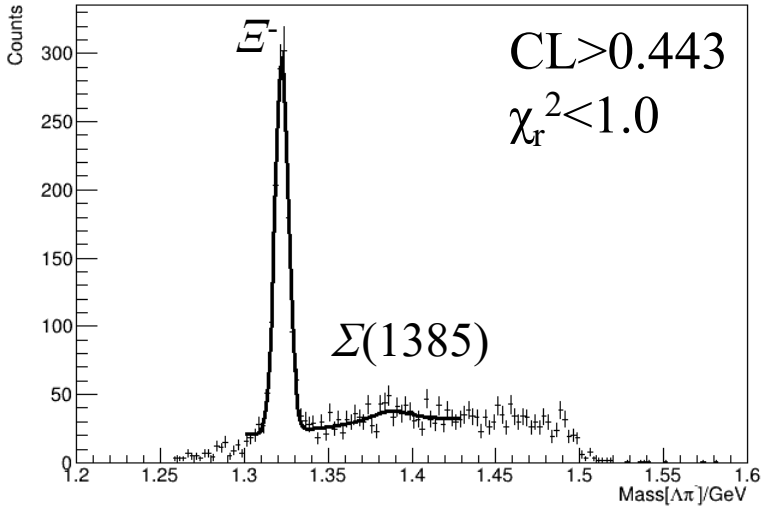


Almost completely removed, but cut is too extreme

Ξ^* Analysis: mass[$\Lambda\pi^-$]

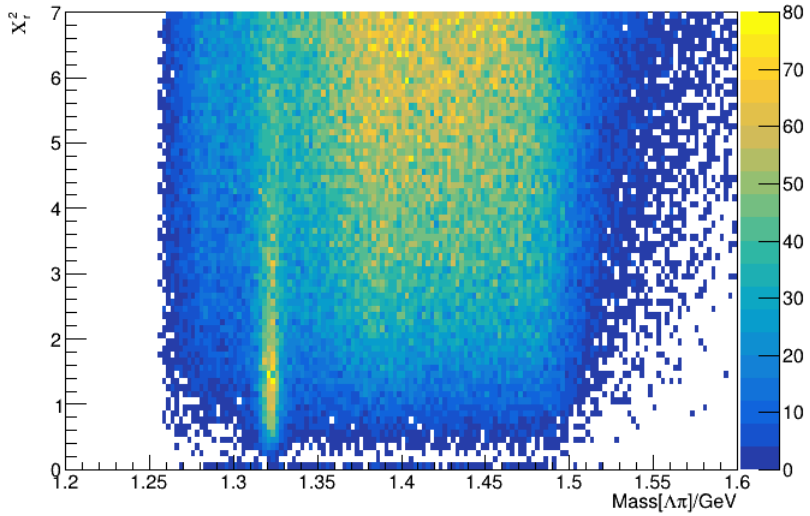




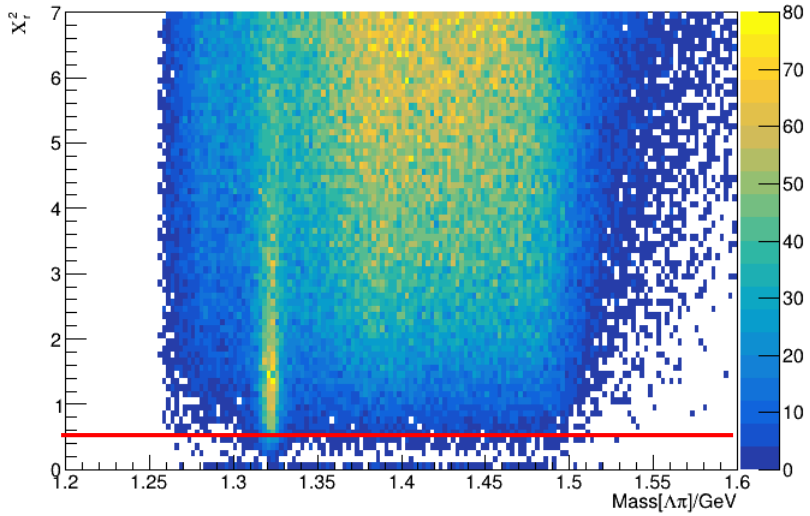


- What if we go to even lower χ_r^2 values (for the heck of it)?

χ_r^2 versus mass[$\Lambda\pi$]

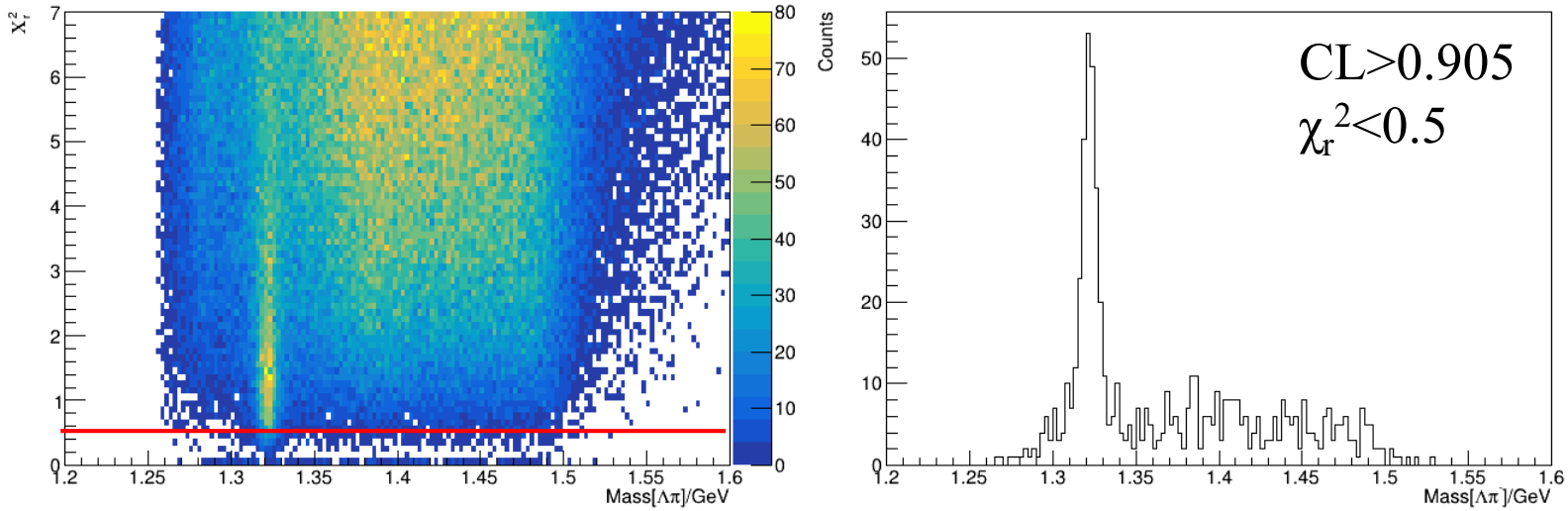


χ_r^2 versus mass[$\Lambda\pi$]



- Looks like we could make a cut at about $\chi_r^2 < 0.5$ (CL>0.905) to remove nearly all of the $\Sigma(1385)$ background

χ_r^2 versus mass[$\Lambda\pi$]



- Looks like we could make a cut at about $\chi_r^2 < 0.5$ (CL>0.905) to remove nearly all of the $\Sigma(1385)$ background

Track-χ_r^2 versus mass[$\Lambda\pi$]

Define:

Track-χ_r^2 = [tracking χ_r^2 of 1st K^+] + [tracking χ_r^2 of 2nd K^+]

Track-χ_r^2 versus mass[$\Lambda\pi$]

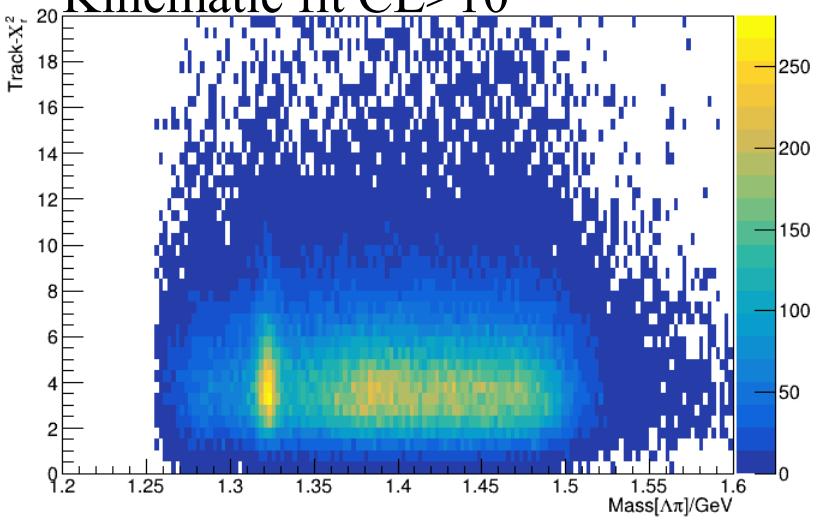
Define:

Track-χ_r^2 = [tracking χ_r^2 of 1st K^+] + [tracking χ_r^2 of 2nd K^+]

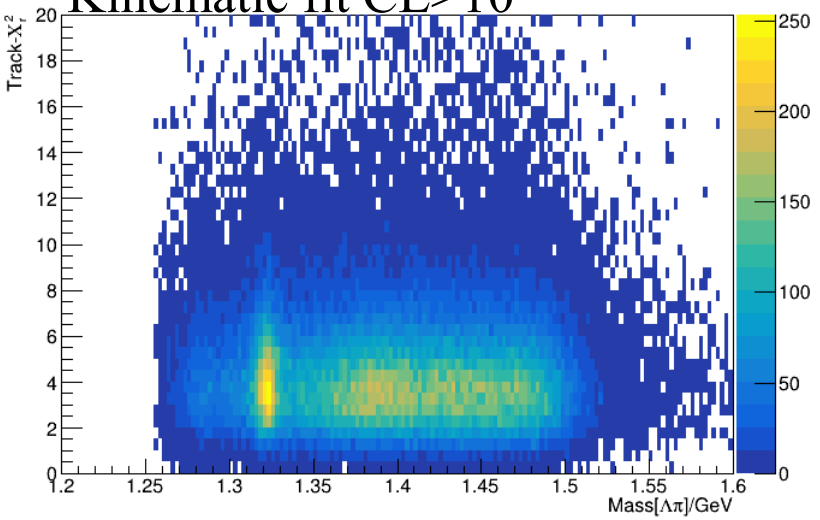
- Looking to see if there are any obvious cuts to make on Track- χ_r^2

Track-χ_r^2 versus mass[$\Lambda\pi$]

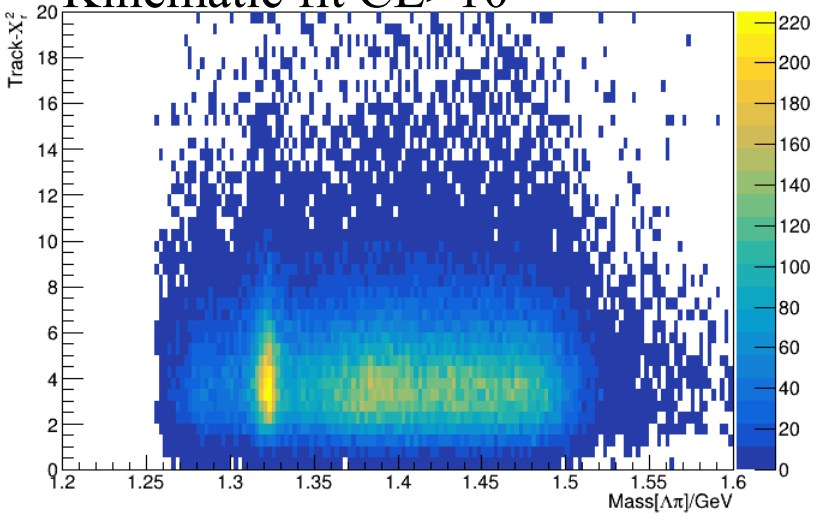
Kinematic fit CL>10^{-8}



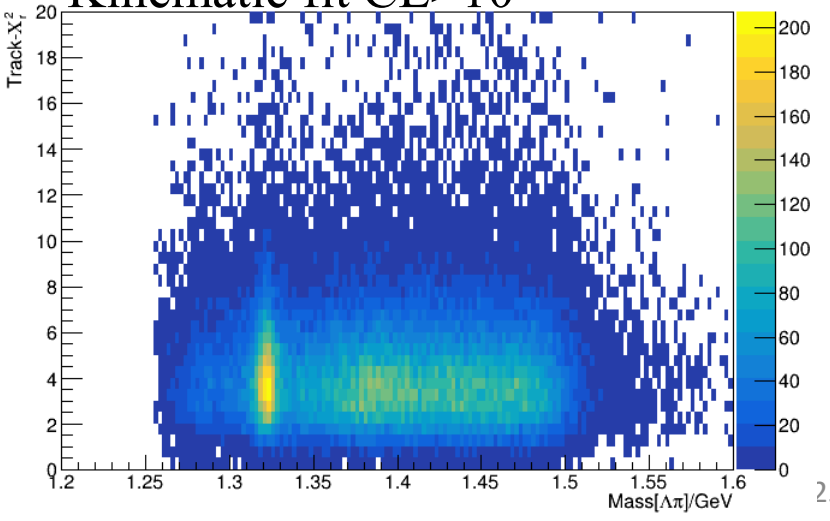
Kinematic fit CL>10^{-7}



Kinematic fit CL>10^{-6}



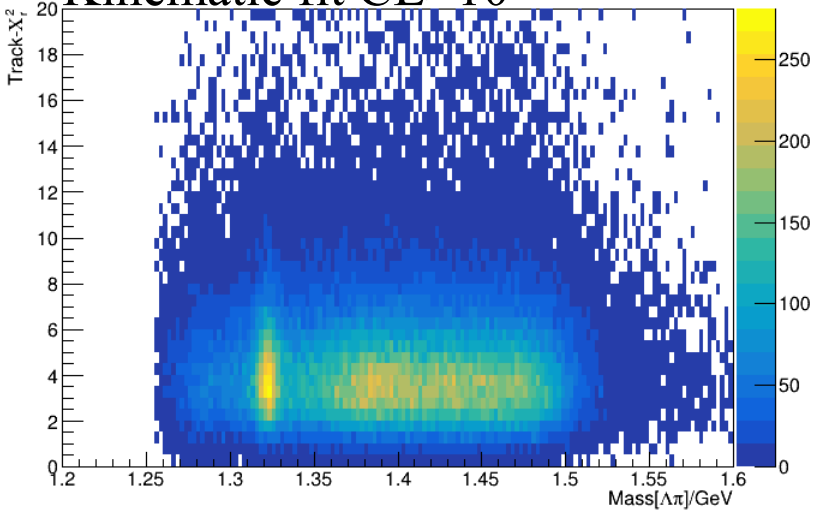
Kinematic fit CL>10^{-5}



Track-χ_r^2 versus mass[$\Lambda\pi$]

No obvious cut to make for these

Kinematic fit CL>10^{-8}



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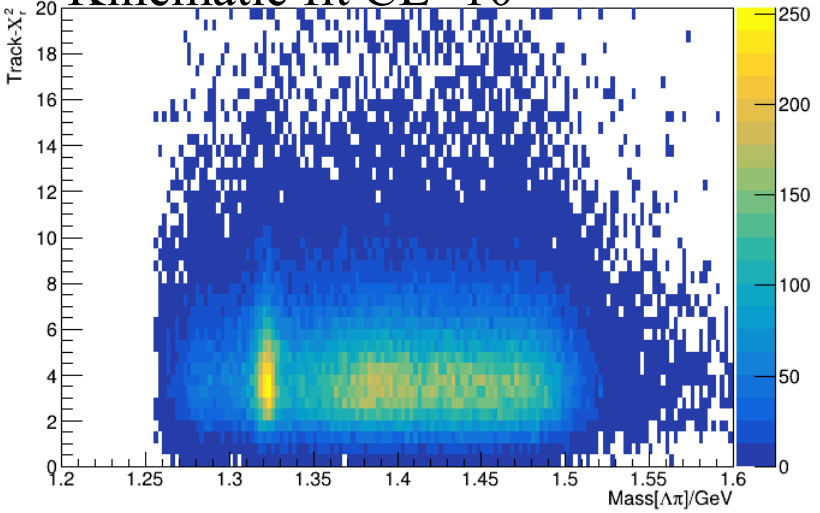

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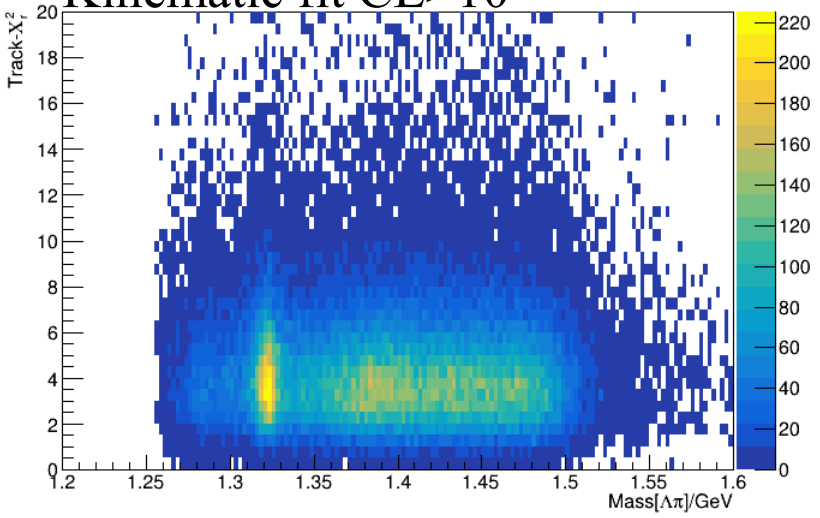

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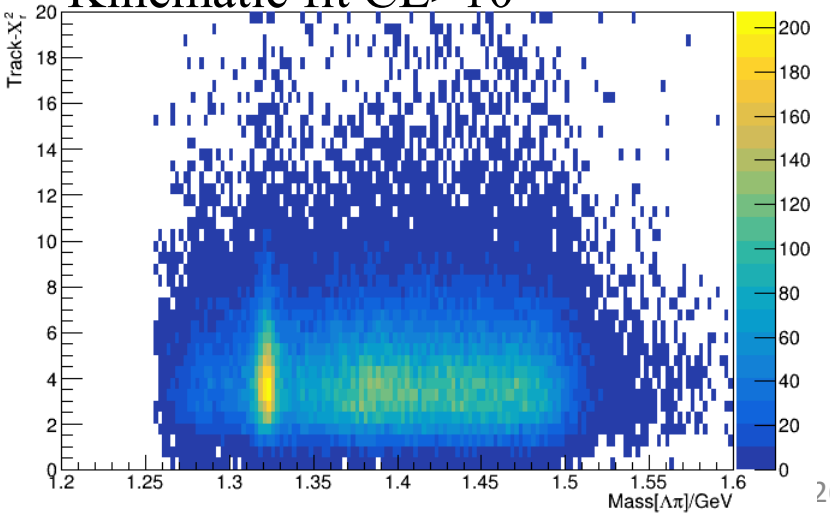
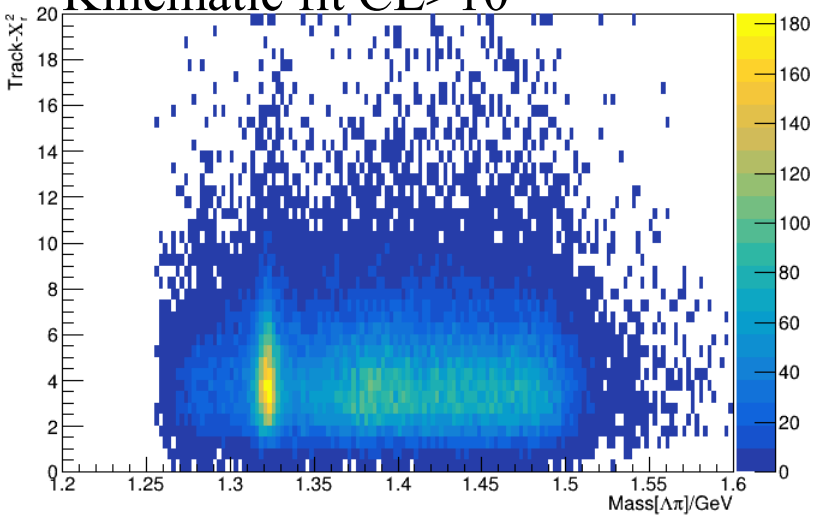
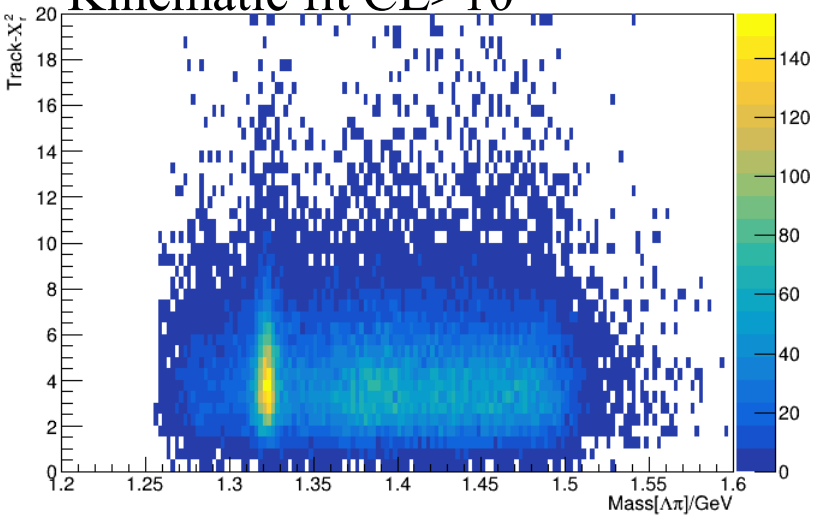


Track-χ_r^2 versus mass[$\Lambda\pi$]

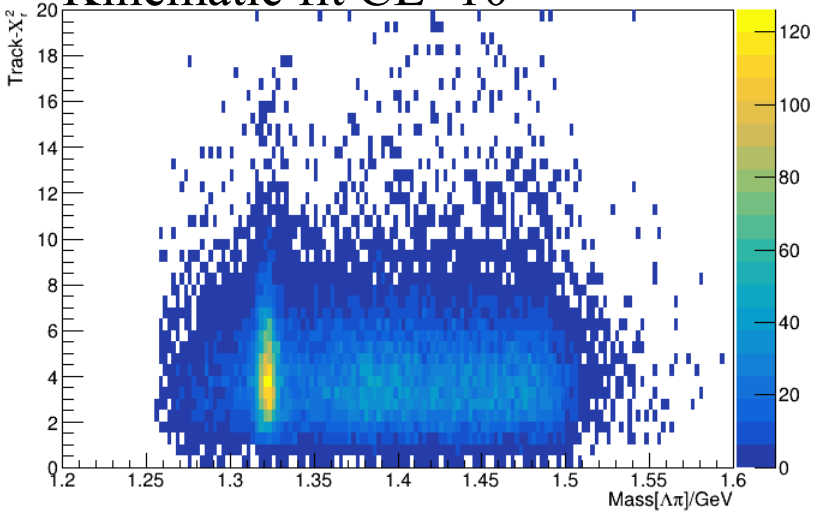
Kinematic fit CL>10^{-4}



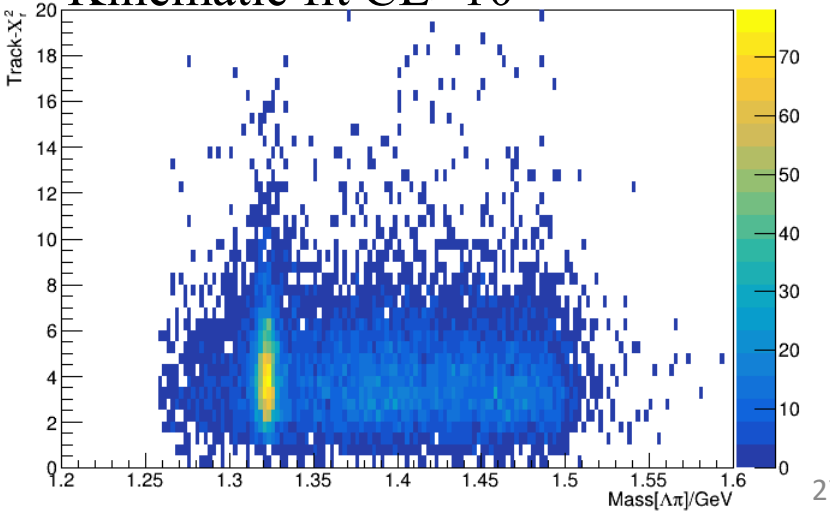
Kinematic fit CL>10^{-3}



Kinematic fit CL>10^{-2}



Kinematic fit CL>10^{-1}



Track-χ_r^2 versus mass[$\Lambda\pi$]

No obvious cut to make for these

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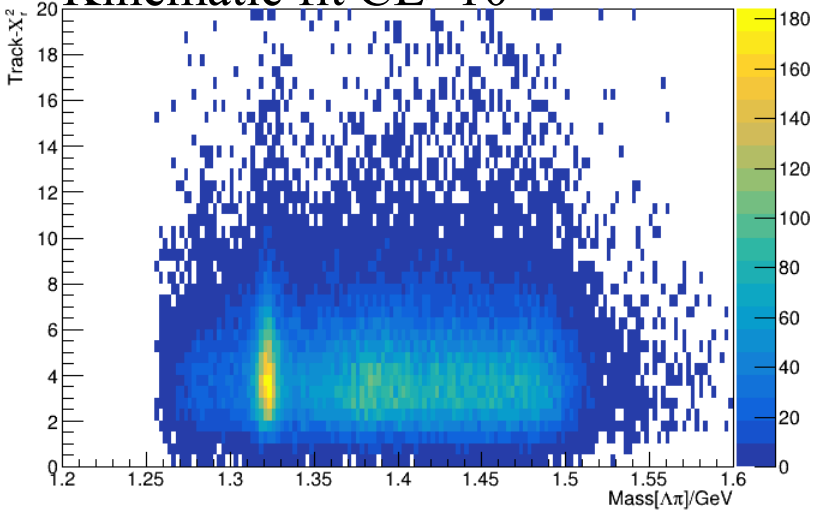

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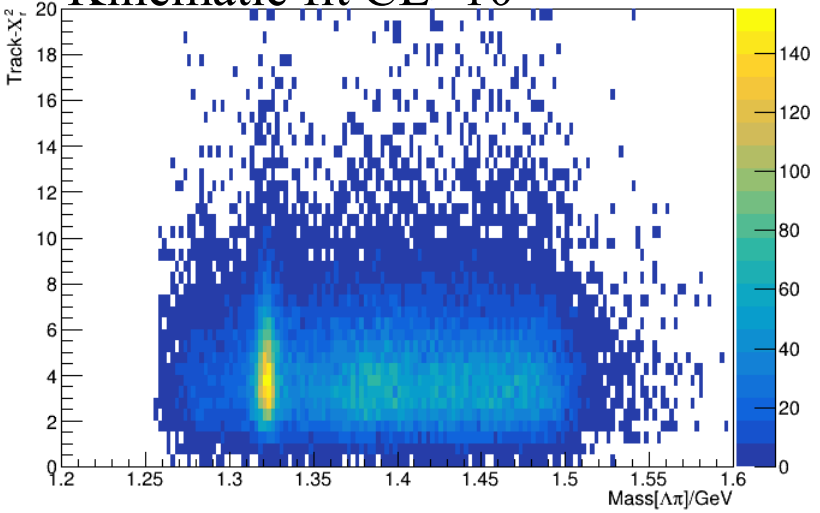

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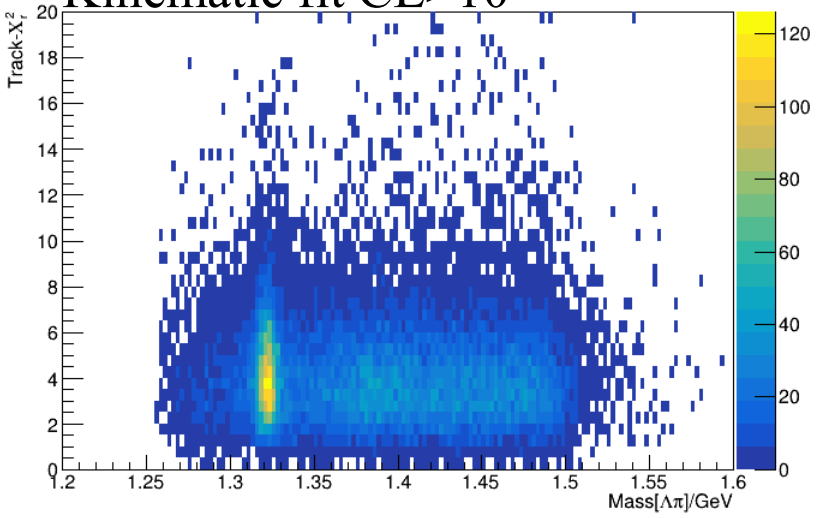
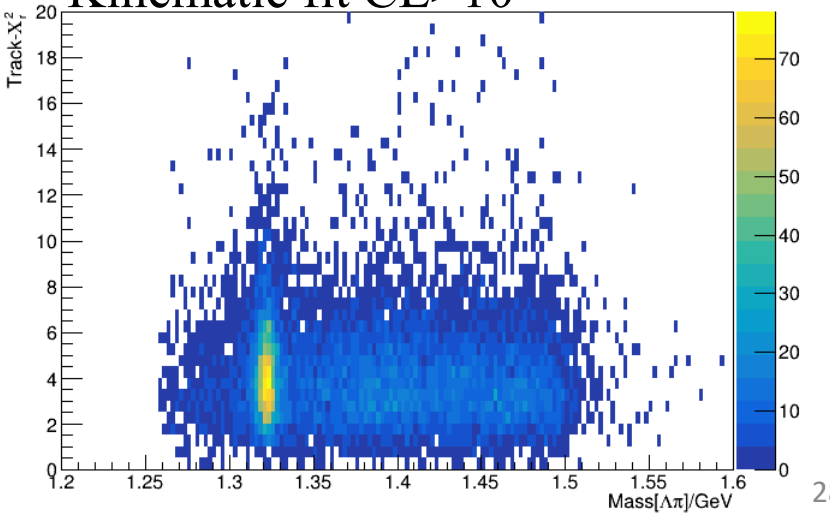


Kinematic fit CL>10^{-1}



χ^2 comparison between different kinematic fits

- Created fake data for:
  - $\gamma\, p \rightarrow K^+K^+\Xi^-\pi^0$: **Primary reaction**

χ^2 comparison between different kinematic fits

- Created fake data for:
  - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$: **Primary reaction**
    - kinematic fit as

χ^2 comparison between different kinematic fits

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  - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$: **Primary reaction**
    - kinematic fit as
      - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$ (mass $\Xi^- \rightarrow \Lambda\pi^-$ not constrained)

χ^2 comparison between different kinematic fits

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  - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$: **Primary reaction**
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      - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$ (mass $\Xi^- \rightarrow \Lambda\pi^-$ not constrained)
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χ^2 comparison between different kinematic fits

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  - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$: **Primary reaction**
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      - $\gamma p \rightarrow K^+\pi^+\Lambda\pi^-\pi^0$
  - $\gamma p \rightarrow K^+\pi^+\Sigma(1385)\,\pi^0$: **Secondary reaction**

χ^2 comparison between different kinematic fits

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    - kinematic fit as
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      - $\gamma p \rightarrow K^+\pi^+\Lambda\pi^-\pi^0$
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χ^2 comparison between different kinematic fits

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χ^2 comparison between different kinematic fits

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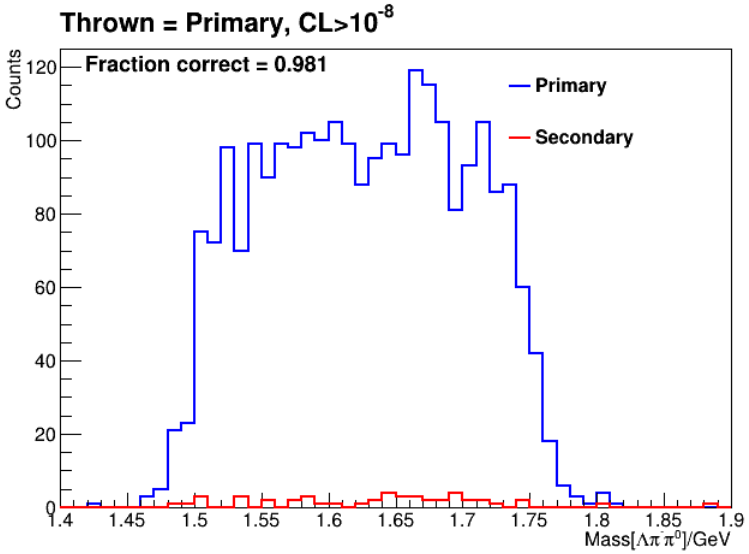
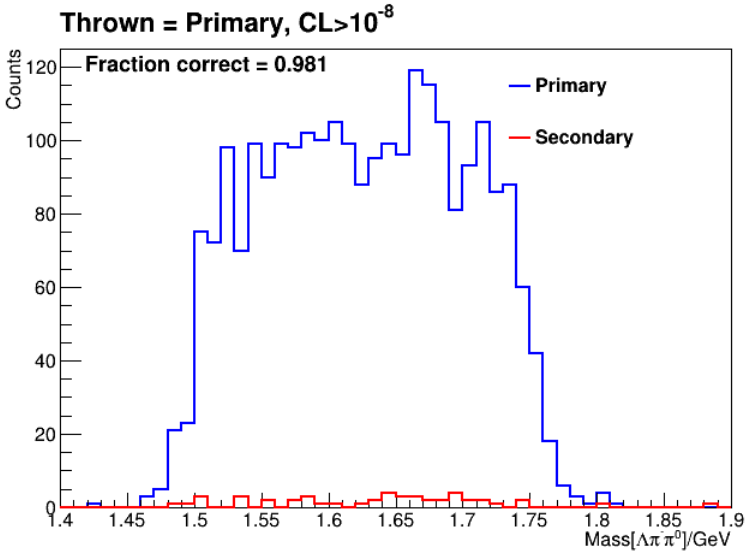
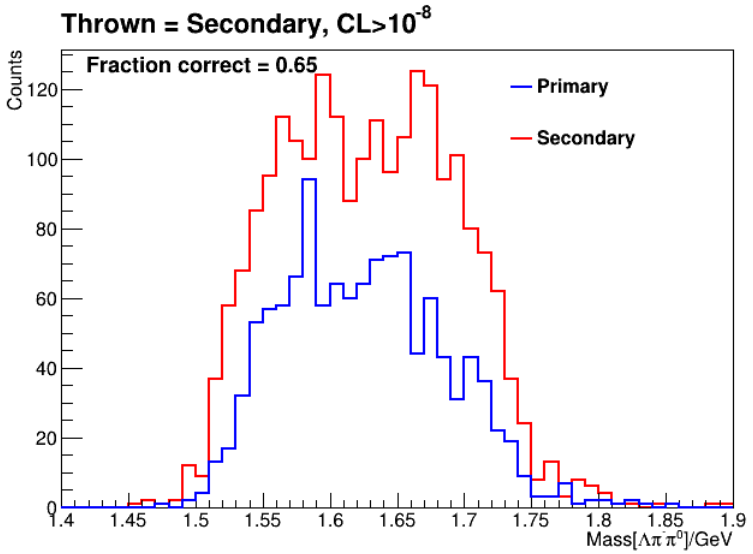
  - $\gamma p \rightarrow K^+\pi^+\Sigma(1385)\,\pi^0$: **Secondary reaction**
    - kinematic fit as
      - $\gamma p \rightarrow K^+K^+\Xi^-\pi^0$
      - $\gamma p \rightarrow K^+\pi^+\Lambda\pi^-\pi^0$
  - Merged the files using code from Alex Barnes to make χ^2 comparisons

Comparison of Primary and Secondary

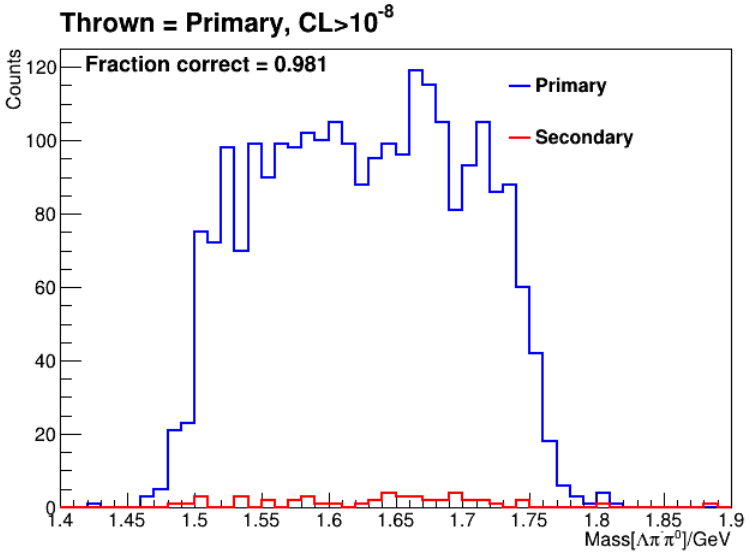


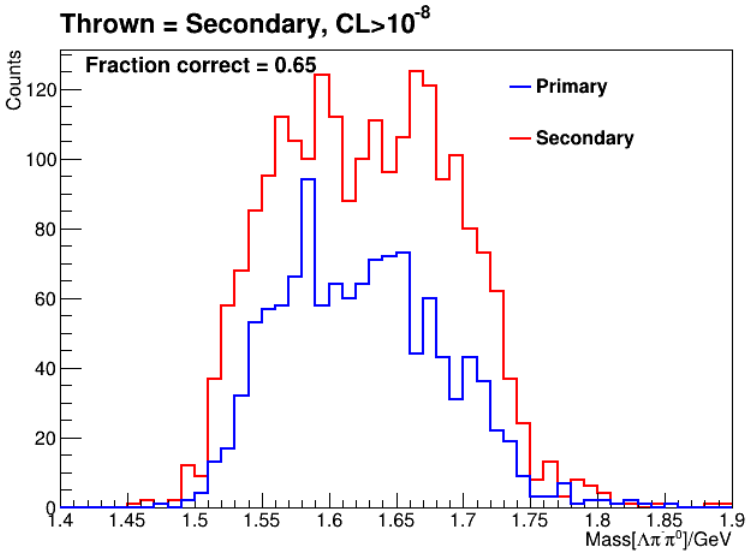
Comparison of Primary and Secondary

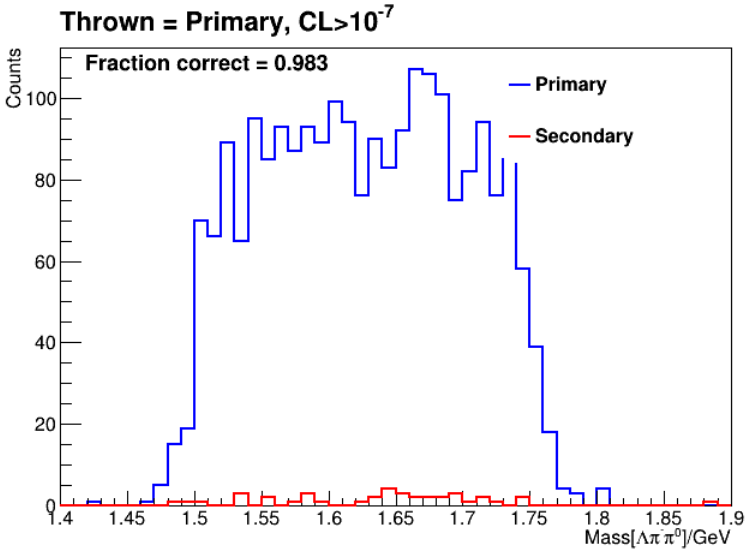




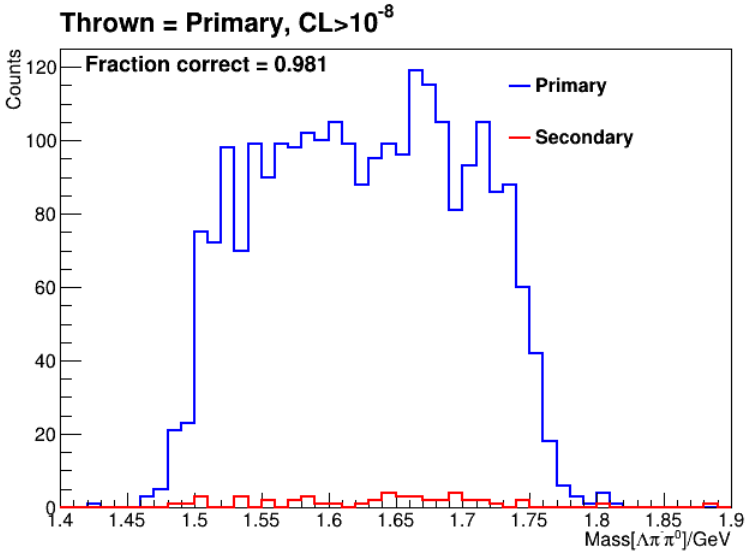
Comparison of Primary and Secondary

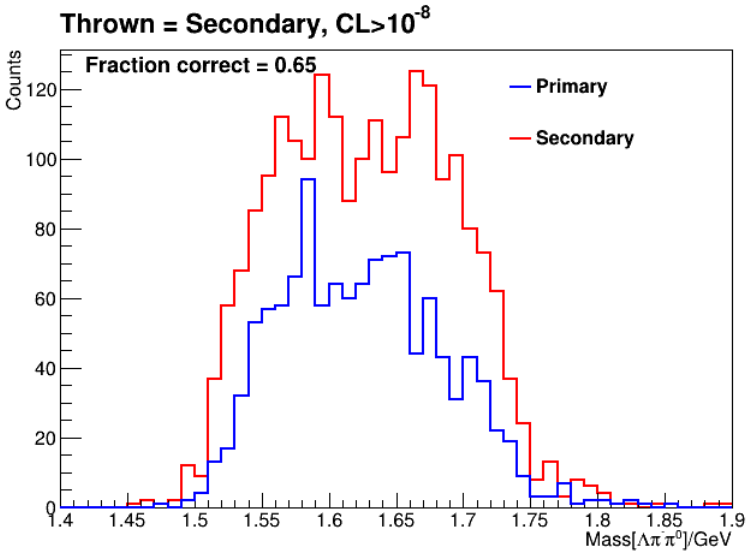


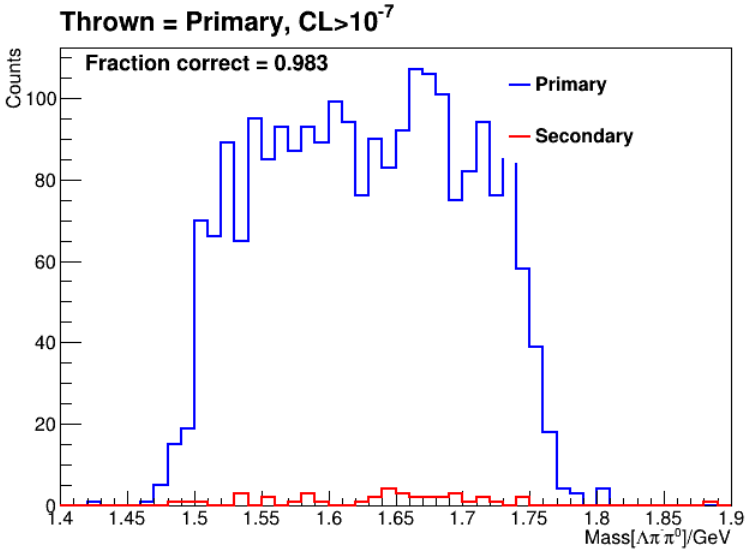


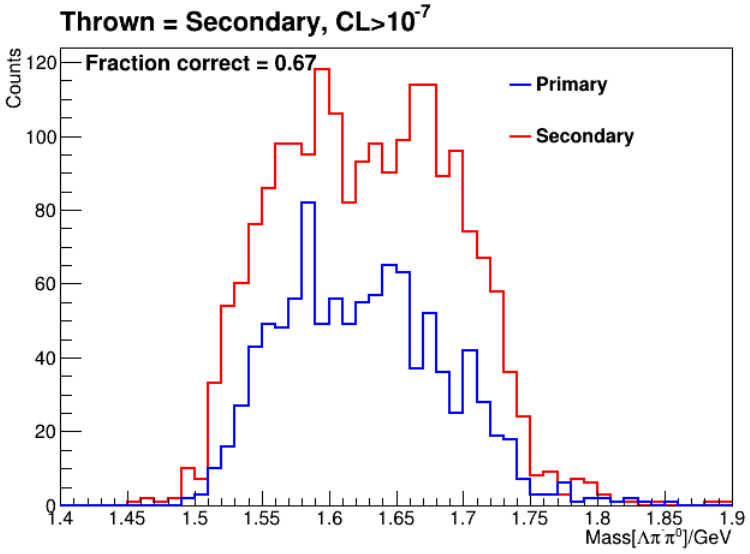


Comparison of Primary and Secondary

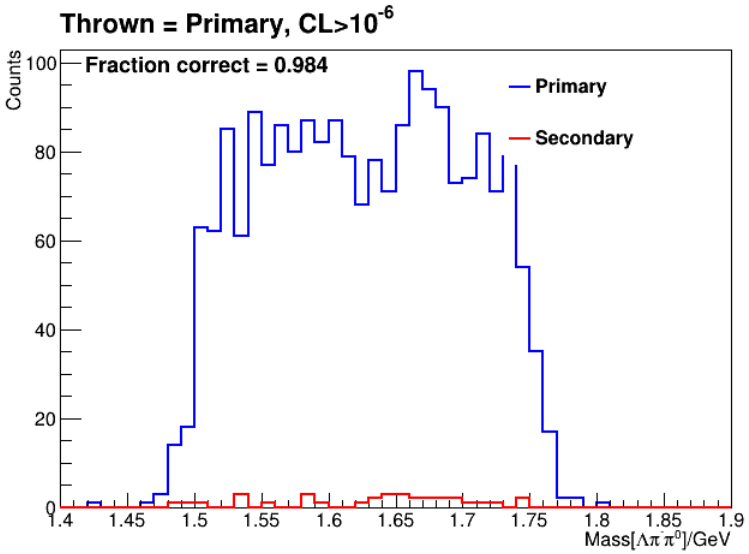


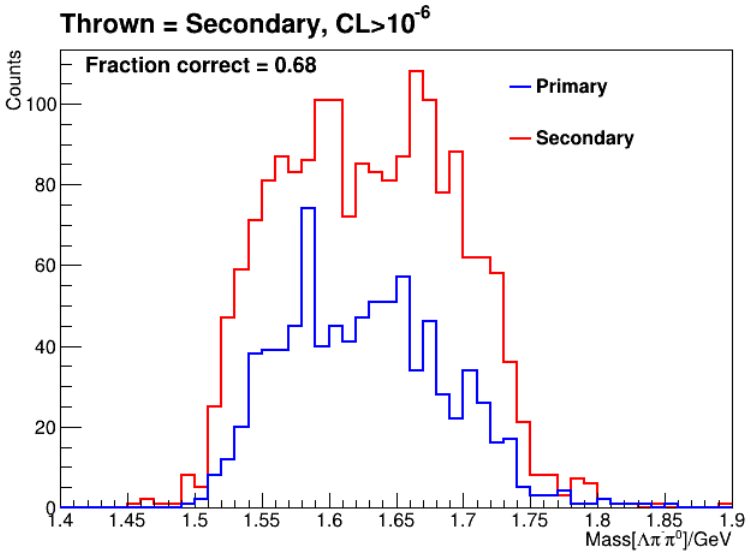


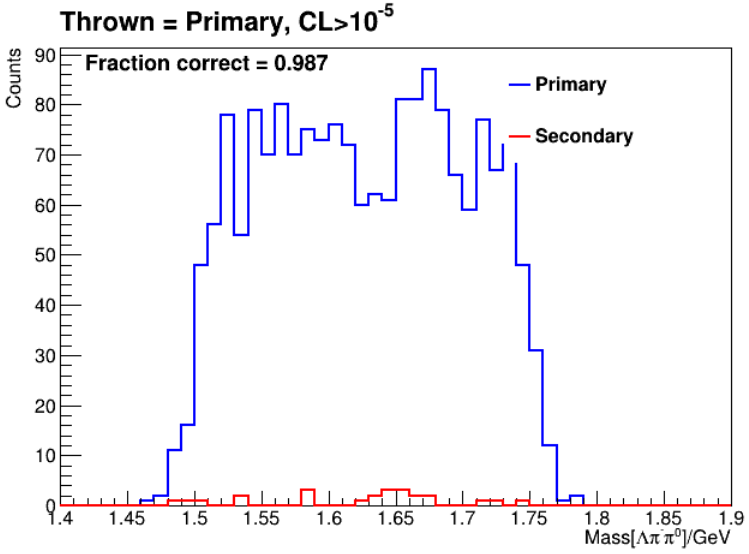


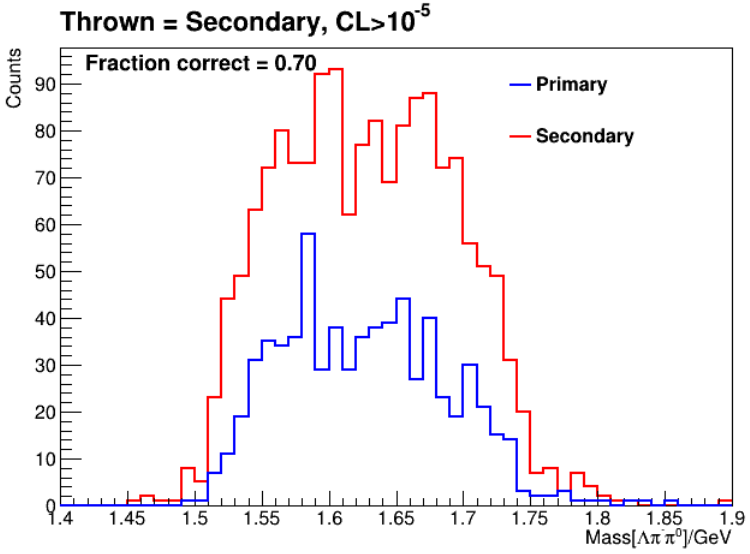


Comparison of Primary and Secondary

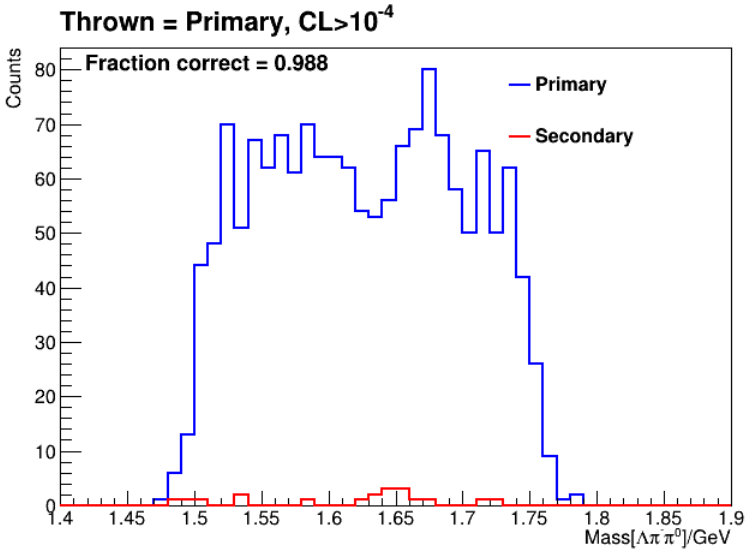


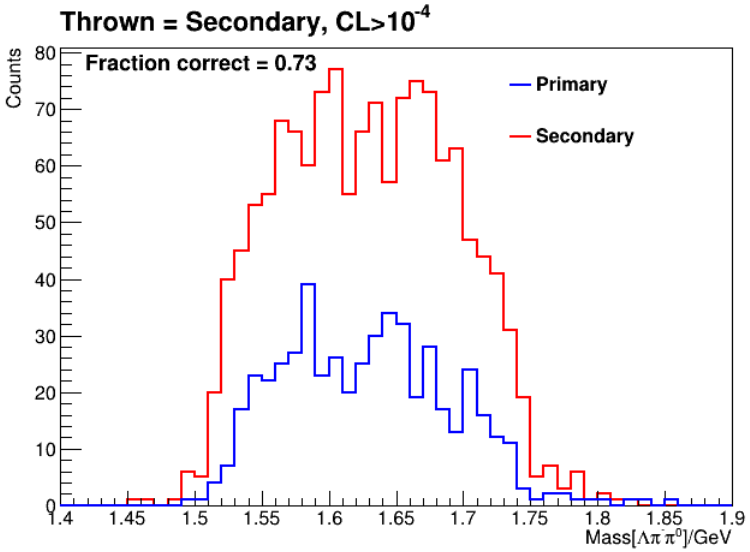


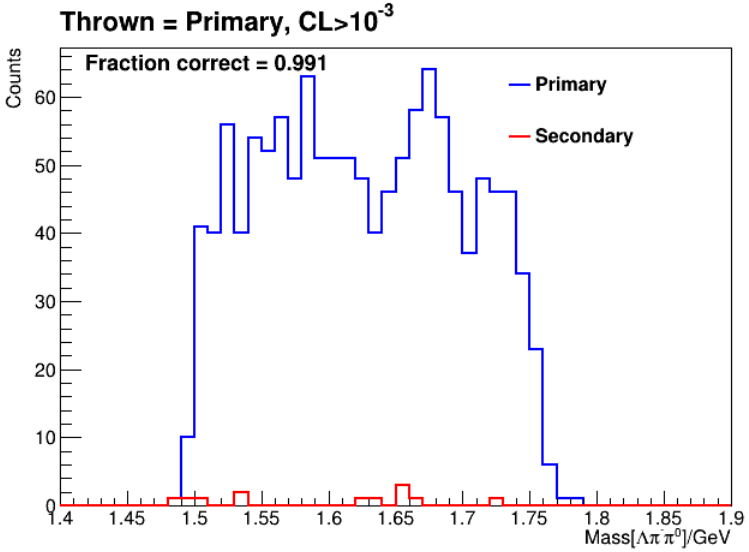


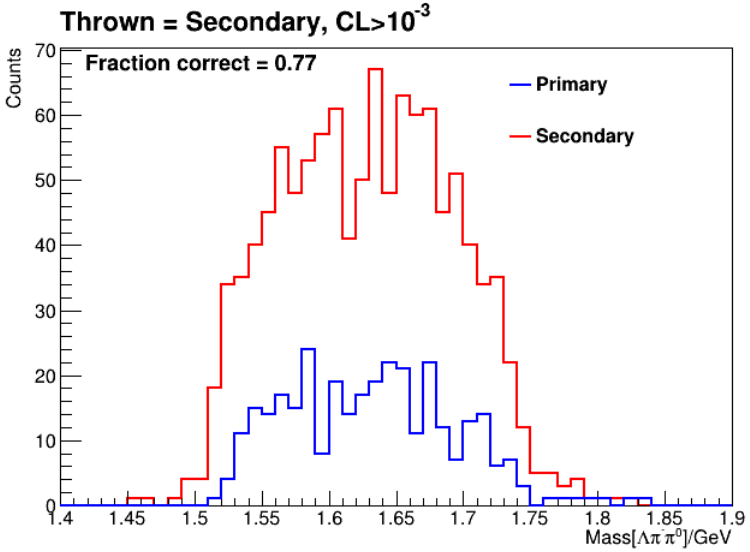


Comparison of Primary and Secondary









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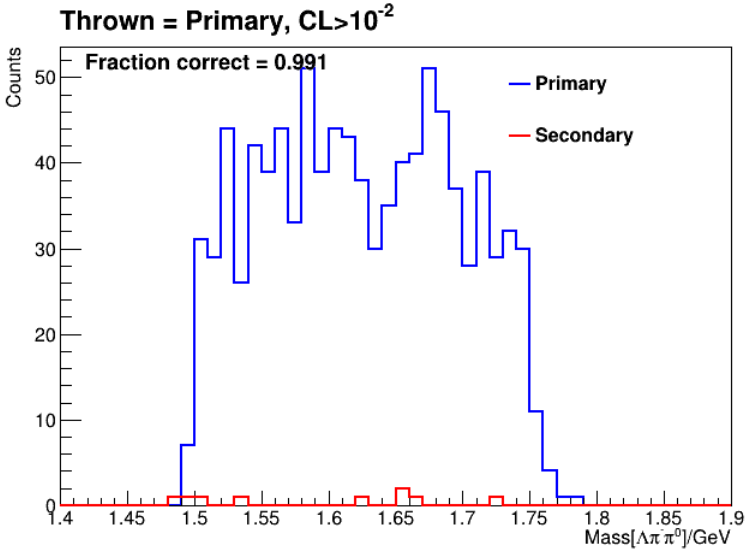

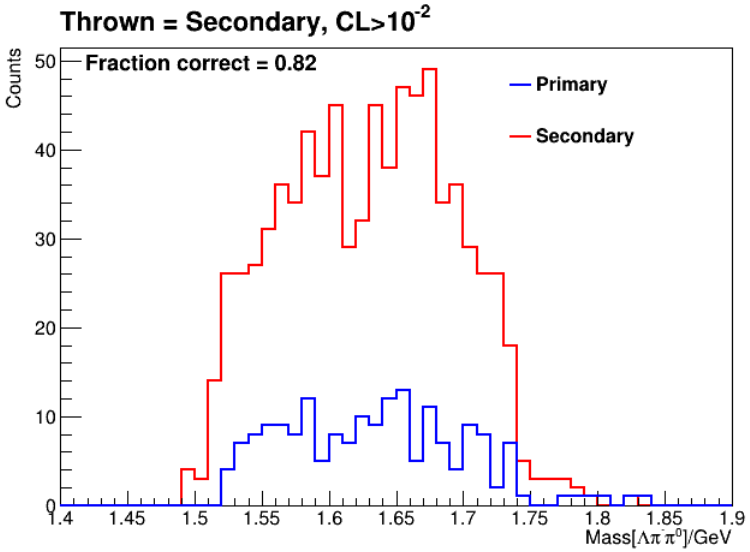

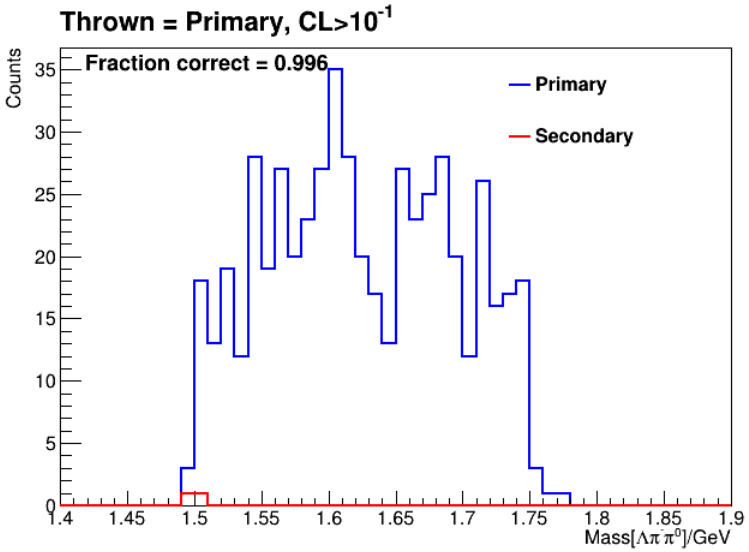

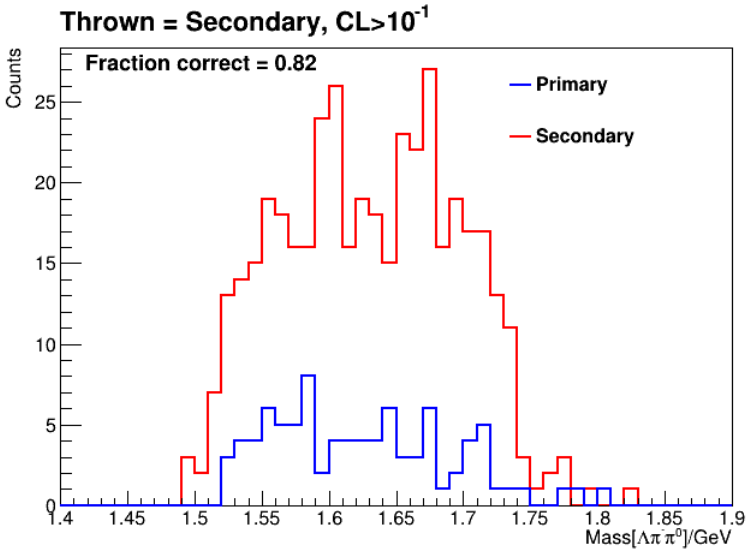

Title