Group meeting
August 30th, 2024

Instruction responsibilities

- Classes for Fall 2024:
  - PHY 331:
    - 2 lectures
  - PHY 361:
    - 2 lectures

Service responsibilities

- Committee:
  - GlueX Compton Analysis Review Committee:
    - Have author response
    - Reviewed the response
    - Need to make formal writeup

Group responsibilities

- Nothing to report

Timelines

2024

January

S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

February

S	M	T	W	T	F	S
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	1	2

March

S	M	T	W	T	F	S
25	26	27	28	29	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

April

S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4

May

S	M	T	W	T	F	S
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1

June

S	M	T	W	T	F	S
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	1	2	3	4	5	6

July

S	M	T	W	T	F	S
30	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

August

S	M	T	W	T	F	S
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Classes start

today

September

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5

Alan teaches

Collab Mtg

Registration DNP

October

S	M	T	W	T	F	S
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2

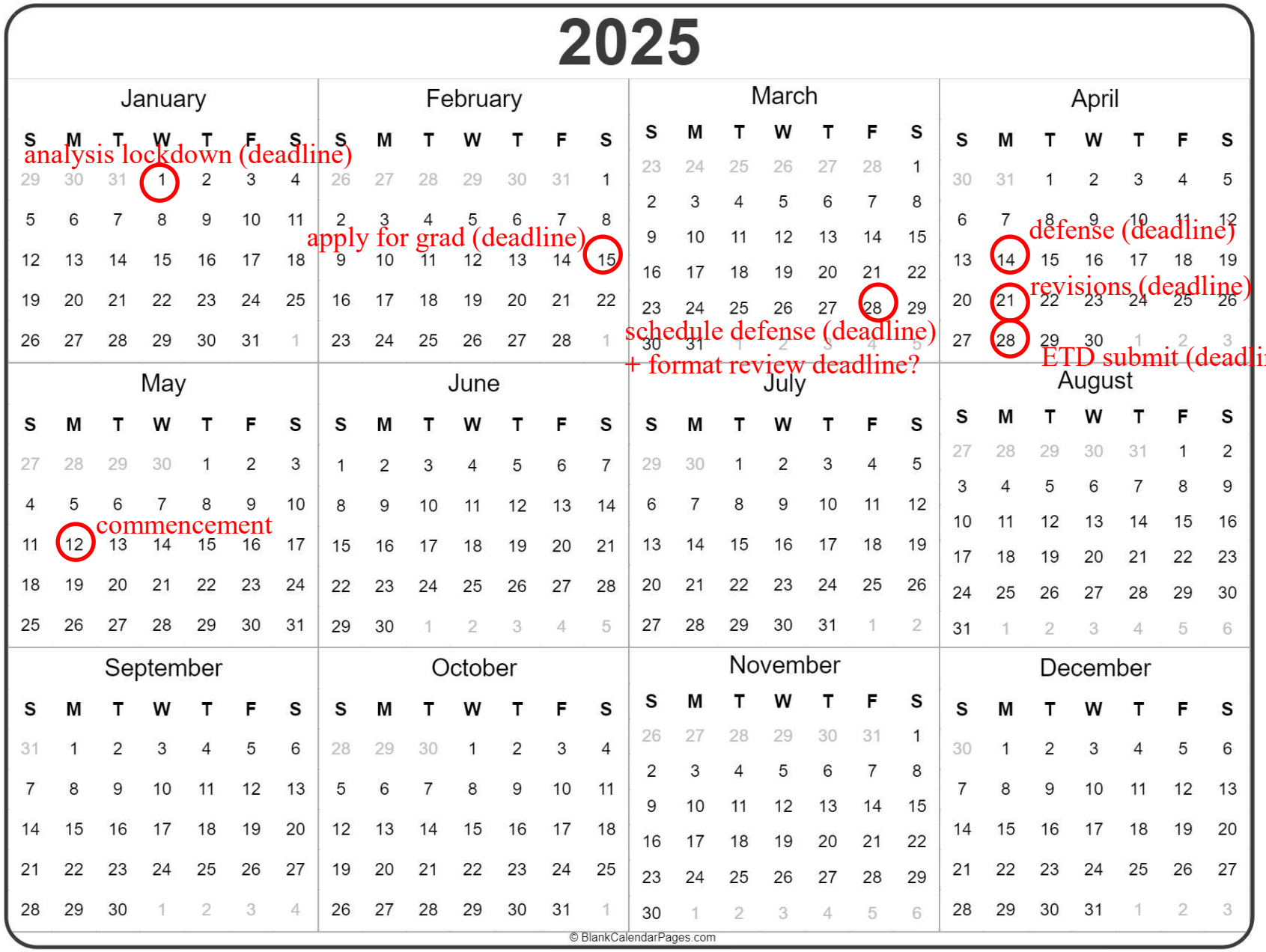
DNP

November

S	M	T	W	T	F	S
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4


2025
January
February
March
April
May
June
July
August
September
October
November
December
analysis lockdown (deadline)
apply for grad (deadline)
defense (deadline)
revisions (deadline)
schedule defense (deadline)
+ format review deadline?
ETD submit (deadline)
commencement
© BlankCalendarPages.com

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

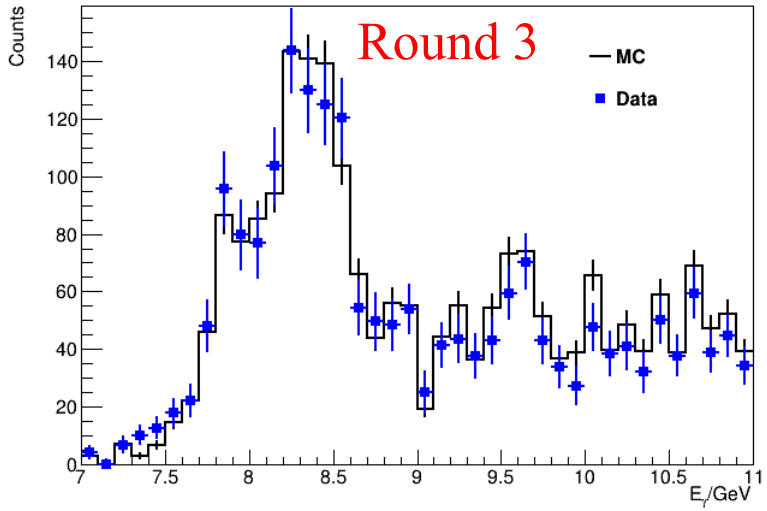
Ξ^* Generator Refinement

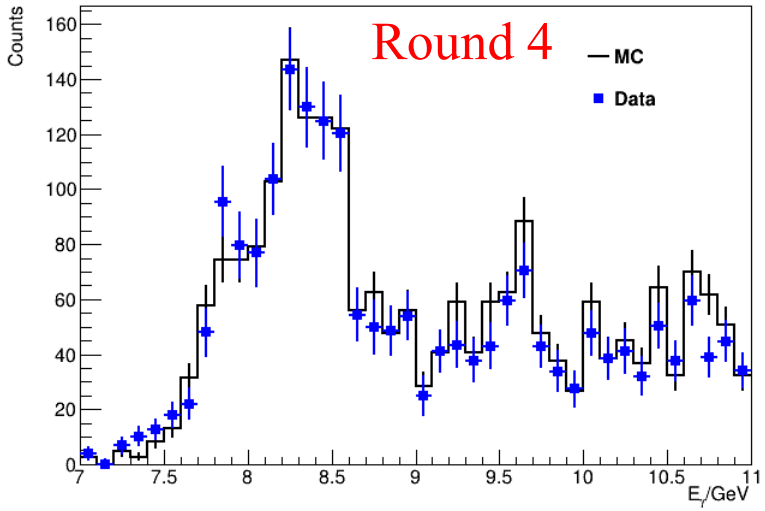
- Starting with code from Brandon build for $\Xi(1530)$ and modifying for general Ξ^*
- Taking the initial reaction as $\gamma\, p \rightarrow K\, Y^*$
- Mandelstam variables have relationship:
  - $s+t+u = m_\gamma^2 + m_p^2 + m_K^2 + m_{Y*}^2$
- We can lock down the kinematics of the initial reaction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

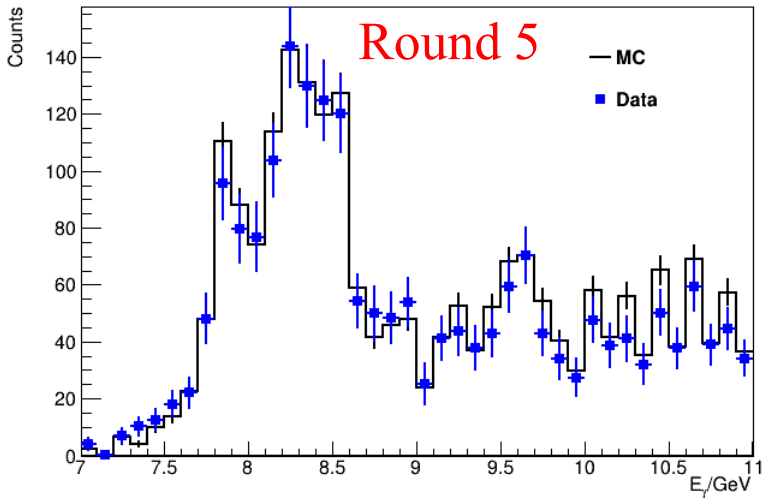
Ξ^* Comparison of Reconstructed MC to Actual Data

- 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^*]
- Fifth round: Second pass at shaping mass[Y^*]

Ξ^* Comparison of Reconstructed MC to Actual Data

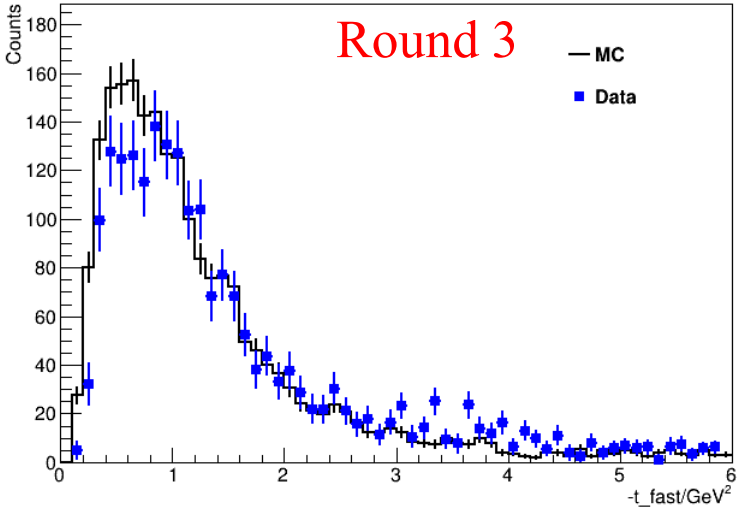


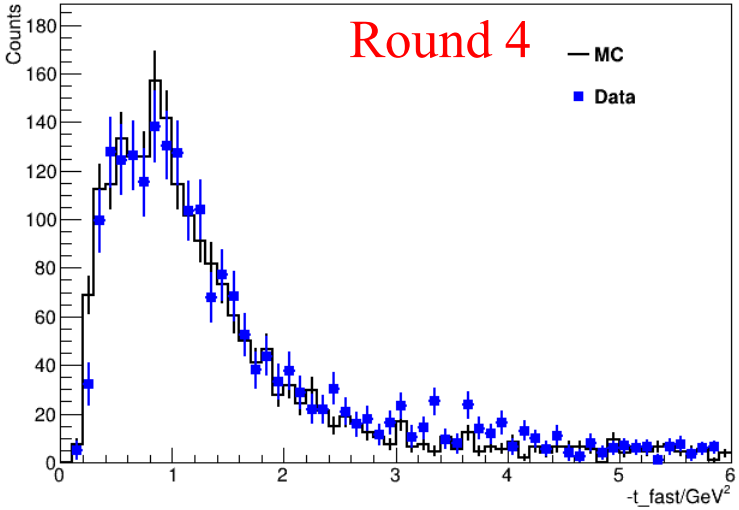


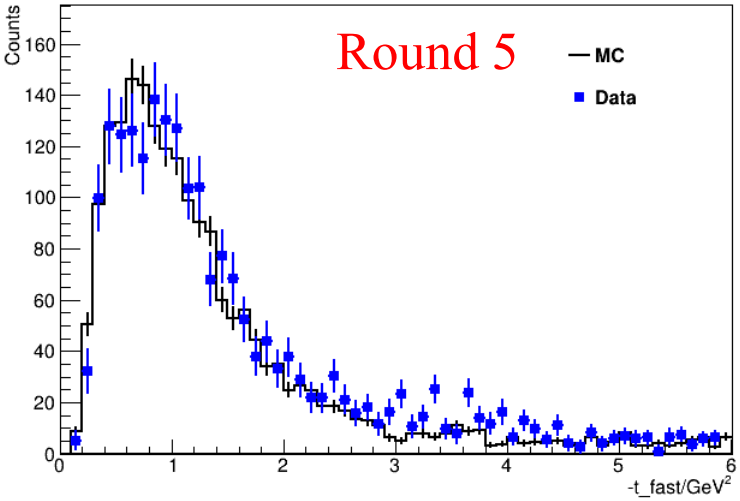


- Distribution in E_γ distribution is good for each round → s is good

Ξ^* Comparison of Reconstructed MC to Actual Data

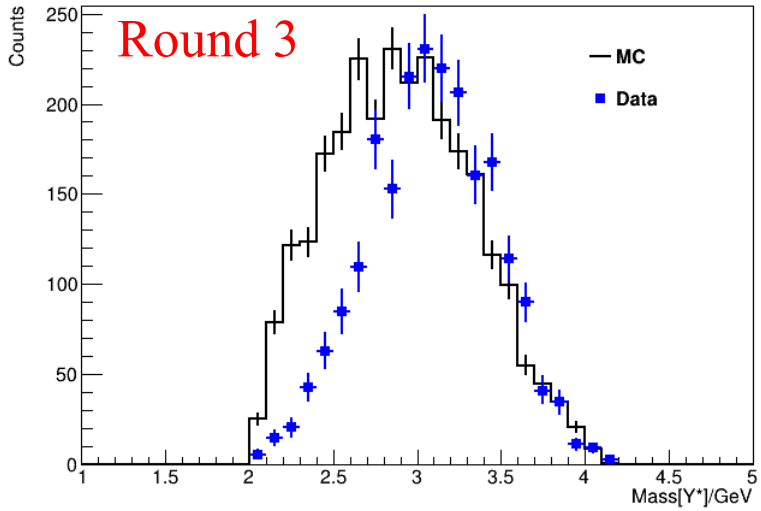


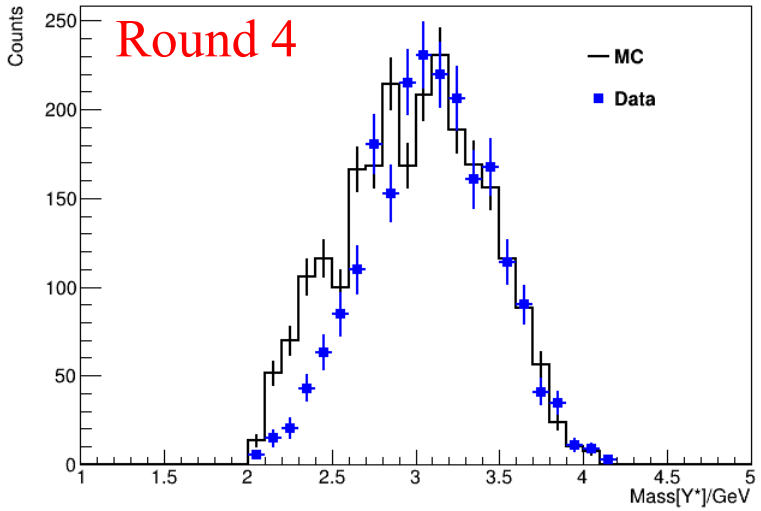


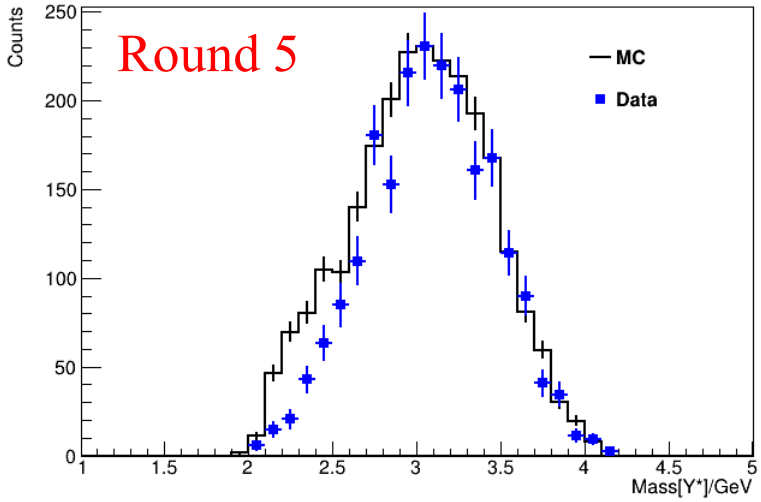


- After final shaping of mass[Y^*] is complete, the *t*-slope will have to be modified

Ξ^* Comparison of Reconstructed MC to Actual Data

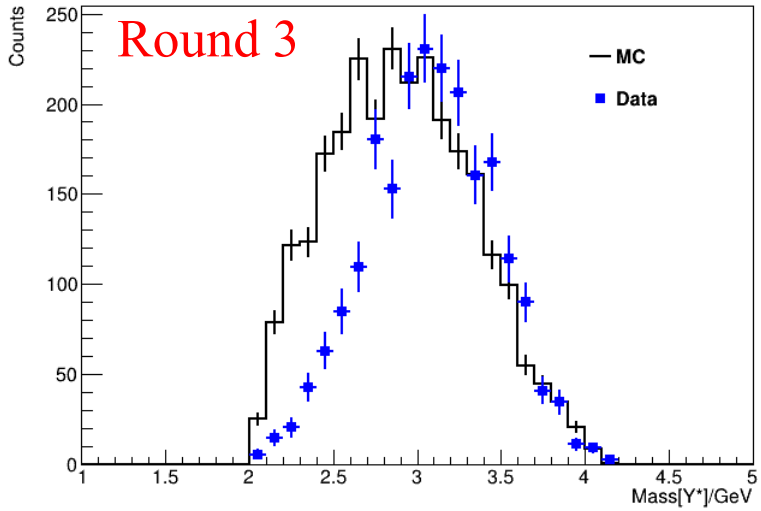


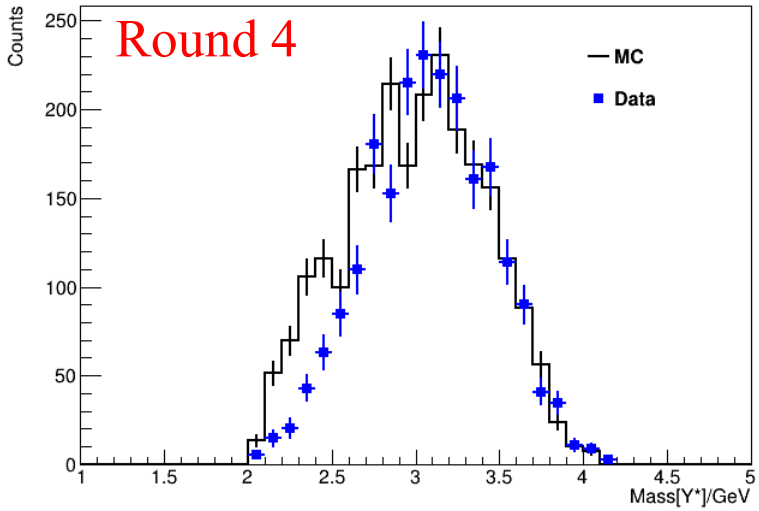


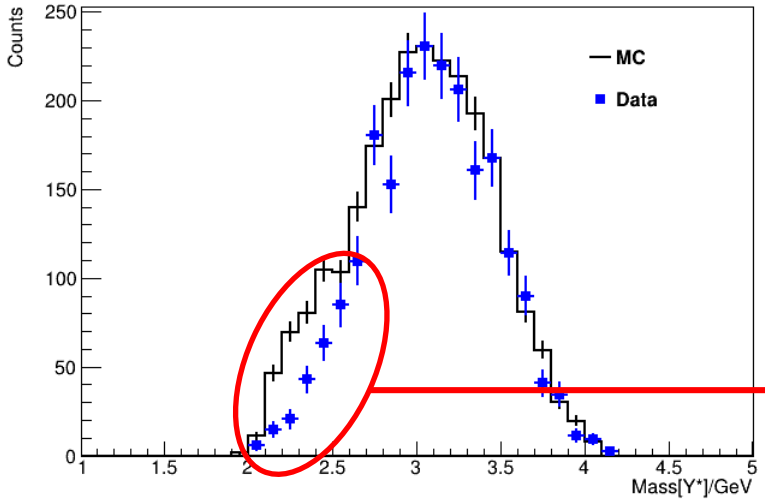


- Mass[Y^*] is not much getting better!

Ξ^* Comparison of Reconstructed MC to Actual Data



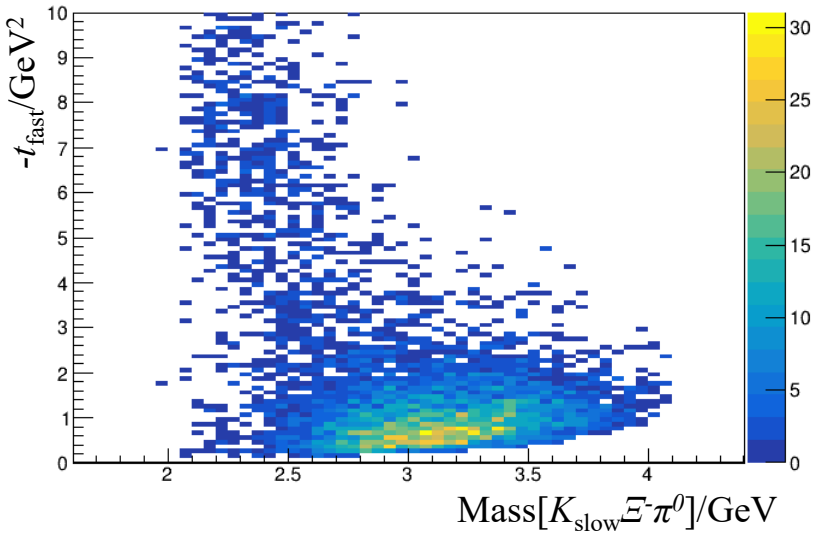




- Mass[Y^*] is not much getting better!

What is going on here?

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

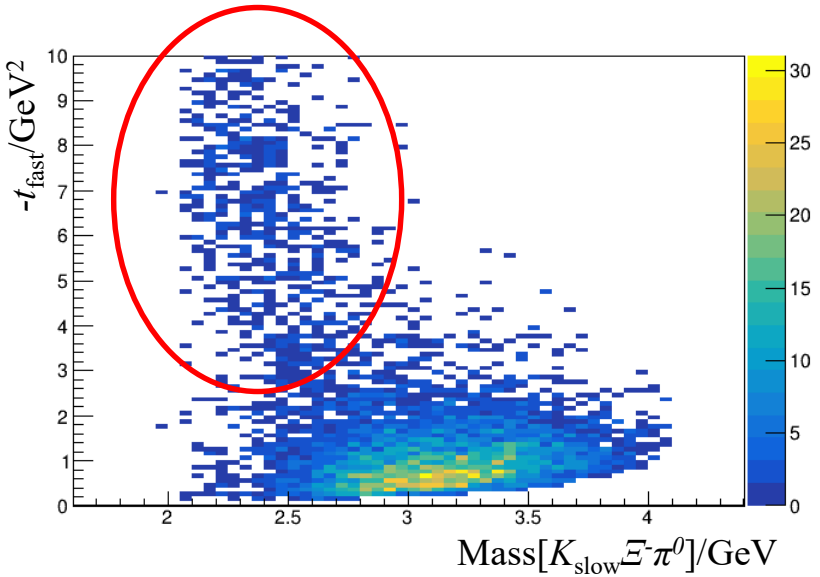


I assume

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

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 $|t|$

Can test with simulated data

$KK\pi$ update

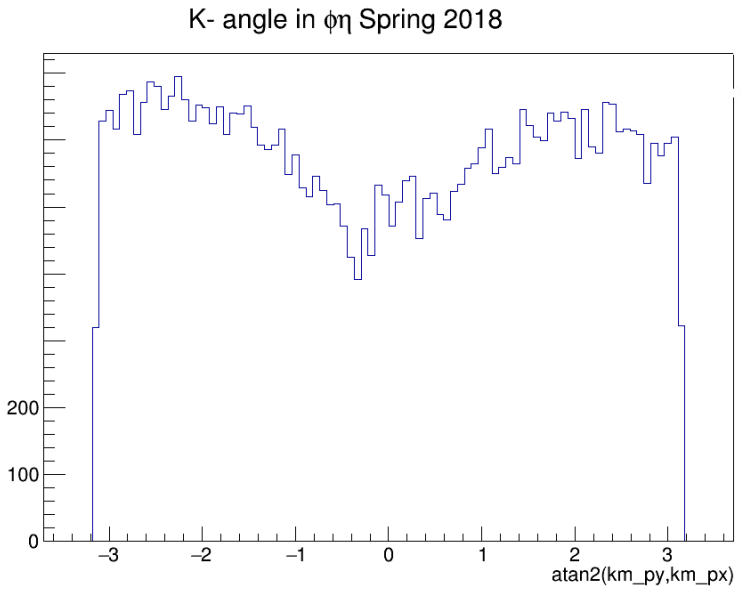
$KK\pi$

Email from Sean Dobbs:

Hi Michael,

We were having a discussion of some strange reconstruction issues in one of the analysis (K+K-eta), and one of them was that in the 2018 data was that it looked like there was an azimuthal modulation of the charged kaons that went into the TOF. I've attached an example figure of what was seen. These are slower kaons, where we have pi/K separation ability, roughly p < 2 GeV. I wonder if you've seen some similar effect in your K+K-pi0 analysis?

Cheers,
Sean



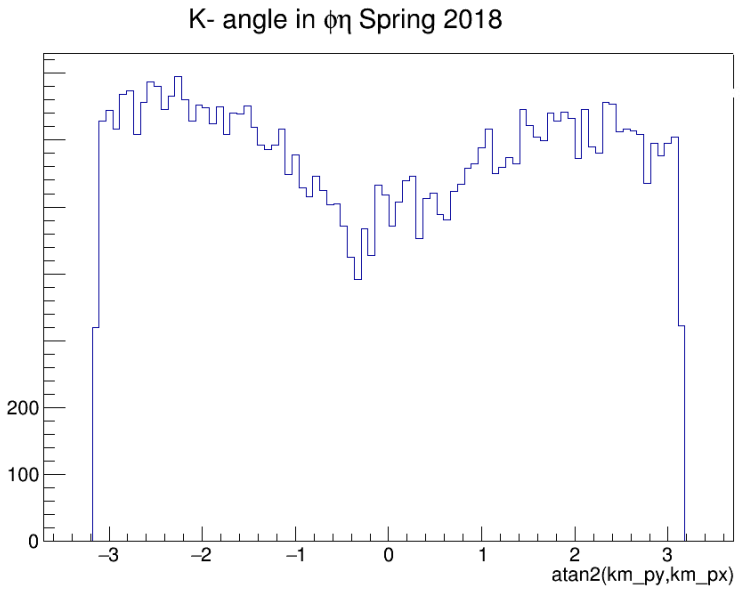
$KK\pi$

Email from Sean Dobbs:

Hi Michael,

We were having a discussion of some strange reconstruction issues in one of the analysis (K+K-eta), and one of them was that in the 2018 data was that it looked like there was an azimuthal modulation of the charged kaons that went into the TOF. I've attached an example figure of what was seen. These are slower kaons, where we have pi/K separation ability, roughly p < 2 GeV. I wonder if you've seen some similar effect in your K+K-pi0 analysis?

Cheers,
Sean



My response:

Sean,

I have seen something similar using the Gottfried-Jackson frame variable phi for Resonance -> Isobar pi, where Isobar = KK. In my stuff, the lower the cutoff value of momentum, the more pronounced the dip in variable phi. The good news is that the simulation shows the same behavior.

A visual of my dip starts on slide 16 from the presentation:

http://meson.hldsite.com/presentations/dugger/kkpi24-03-13.pdf

NOTE the typo: cos(phi) should be phi

* The theta and phi variables are in the Gottfried-Jackson frame and represent the isobar angle

* Slide 16 = Thrown
* Slide 17 = MC accepted
* Slide 18 = PWA fit
* Slide 19 = Acceptance corrected fit

I hope this helps.

Take care,
Michael

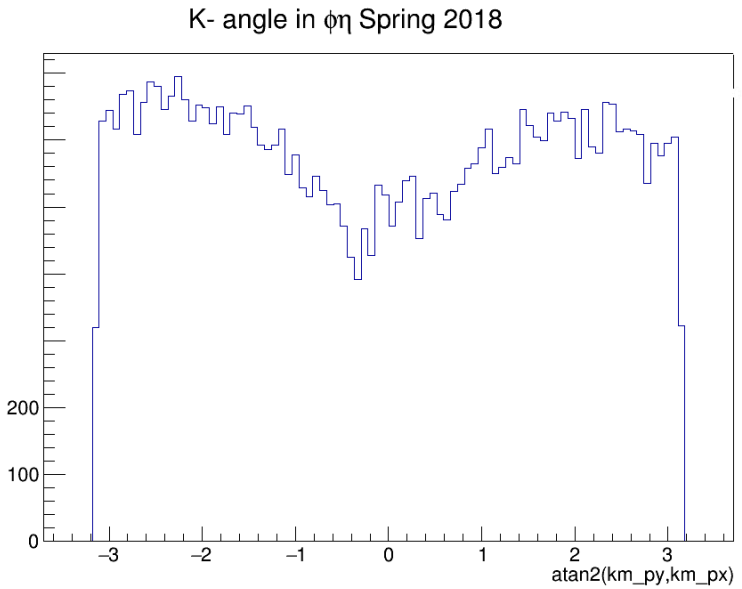
$KK\pi$

Email from Sean Dobbs:

Hi Michael,

We were having a discussion of some strange reconstruction issues in one of the analysis (K+K-eta), and one of them was that in the 2018 data was that it looked like there was an azimuthal modulation of the charged kaons that went into the TOF. I've attached an example figure of what was seen. These are slower kaons, where we have pi/K separation ability, roughly p < 2 GeV. I wonder if you've seen some similar effect in your K+K-pi0 analysis?

Cheers,
Sean



My response:

Sean,

I have seen something similar using the Gottfried-Jackson frame variable phi for Resonance -> Isobar pi, where Isobar = KK. In my stuff, the lower the cutoff value of momentum, the more pronounced the dip in variable phi. The good news is that the simulation shows the same behavior.

A visual of my dip starts on slide 16 from the presentation:

http://meson.hldsite.com/presentations/dugger/kkpi24-03-13.pdf

NOTE the typo: cos(phi) should be phi

* The theta and phi variables are in the Gottfried-Jackson frame and represent the isobar angle

* Slide 16 = Thrown
* Slide 17 = MC accepted
* Slide 18 = PWA fit
* Slide 19 = Acceptance corrected fit

I hope this helps.

Take care,
Michael

Sasha Ostrovidov:

Michael,

Thanks for providing Sean with your KKpi slides.
It's hard for me to figure out the relation between single Kaon angle in the lab frame and angle phi of K+K- isobar in GJ frame. Would it be possible for you to create a plot of K- azimuthal angle in the lab frame from your final 2018 event sample? Just atan2(py,px) for K- lab 4-vector. Of course, if it is not too much work. I suspect the issue is in the detector geometric survey and, therefore, it'll be clearest in the lab angles.

Thanks,
Sasha

$KK\pi$

Me:

Hi,

I have attached the requested plot:

* kmatan2.png : atan2(km_py,km_px)

I also have the plot for the case where momentum of Km < 2.0 GeV

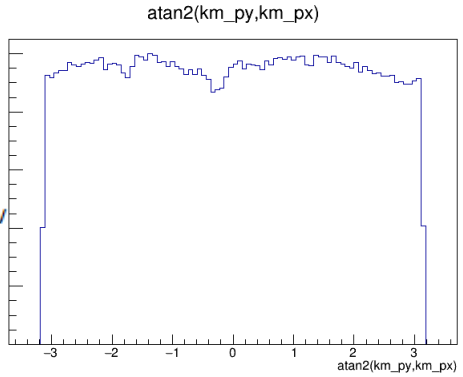
* kmatan2MoMax2.png : atan2(km_py,km_px)

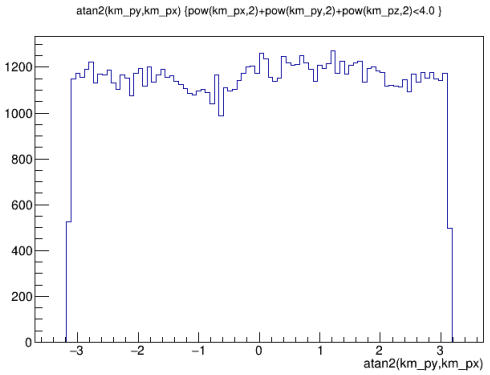
There is a slight dip, but not as pronounced as expected.

There might be a difference between our cuts.

What cuts do you have?

Take care,
Michael





Sasha:

Michael,

Hmm.. You also see a dip at the same location but
it is much smaller than what I see.

Most of the cuts are standard GlueX cuts.
3 non-standard cuts which seem to affect my azimuthal angle:

1) Delta_t(TOF) < 0.2ns (default is 0.3ns) has very small effect

2) M(K+K-) < 1.3 GeV (I'm interested in phi-meson) has also some effect

3) The cut which visually increases the deep is the requirement that
both Kaons are detected in TOF. In other words, their lab angle should
be under 11 degrees,

Sasha

$KK\pi$

Me:

Sasha,

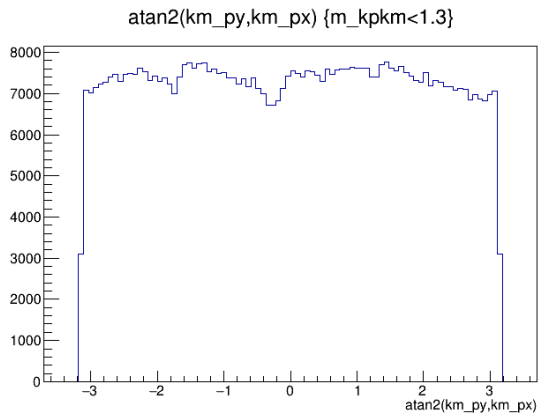
I have attached a plot showing the case where M(K+K-) < 1.3. The plot looks about the same as prior to the cut.

I have a requirement that the Kaons are seen in the TOF. I also require confidence level > 10^-4.

I do not know what the standard GlueX cuts are :(

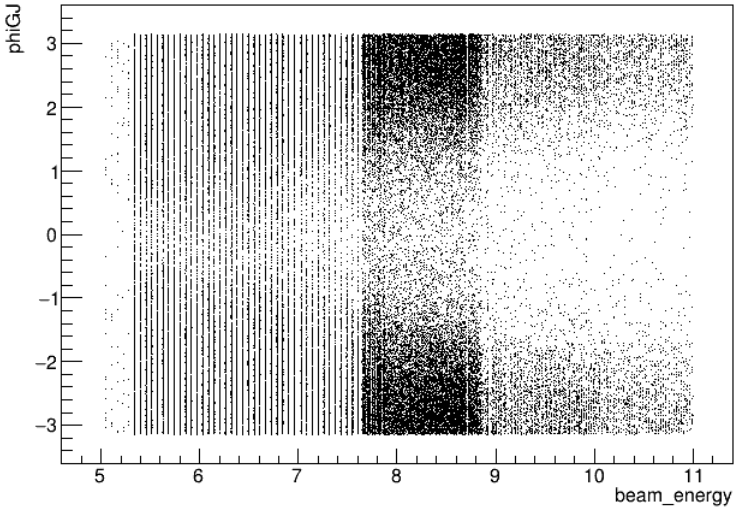
I do not have a Delta_t(TOF) cut and can put that in to see if that changes things. Do you happen to have DSelector code you can share for that cut?

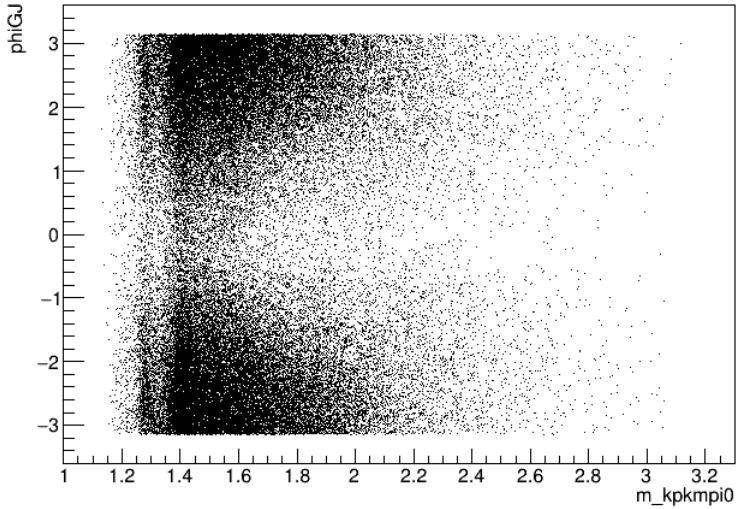
Take care,
Michael

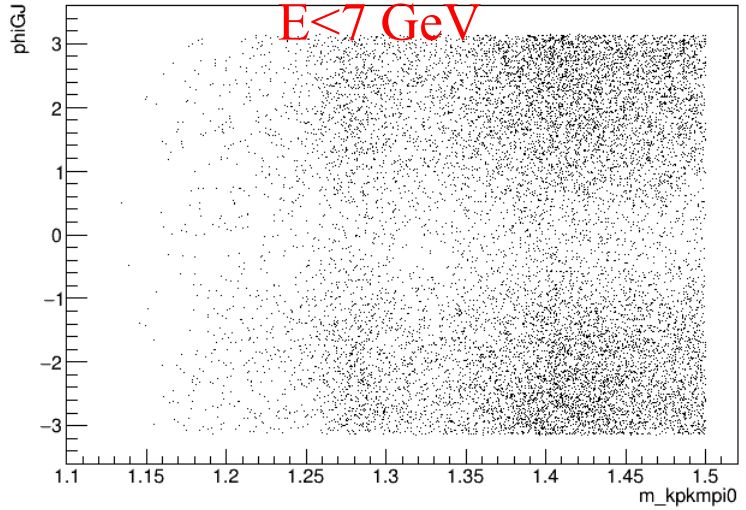


$KK\pi$

Outside the discussion with Sasha and Sean, I made some plots that illustrate our φ_{GJ} issue.
For momentum < 3 GeV:







Title

Title