Group meeting
August 2nd, 2024

Instruction responsibilities

- Classes for Fall 2024:
  - PHY 331:
    - Made syllabus ☺
  - PHY 361:
    - Need to make syllabus

ASU

Service responsibilities

- Committee:
  - GlueX Compton Analysis Review Committee:
    - Waiting for author response

Group responsibilities

- Undergrad: Met with Dylan on Tuesday
- Looks like the next allotment of DOE money has arrived early ☺

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

today (2)

Classes start (22)

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 (3)

Registration DNP (20)

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 (6–10)

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

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2025

January

analysis lockdown (deadline) — 1 (circled)

S	M	T	W	T	F	S
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	1

February

apply for grad (deadline) — 15 (circled)

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	1

March

schedule defense (deadline) + format review deadline? — 28 (circled)

S	M	T	W	T	F	S
23	24	25	26	27	28	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

April

defense (deadline) — 14 (circled)

revisions (deadline) — 21 (circled)

ETD submit (deadline) — 28 (circled)

S	M	T	W	T	F	S
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

May

commencement — 12 (circled)

S	M	T	W	T	F	S
27	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

June

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

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20	21	22	23	24	25	26
27	28	29	30	31	1	2

August

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
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17	18	19	20	21	22	23
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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

November

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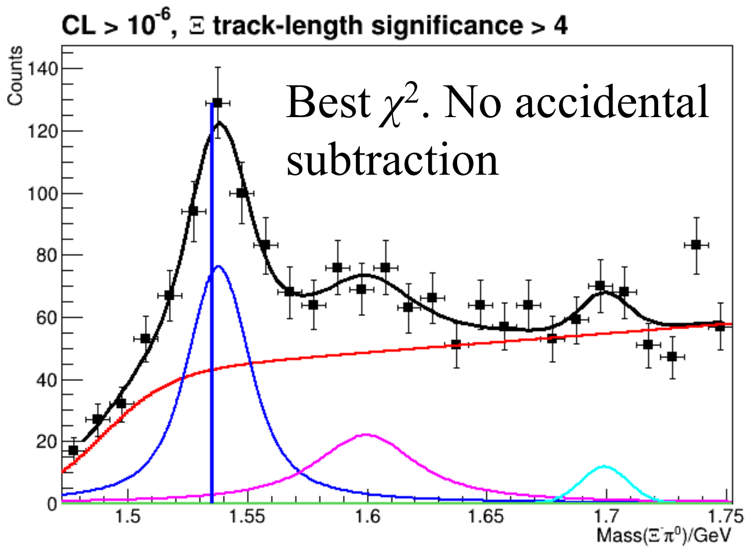
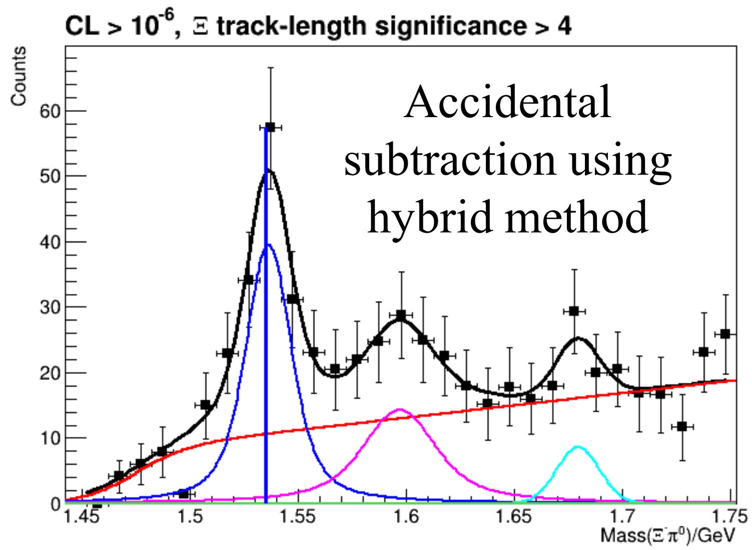
$\Xi^{*} \rightarrow \Xi\pi^{0}$ update

- Created talk that I did not present ☹
- Material from the talk only contained 1 slide that is new to the group: Hybrid method slide

Accidental subtraction using hybrid method





$KK\pi$ update

- Presented a few slides on inclusion of polarization in our code
- Made a slide about the ψ variable for Σ of vector mesons
- I have some new material on DIRC

Σ (vector meson decay)

The polarized cross section has the form $\sigma = \sigma_u[1 - P\Sigma\cos(2\psi)]$, where

- σ_u = unpolarized cross section
- P = degree of polarization
- Σ = Beam asymmetry
- ψ shown on next slide

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ψ angle for determination of Σ (ρ^0 decay)

Here, P_γ is the degree of linear polarization of the photon; Φ is the angle of the photon electric polarization vector with respect to the production plane measured in the over-all (γp) c.m. system; θ and ϕ are the polar and azimuthal angles of the π^+ in the ρ^0 rest frame. (See Fig. 12 and Ref. 36.)

- J. Ballam, et. al., Phys. Rev. D **5** 545 (1972)

Note: The angle Φ is the same as in our typical intensity expressions (sometimes called big phi) and if z-axis is taken along direction of γ, then φ given here is the azimuthal angle in the Gottfried-Jackson frame.

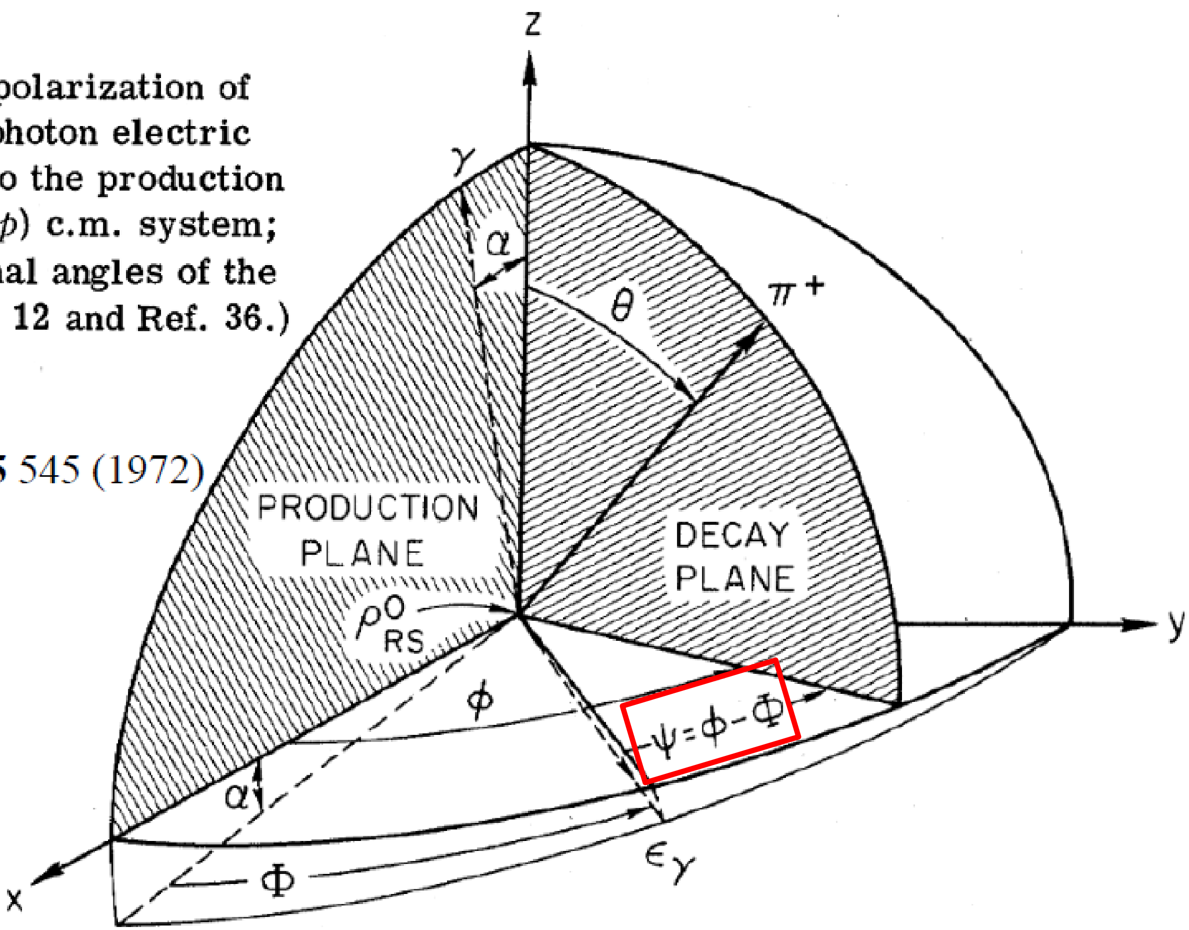

FIG. 12. Angles used in the study of ρ^0 decay. The angle α is zero in the Gottfried-Jackson system.

Σ (vector meson decay)

Can define $\psi_\xi = \psi + \xi$, where

- ξ is the lab-angle of the polarization relative to the floor

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ASU

Σ (vector meson decay)

Can define $\psi_\xi = \psi + \xi$, where

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Now $\sigma_\xi = \sigma_u[1 - P\Sigma\cos(2\psi_\xi - 2\xi)]$

This means that

$$\sigma_0 = \sigma_u[1 - P\Sigma\cos(2\psi_\xi)]$$

ASU

Σ (vector meson decay)

Can define $\psi_\xi = \psi + \xi$, where

- ξ is the lab-angle of the polarization relative to the floor

Now $\sigma_\xi = \sigma_u[1 - P\Sigma\cos(2\psi_\xi - 2\xi)]$

This means that

$$\sigma_0 = \sigma_u[1 - P\Sigma\cos(2\psi_\xi)]$$

and

$$\sigma_{90} = \sigma_u[1 + P\Sigma\cos(2\psi_\xi)]$$

ASU

Σ (vector meson decay)

Can define $\psi_\xi = \psi + \xi$, where

- ξ is the lab-angle of the polarization relative to the floor

Now $\sigma_\xi = \sigma_u[1 - P\Sigma\cos(2\psi_\xi - 2\xi)]$

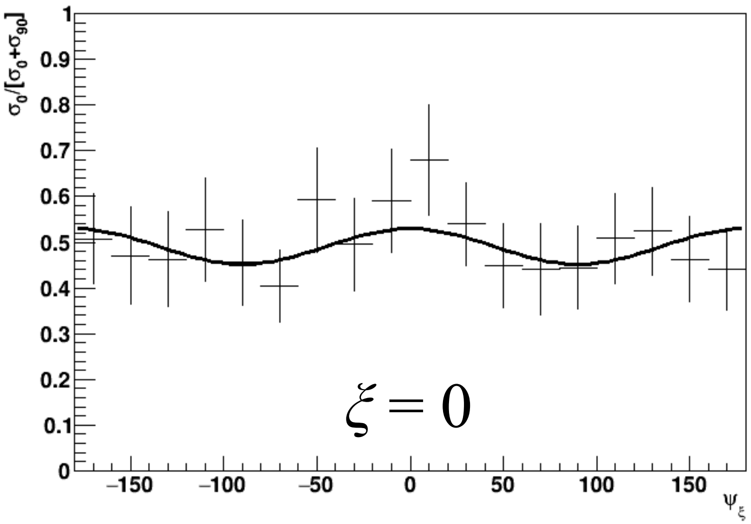
This means that

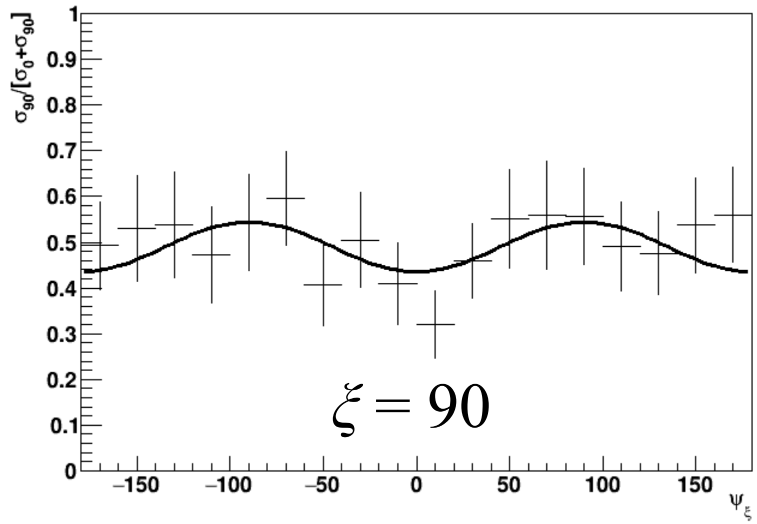
$$\sigma_0 = \sigma_u[1 - P\Sigma\cos(2\psi_\xi)]$$

and sign flip

$$\sigma_{90} = \sigma_u[1 + P\Sigma\cos(2\psi_\xi)]$$

Σ (vector meson decay)





- Mass[$KK\pi$] = 1425 MeV
- Error bars not correct (did not take car of covariance)

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Inclusion of DIRC

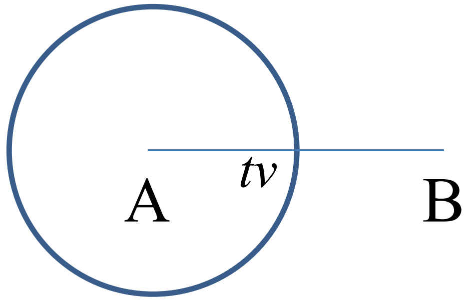
Inclusion of DIRC

Charged particle moves from point A to point B

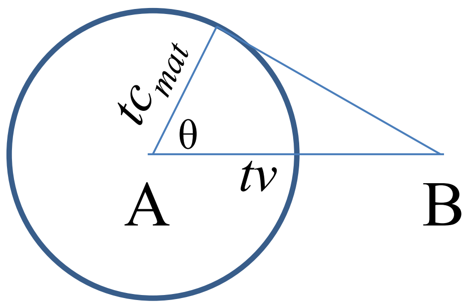
A tv B

Inclusion of DIRC

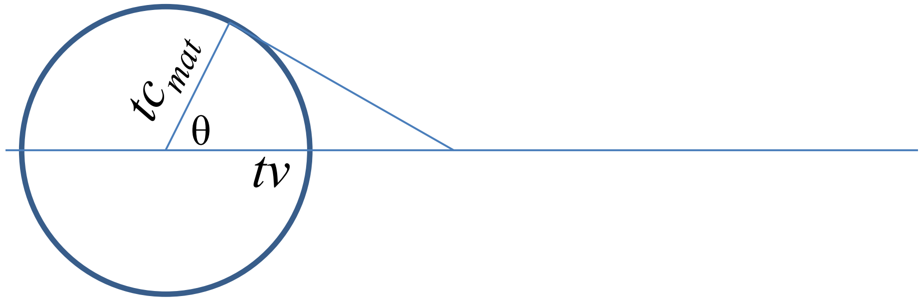
Charged particle moves from point A to point B
At point A, the particle radiates light



Inclusion of DIRC

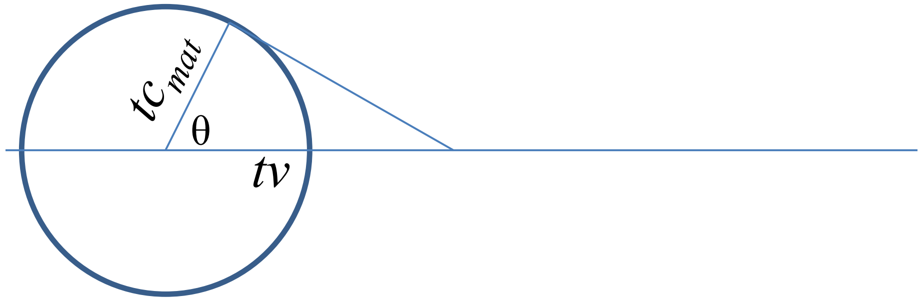


Inclusion of DIRC



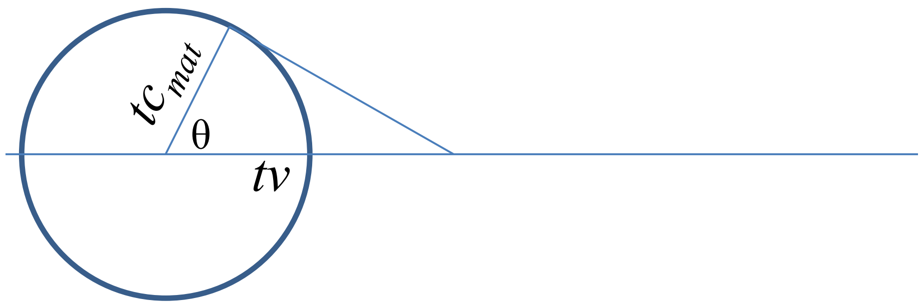
$\cos(\theta) = c_{mat}/v$

Inclusion of DIRC



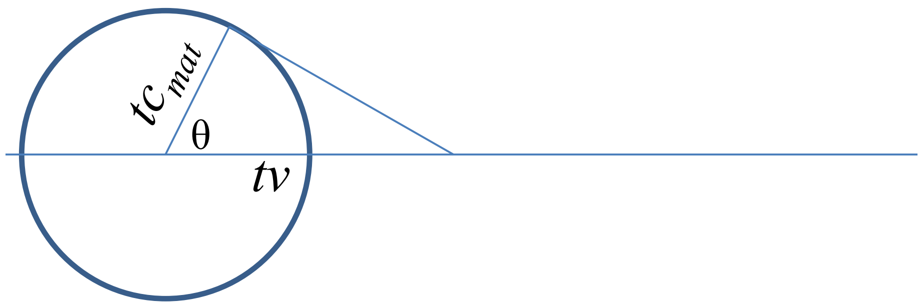
$\cos(\theta) = c_{mat}/v$ and $n = c/c_{mat}$

Inclusion of DIRC



$\cos(\theta) = c_{mat}/v$ and $n=c/c_{mat}$
so
$\beta = 1/[n \cos(\theta)]$

Inclusion of DIRC



$\cos(\theta) = c_{mat}/v$ and $n=c/c_{mat}$

so

$\beta = 1/[n\cos(\theta)]$

Inclusion of DIRC

$\beta = 1/[n\cos(\theta)]$

so

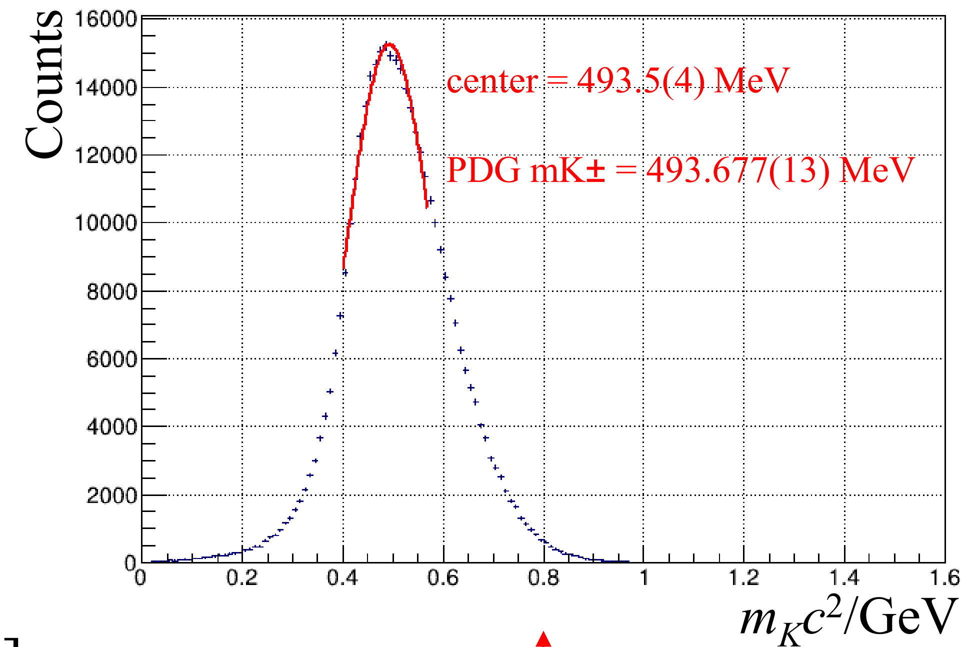
$(\gamma\beta)^2 = 1/[n^2\cos^2(\theta)-1]$

which implies

$p^2c^2/(m^2c^4) = 1/[n^2\cos^2(\theta)-1]$

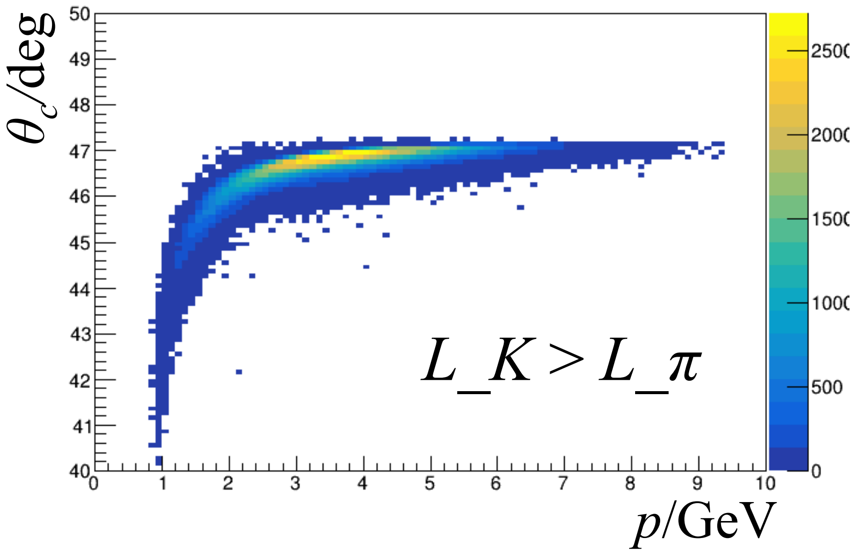
or

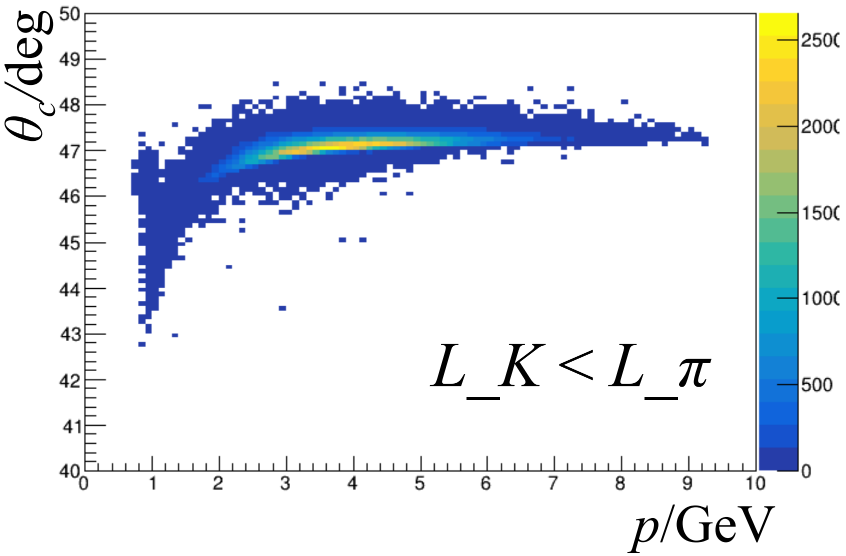
$mc^2 = pc[n^2\cos^2(\theta)-1]$

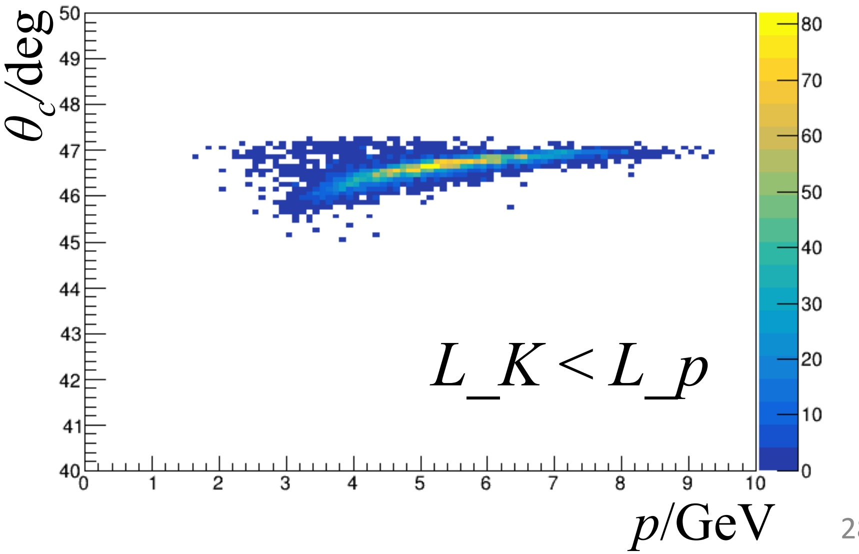


Set effective index of refraction
n = 1.4805 to get above plot

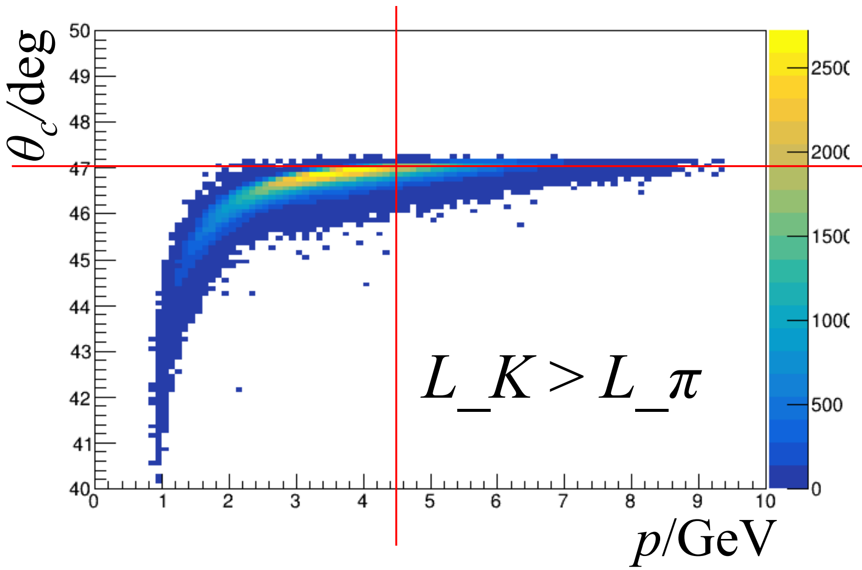
Cerenkov opening angle vs momentum for different likelihood scenarios

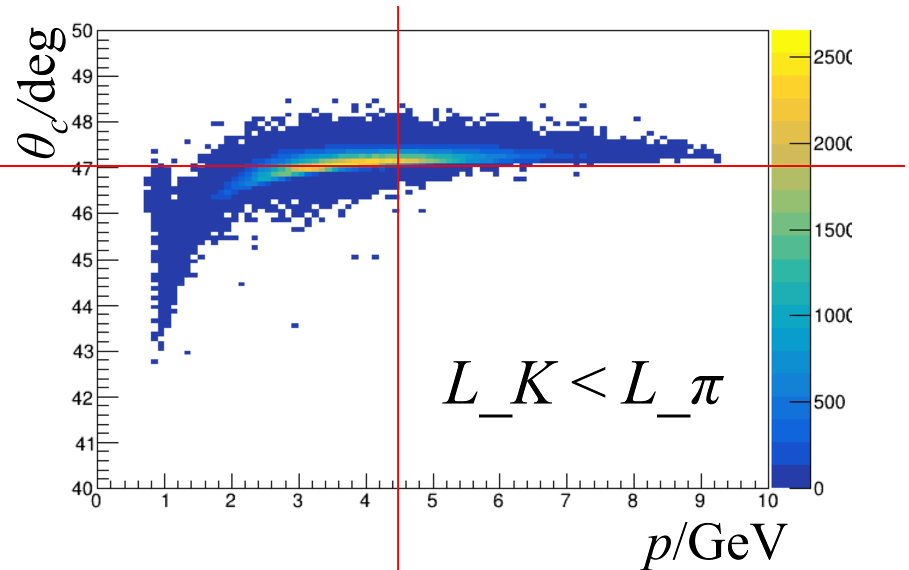


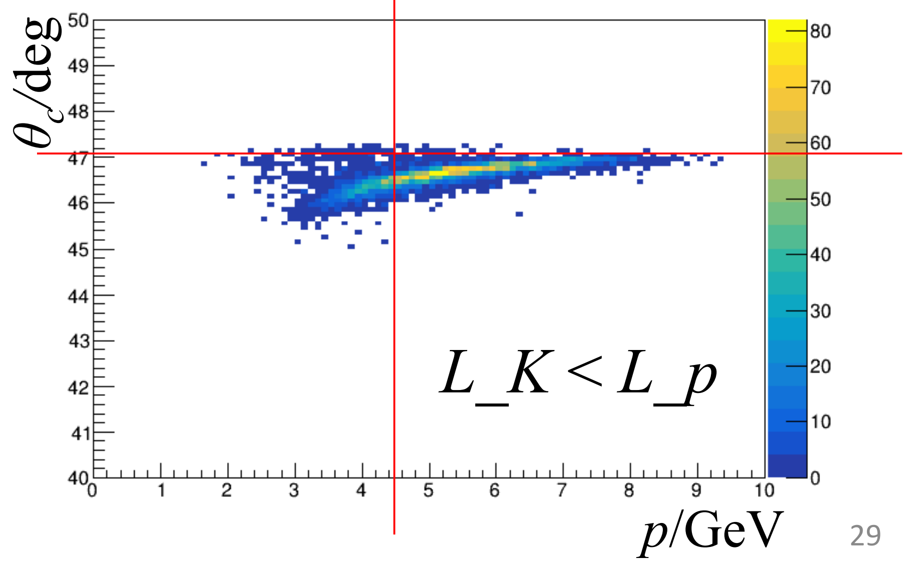




Cerenkov opening angle vs momentum for different likelihood scenarios



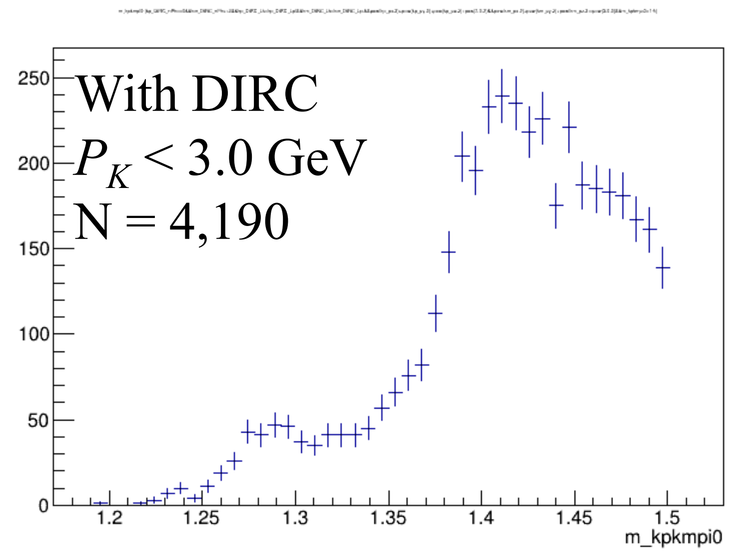


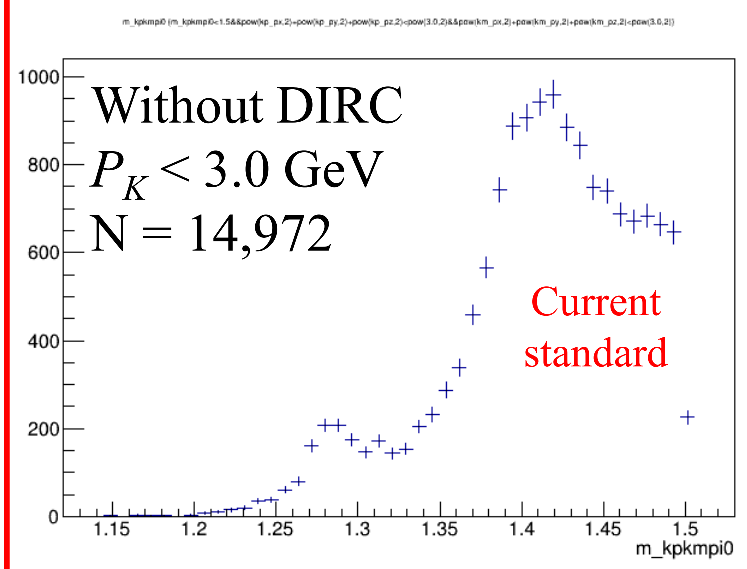


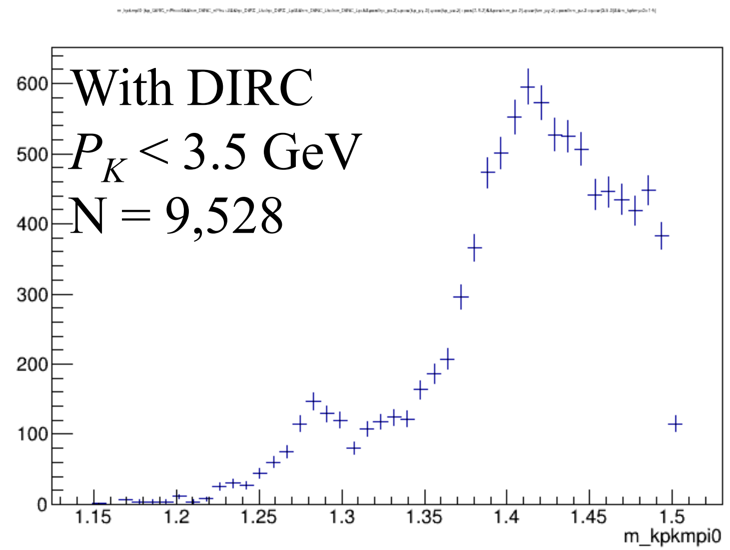
A momentum cutoff at 4.5 GeV is probably good ☺

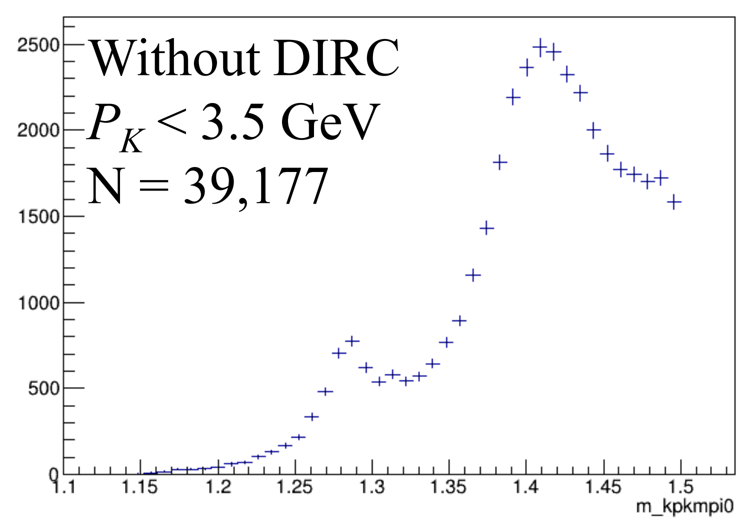
ASU

mass[$K^+K^-\pi^0$] With and Without DIRC

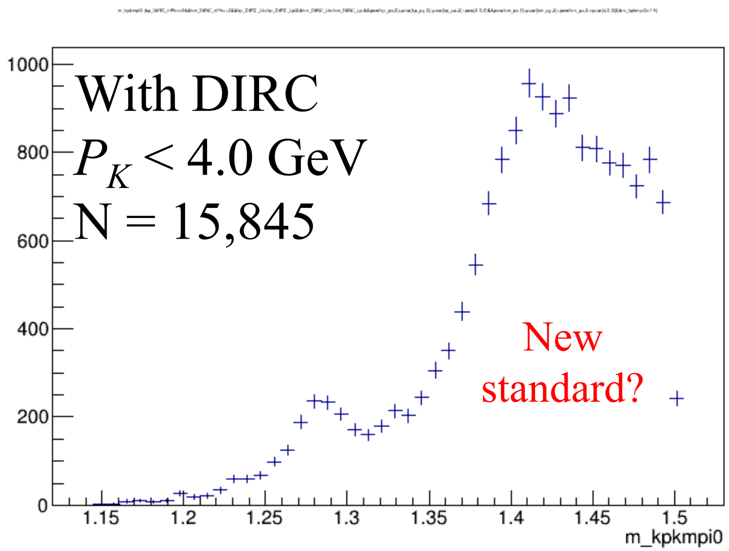


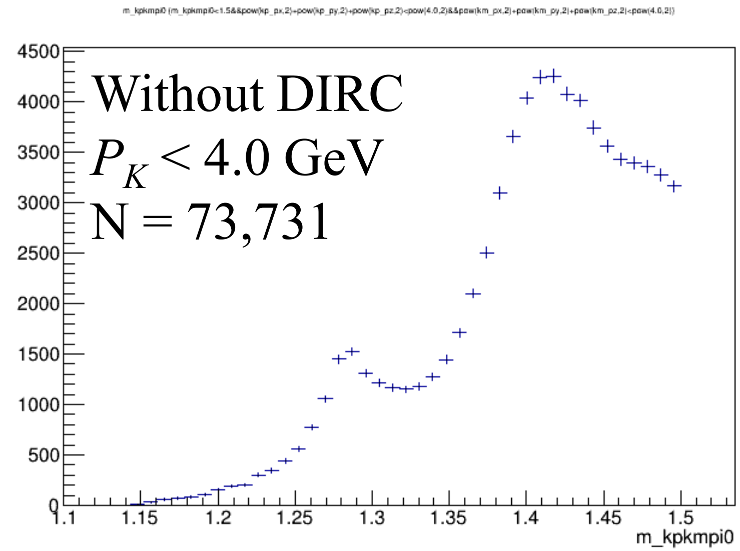


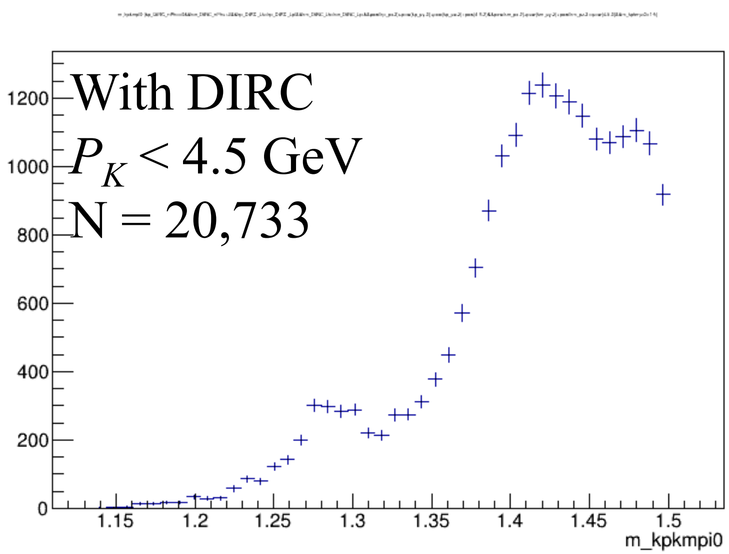


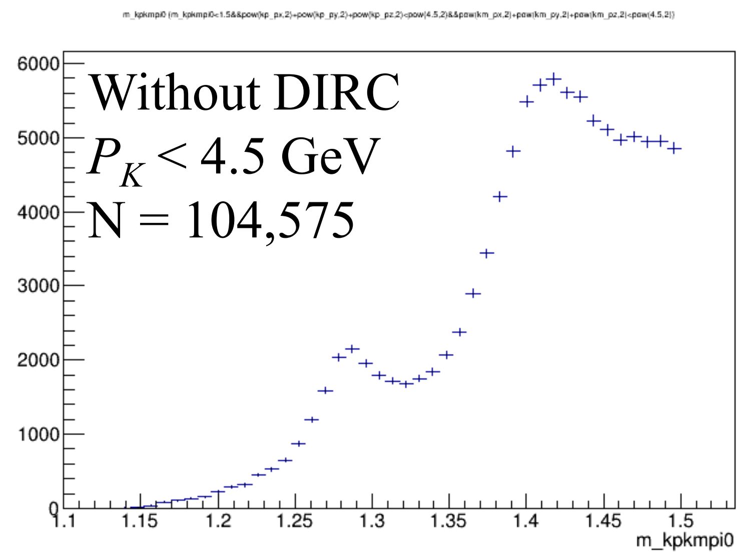


mass[$K^+K^-\pi^0$] With and Without DIRC

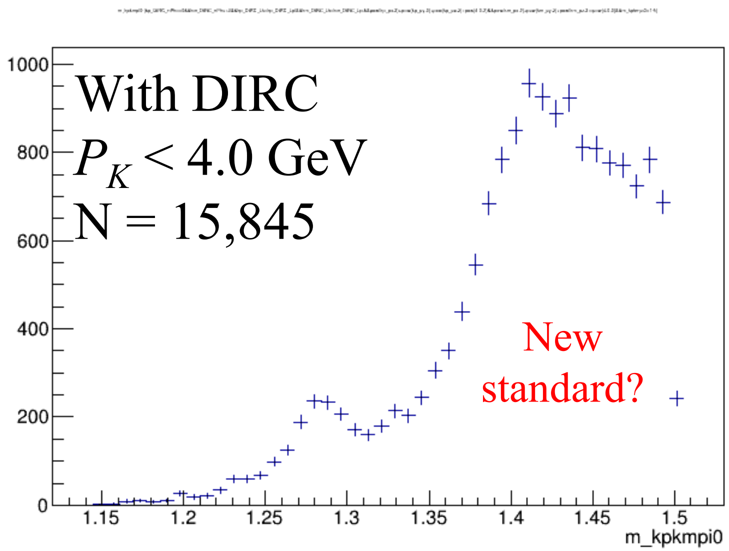


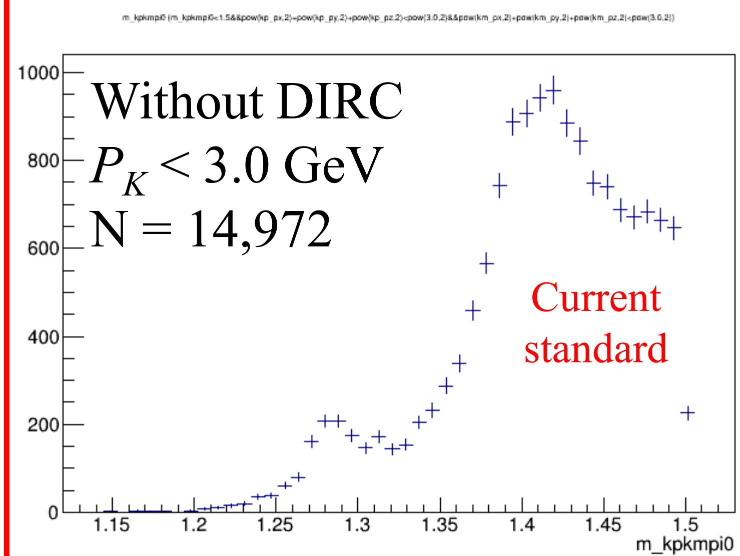


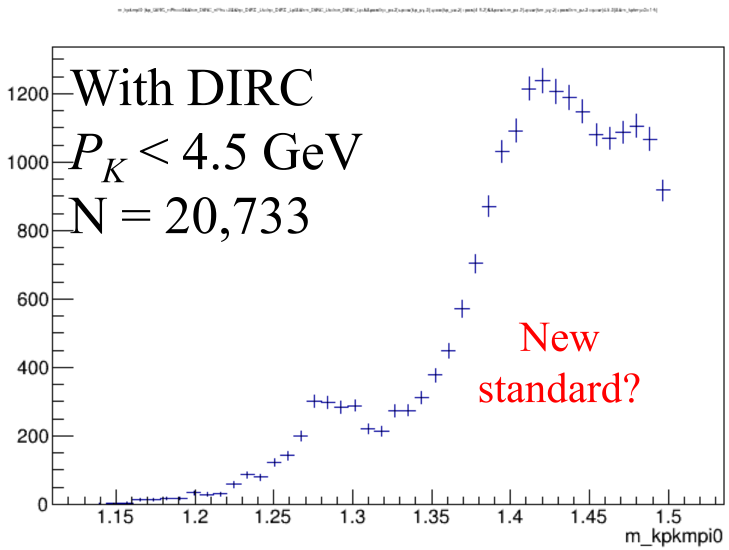




mass[$K^+K^-\pi^0$] With and Without DIRC







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