$K^+K^-\pi^0$ update

Isobar fits
and
comparison of real to fake data

Included waves

- Uniform background

- $J = 0$:
  - $a_0\pi^0$
  - $K^{*+}K^-$
  - $K^{*-}K^+$

Included waves

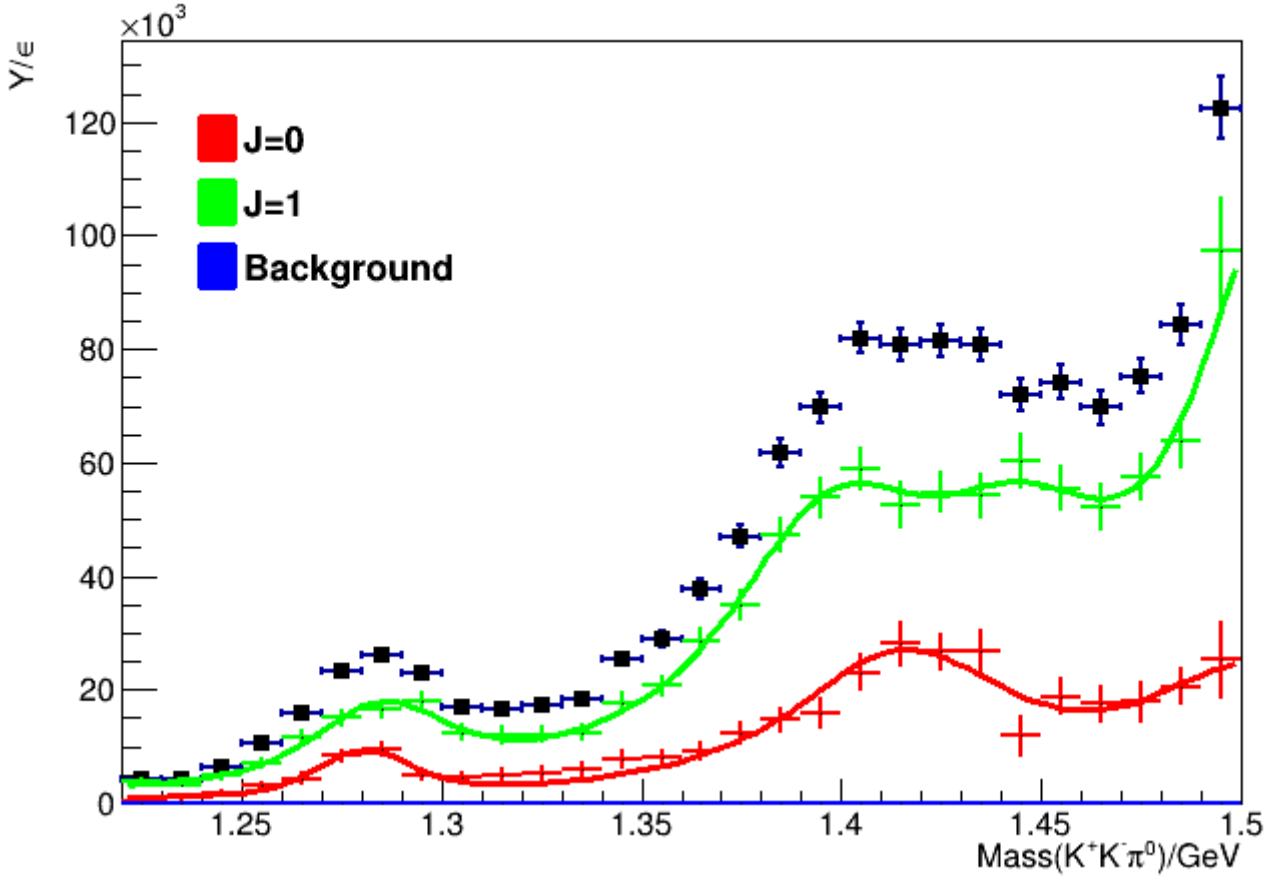
- Uniform background

- $J = 0$:
  - $a_0\pi^0$
  - $K^{*+}K^-$
  - $K^{*-}K^+$

- $J = 1$:
  - $a_0\pi^0$
  - $K^{*+}K^-$ (L=0, and L=1)
  - $K^{*-}K^+$ (L=0, and L=1)

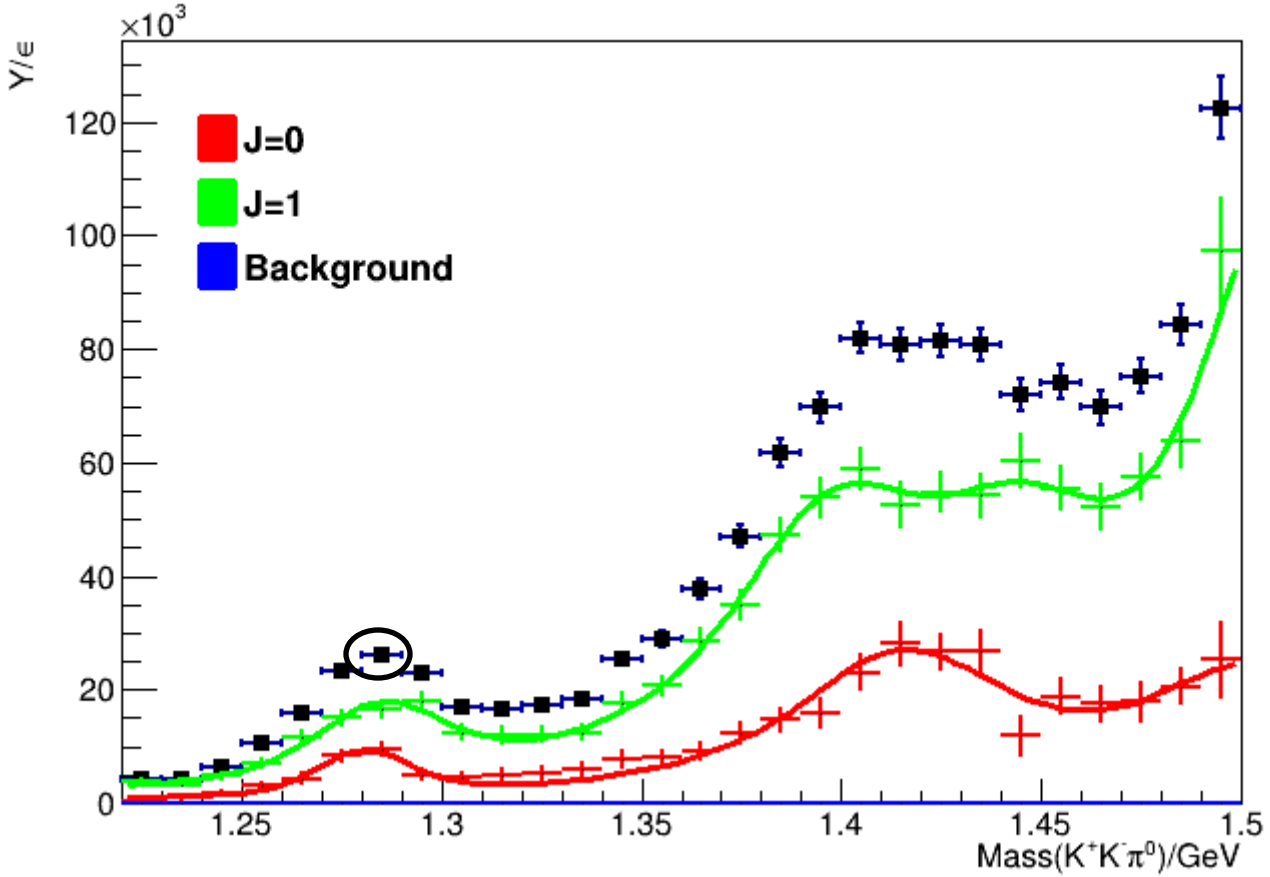
PWA Results for $J = 0,1$ and background

Isobar fit results



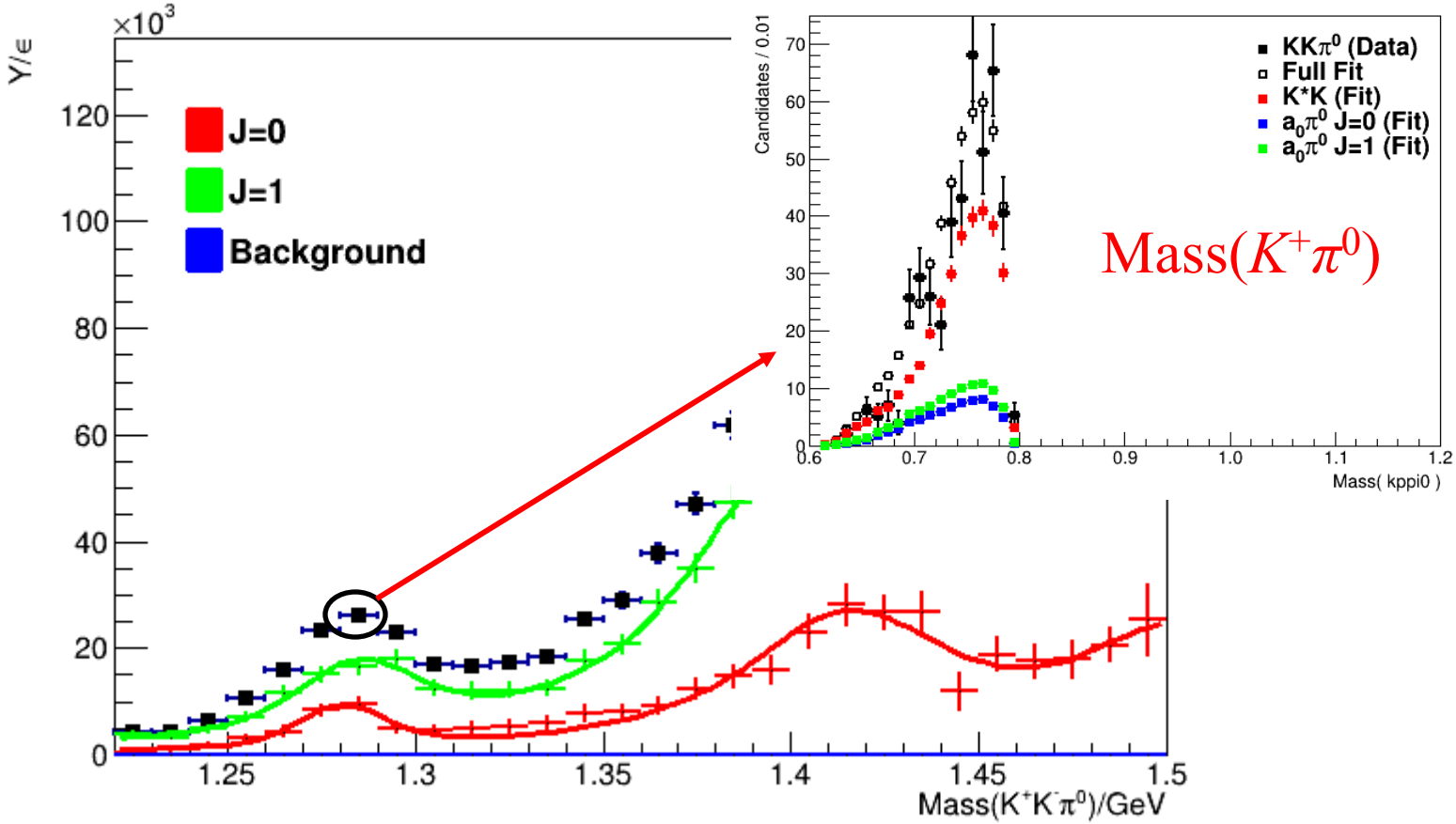
PWA Results for $J = 0,1$ and background

Isobar fit results



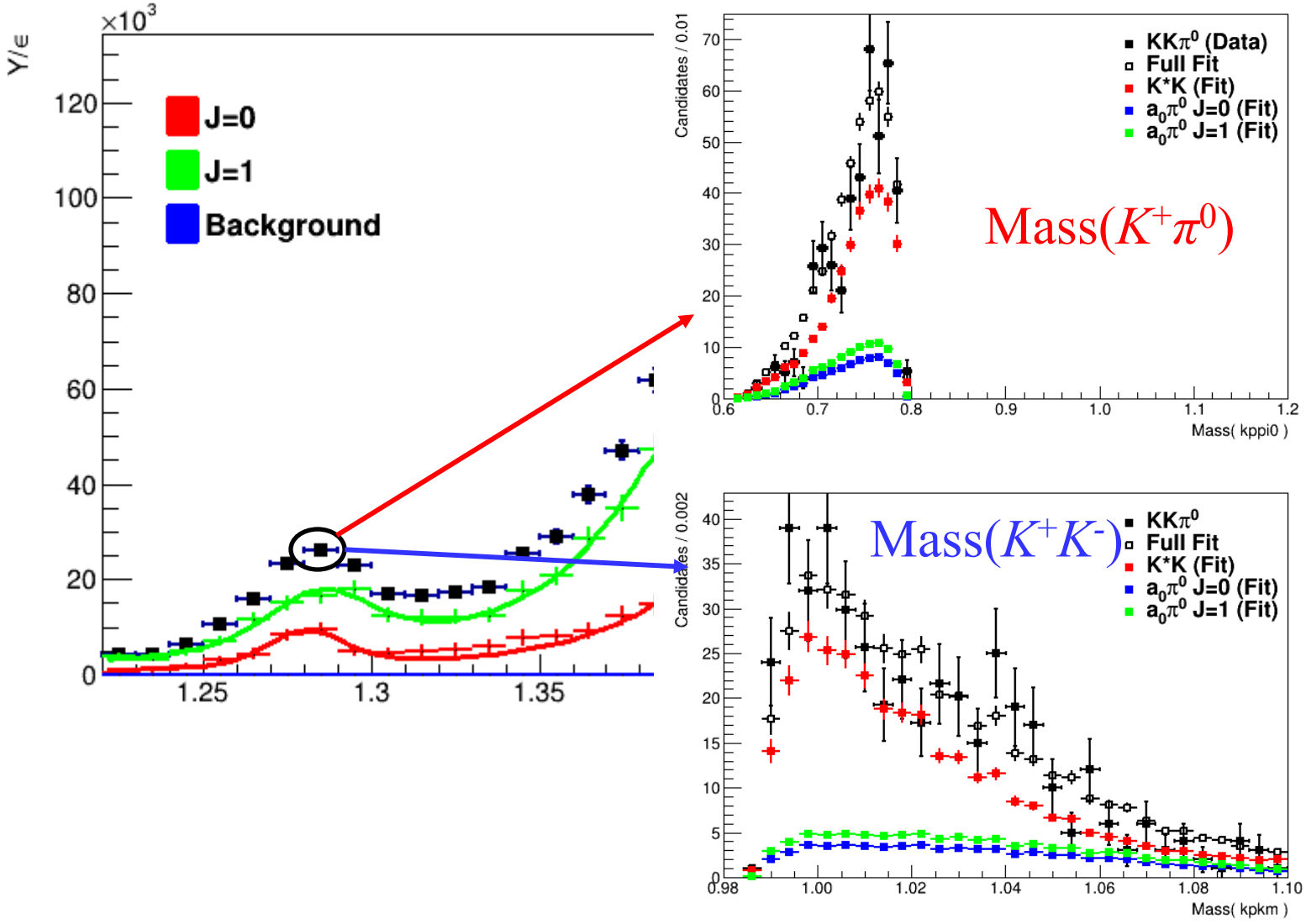
PWA Results for $J = 0,1$ and background

Isobar fit results



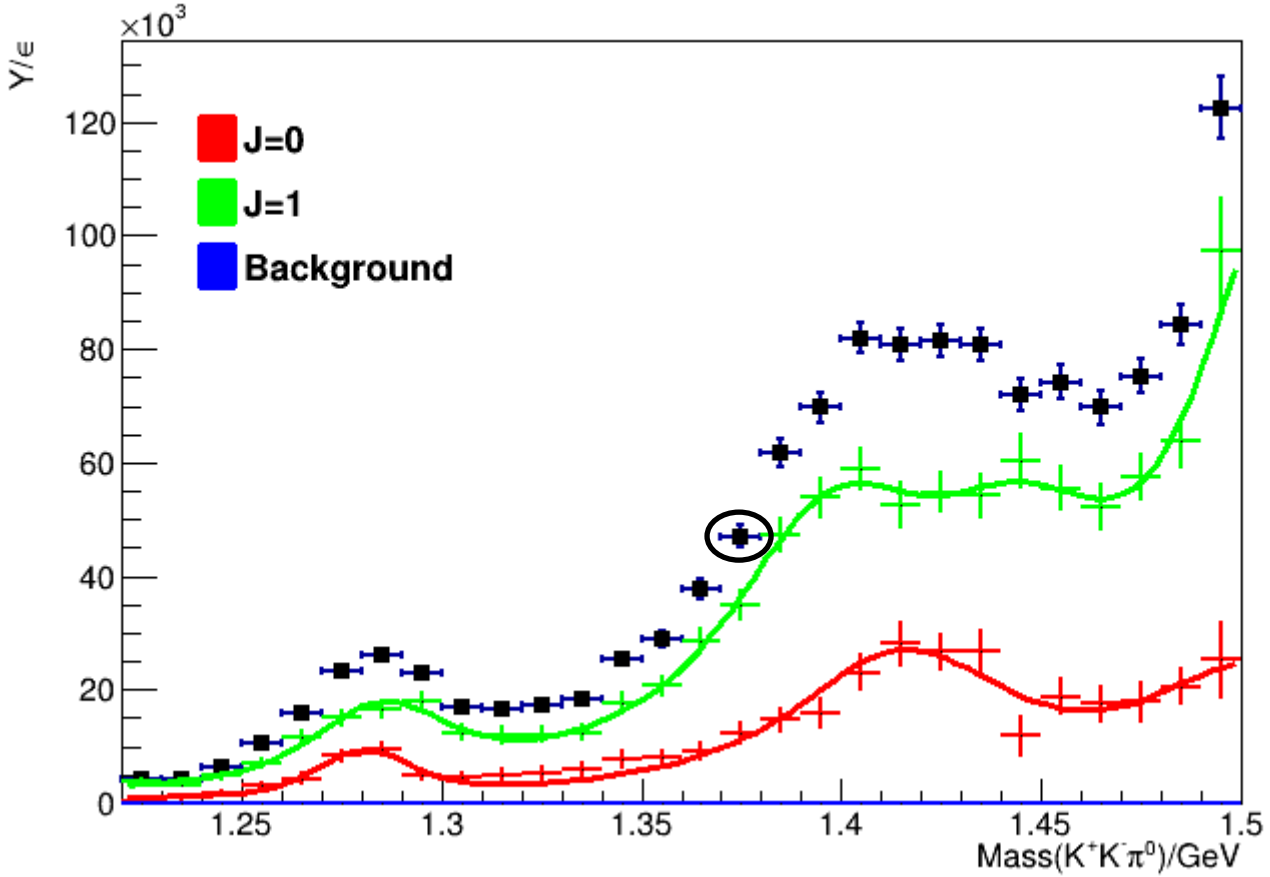
PWA Results for $J = 0,1$ and background

Isobar fit results



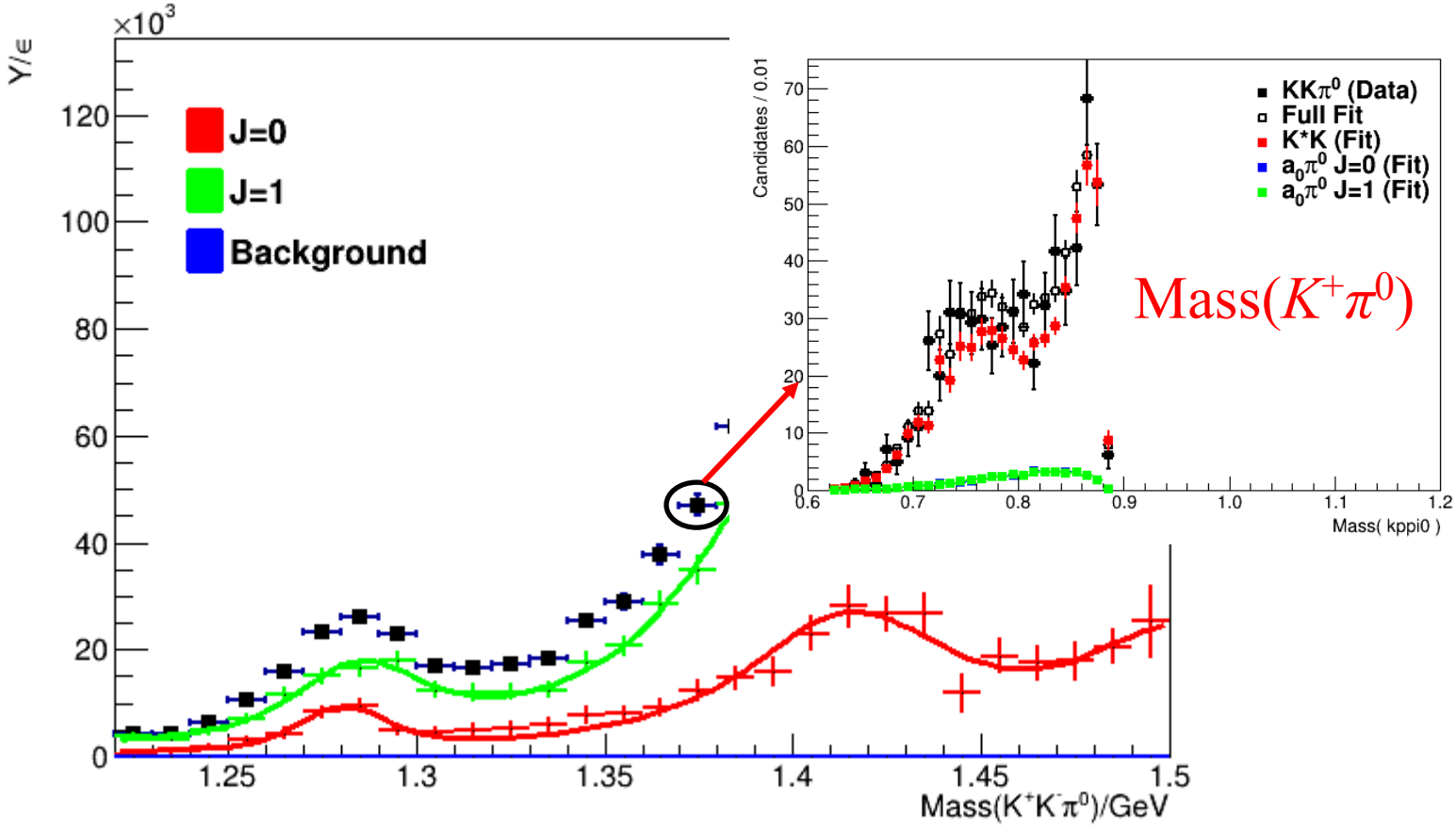
PWA Results for $J = 0,1$ and background

Isobar fit results



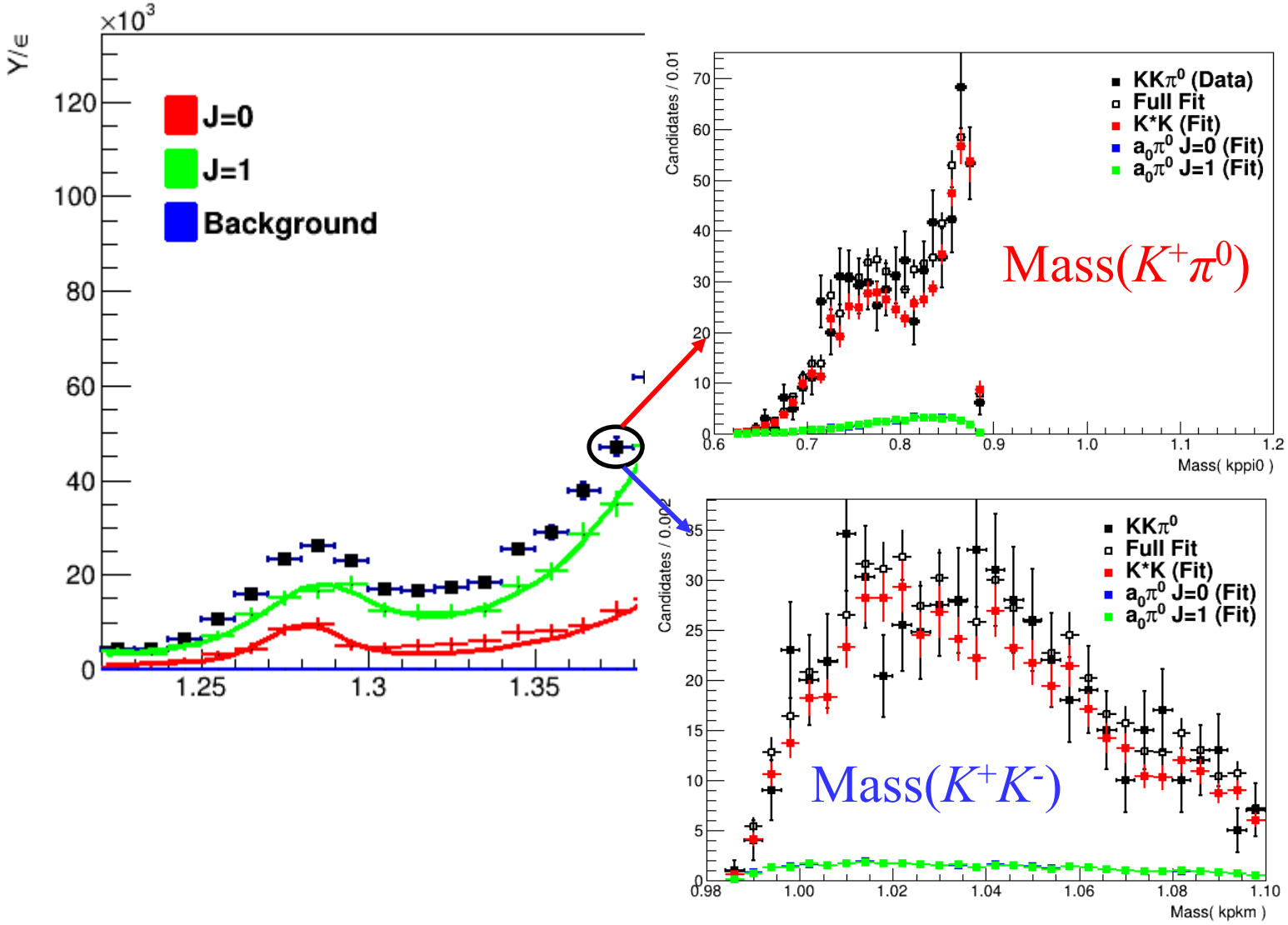
PWA Results for $J = 0,1$ and background

Isobar fit results



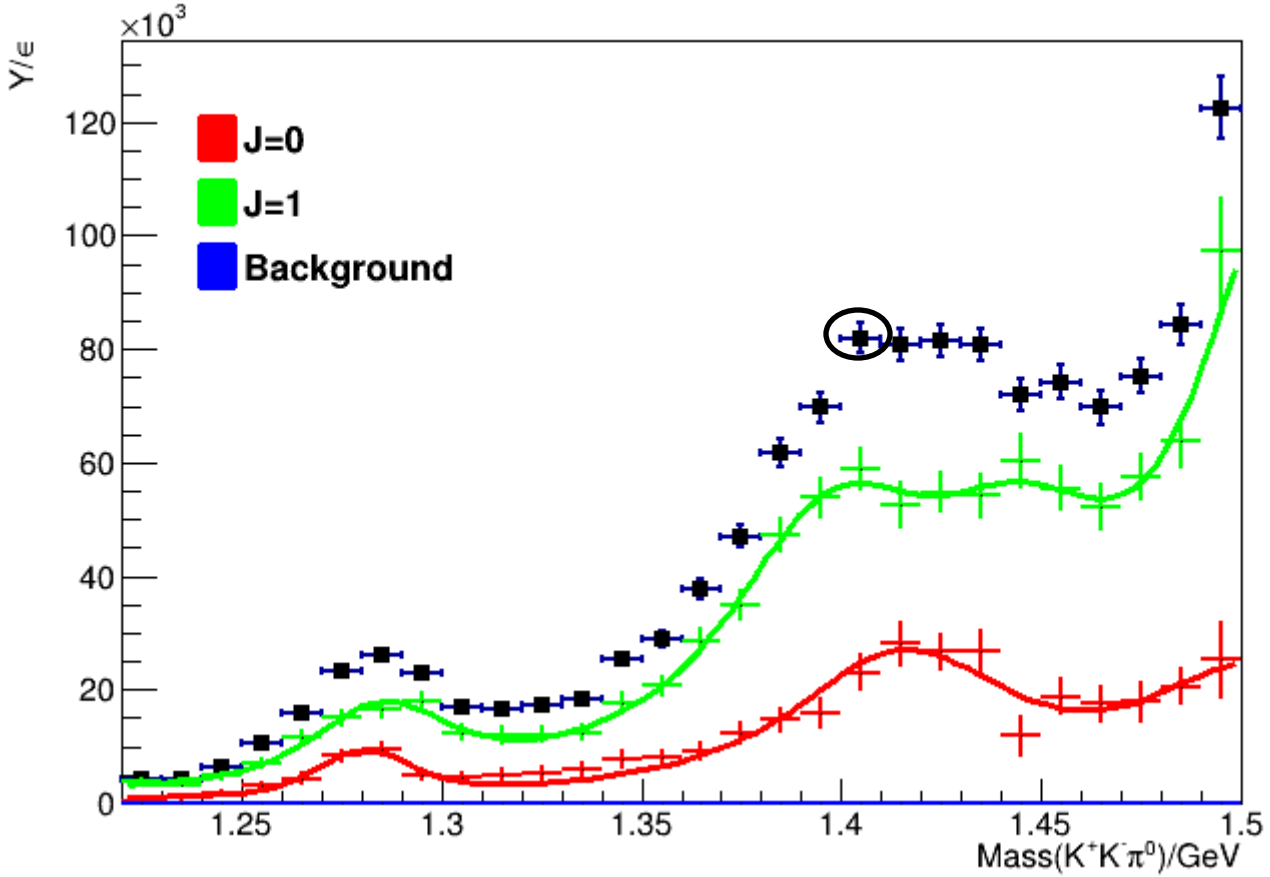
PWA Results for $J = 0,1$ and background

Isobar fit results



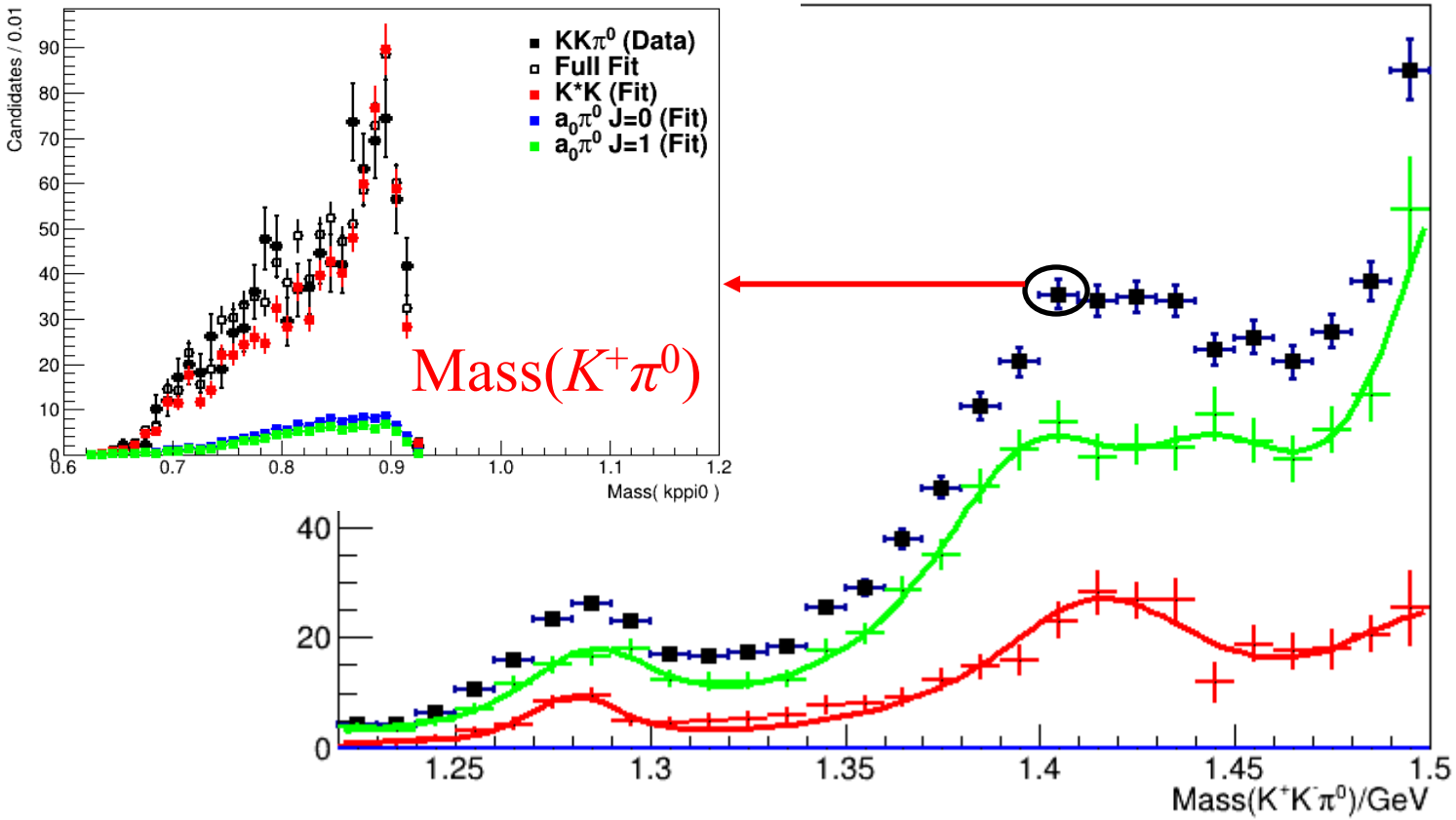
PWA Results for $J = 0,1$ and background

Isobar fit results



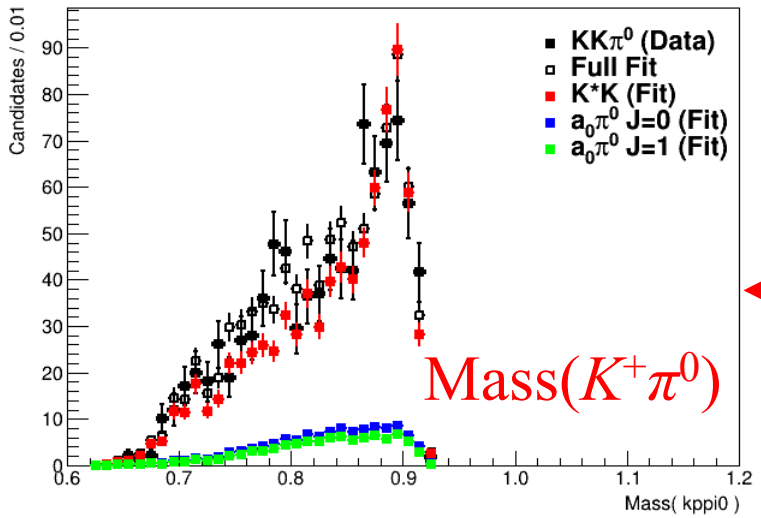
PWA Results for $J = 0,1$ and background

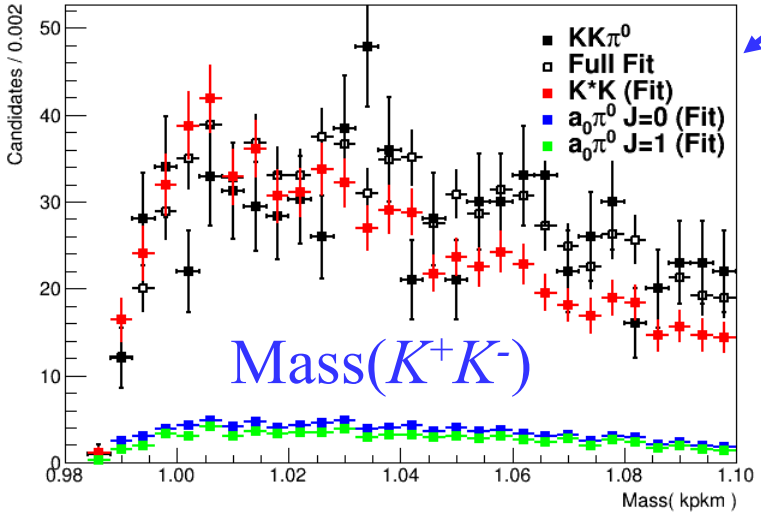
Isobar fit results

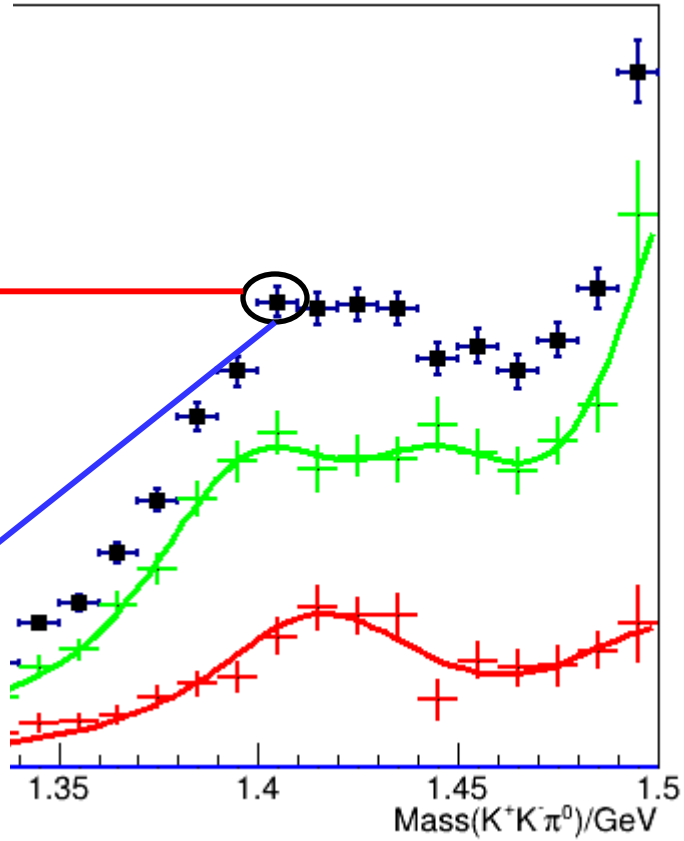


PWA Results for $J = 0,1$ and background

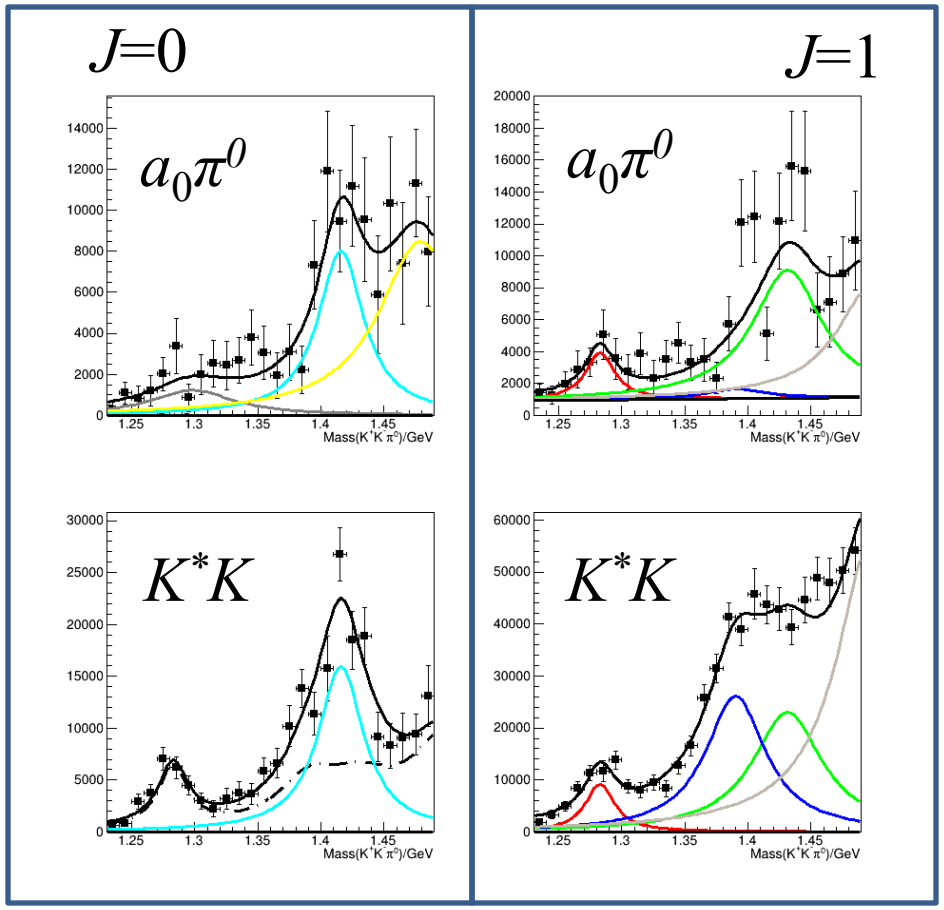
Isobar fit results







Simultaneous fit



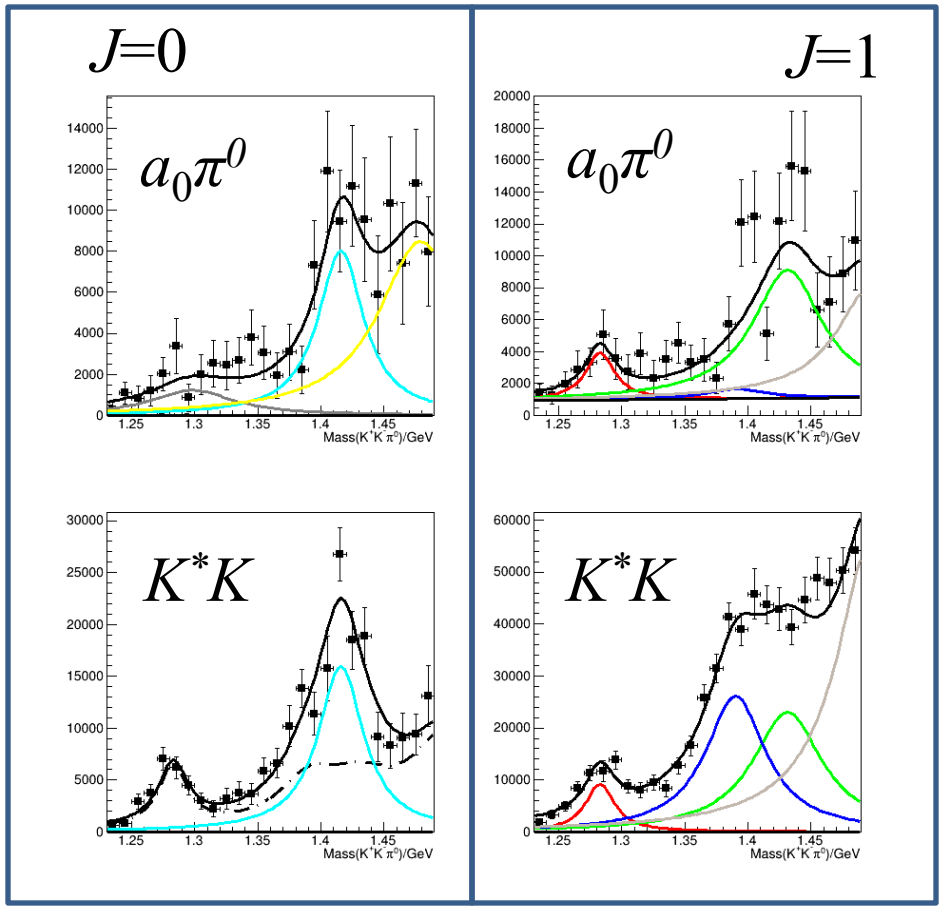
Simultaneous fit

J=0

Gray: $\eta(1295)$

Cyan: $\eta(1405)$

Yellow: $\eta(1475)$



Simultaneous fit

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Gray: $\eta(1295)$

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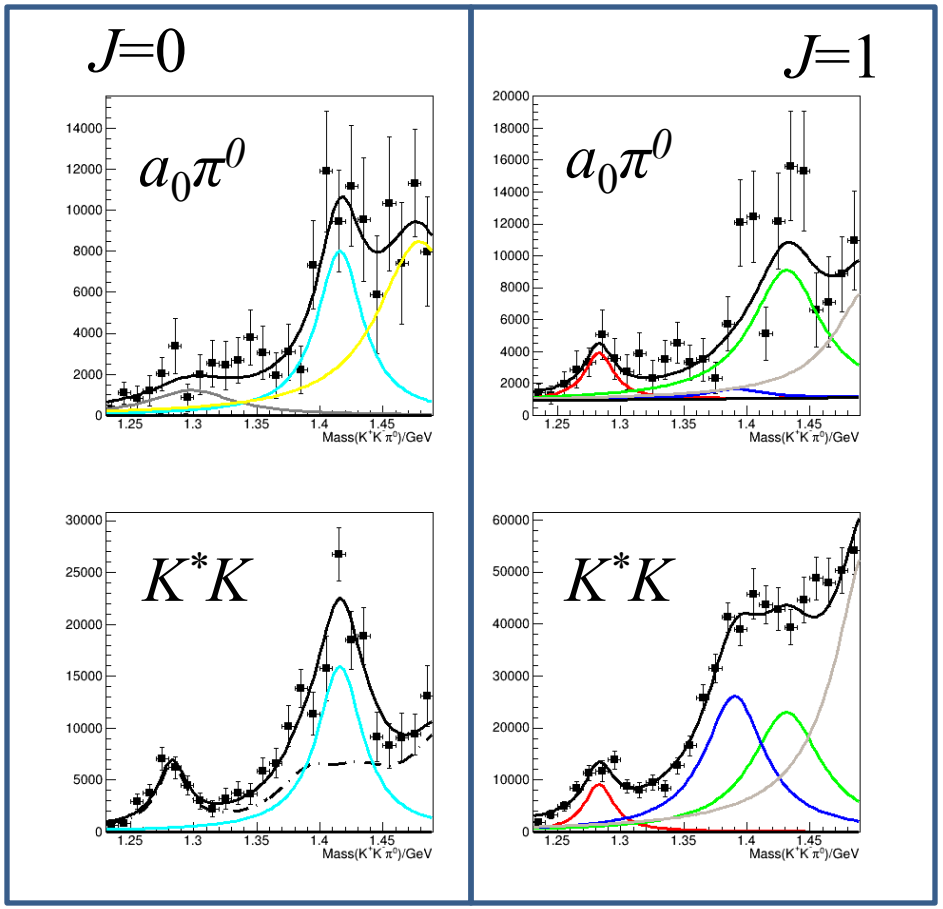


J=1

Red: $f_1(1285)$

Blue: $h_1(1415)$

Green: $f_1(1420)$

Brown: $f_1(1510)$

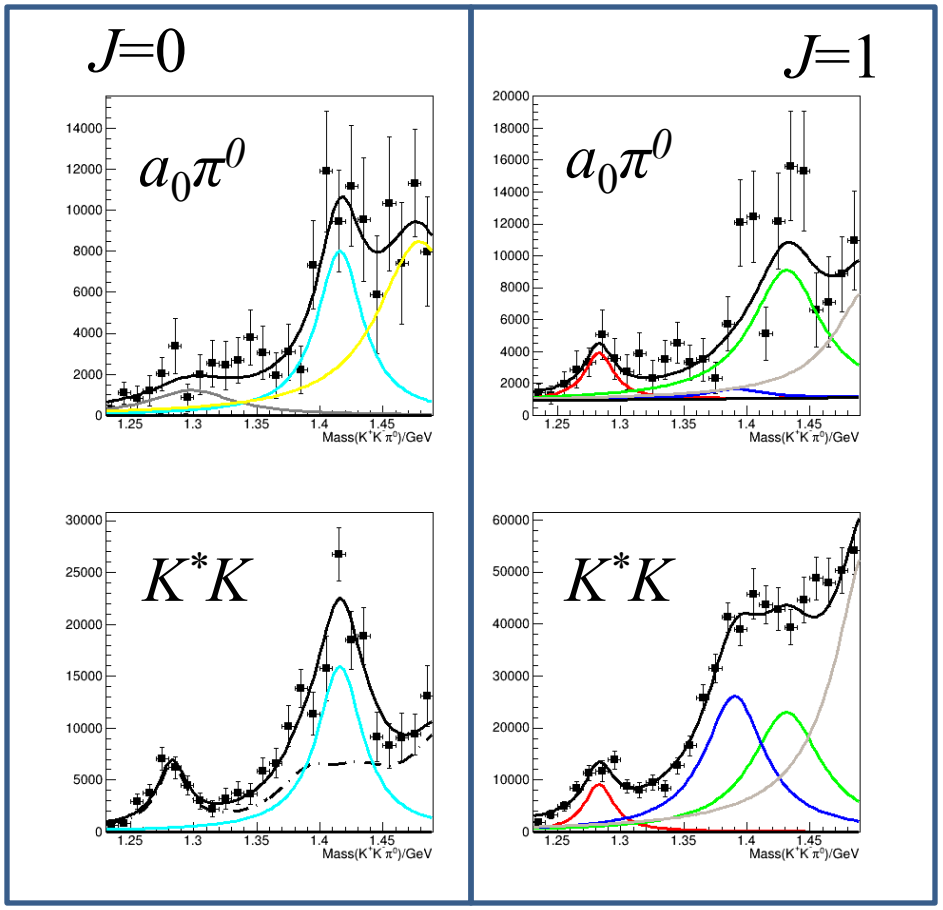
Simultaneous fit

J=0

Gray: $\eta(1295)$

Cyan: $\eta(1405)$

Yellow: $\eta(1475)$



J=1

Red: $f_1(1285)$

Blue: $h_1(1415)$

Green: $f_1(1420)$

Brown: $f_1(1510)$

- Dashed-dotted line is estimated leakage of J=1 into J=0

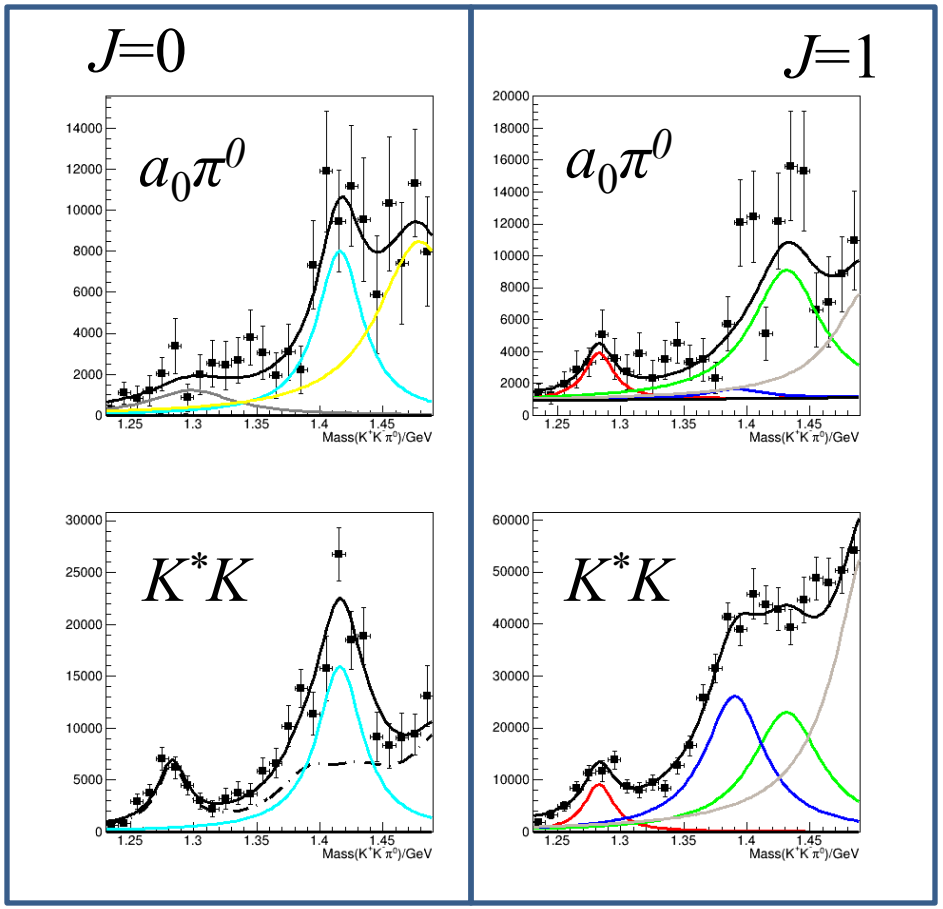
Simultaneous fit

J=0

Gray: $\eta(1295)$

Cyan: $\eta(1405)$

Yellow: $\eta(1475)$



J=1

Red: $f_1(1285)$

Blue: $h_1(1415)$

Green: $f_1(1420)$

Brown: $f_1(1510)$

- Dashed-dotted line is estimated leakage of J=1 into J=0
- Used parameters (centers and widths) of Breit-Wigners from the above fit to lock down those parameters for mass-dependent fit

Included waves for mass dependent fit

- $J = 0$:

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$
  - $\eta(1475) \rightarrow a_0\pi^0, K^*K$

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$
  - $\eta(1475) \rightarrow a_0\pi^0, K^*K$

- $J = 1$:

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$
  - $\eta(1475) \rightarrow a_0\pi^0, K^*K$

- $J = 1$:
  - $f_1(1285) \rightarrow a_0\pi^0, K^*K$

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$
  - $\eta(1475) \rightarrow a_0\pi^0, K^*K$

- $J = 1$:
  - $f_1(1285) \rightarrow a_0\pi^0, K^*K$
  - $h_1(1415) \rightarrow K^*K$ (Note: $h_1 \rightarrow a_0\pi^0$ not allowed)

Included waves for mass dependent fit

- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$
  - $\eta(1475) \rightarrow a_0\pi^0, K^*K$

- $J = 1$:
  - $f_1(1285) \rightarrow a_0\pi^0, K^*K$
  - $h_1(1415) \rightarrow K^*K$ (Note: $h_1 \rightarrow a_0\pi^0$ not allowed)
  - $f_1(1420) \rightarrow a_0\pi^0, K^*K$

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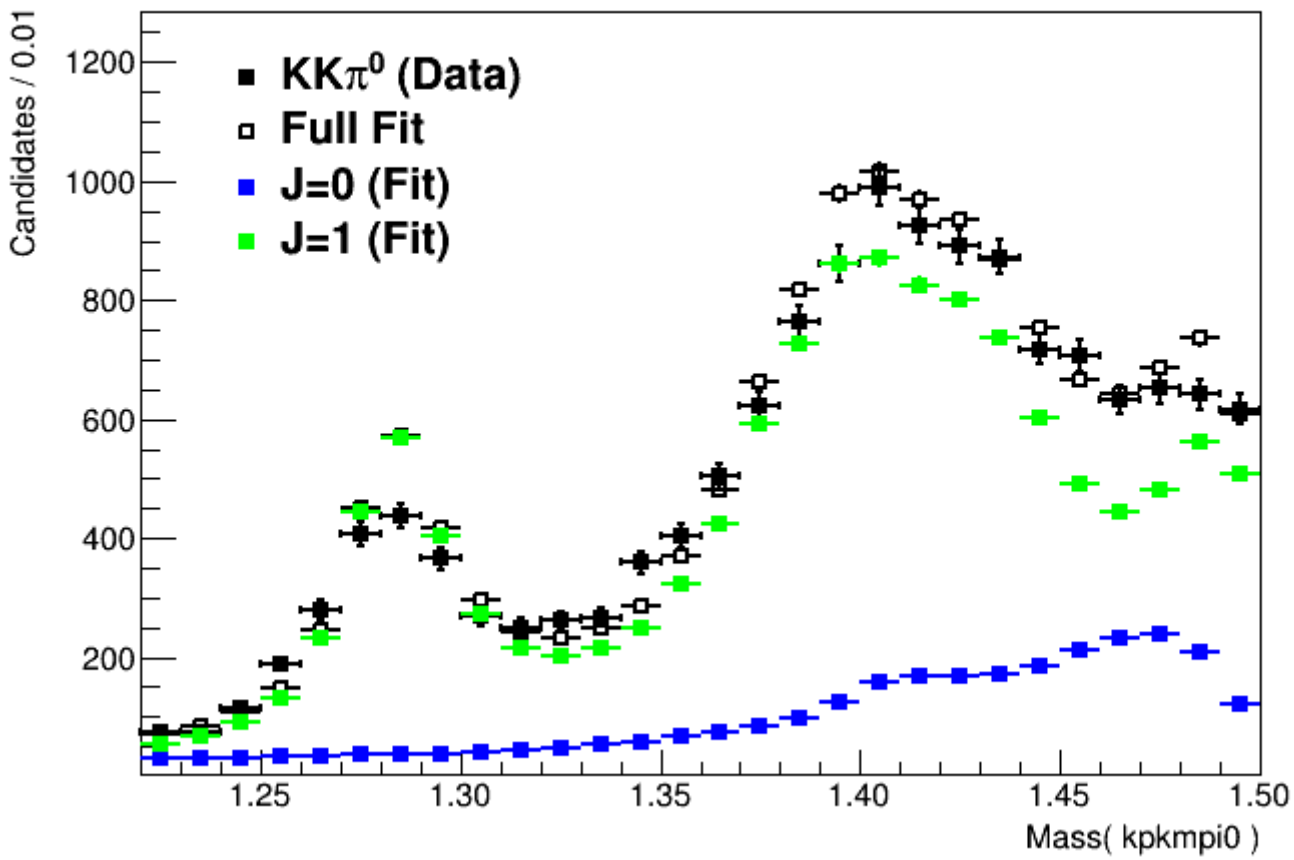
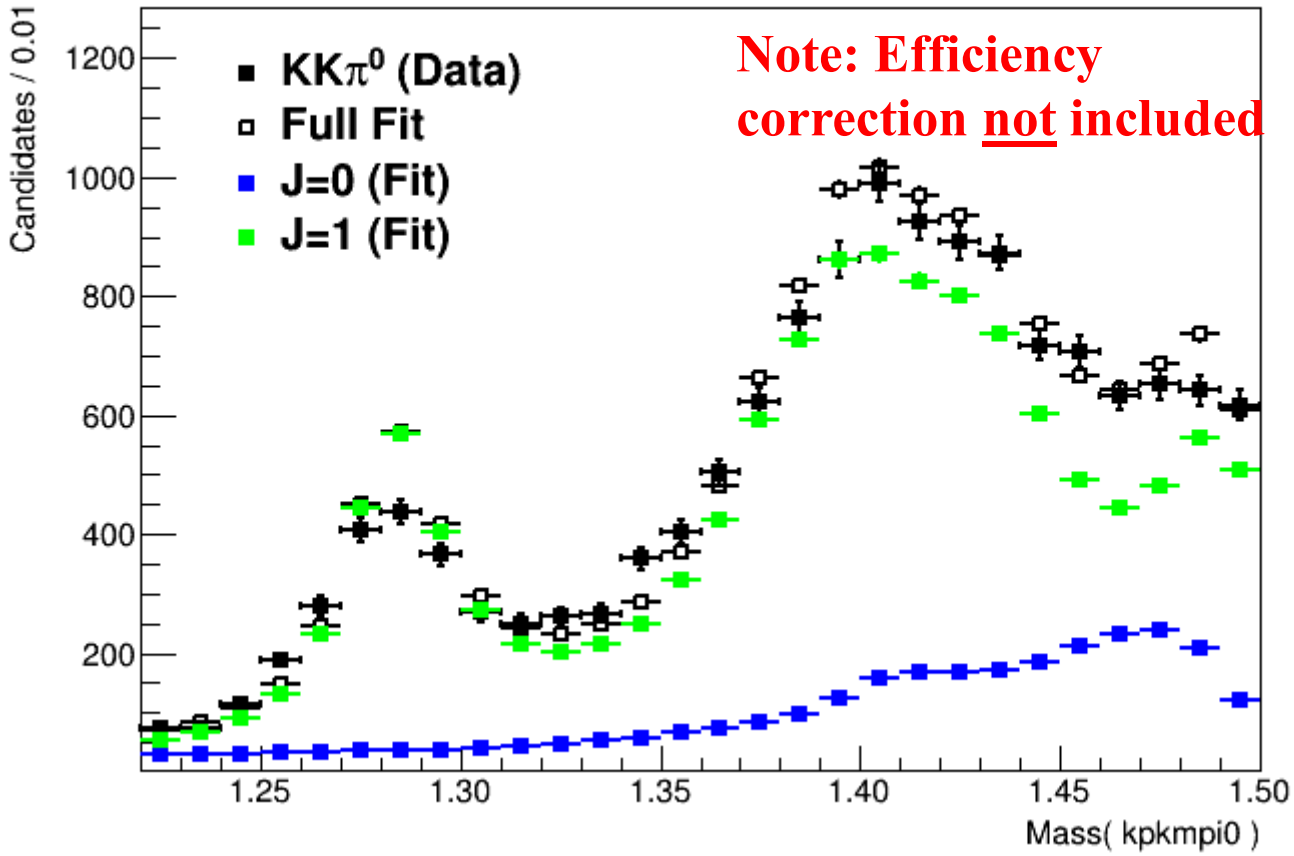
- $J = 0$:
  - ~~$\eta(1295)$~~ Not included
  - $\eta(1405) \rightarrow a_0\pi^0, K^*K$
  - $\eta(1475) \rightarrow a_0\pi^0, K^*K$

- $J = 1$:
  - $f_1(1285) \rightarrow a_0\pi^0, K^*K$
  - $h_1(1415) \rightarrow K^*K$ (Note: $h_1 \rightarrow a_0\pi^0$ not allowed)
  - $f_1(1420) \rightarrow a_0\pi^0, K^*K$
  - $f_1(1510) \rightarrow a_0\pi^0, K^*K$

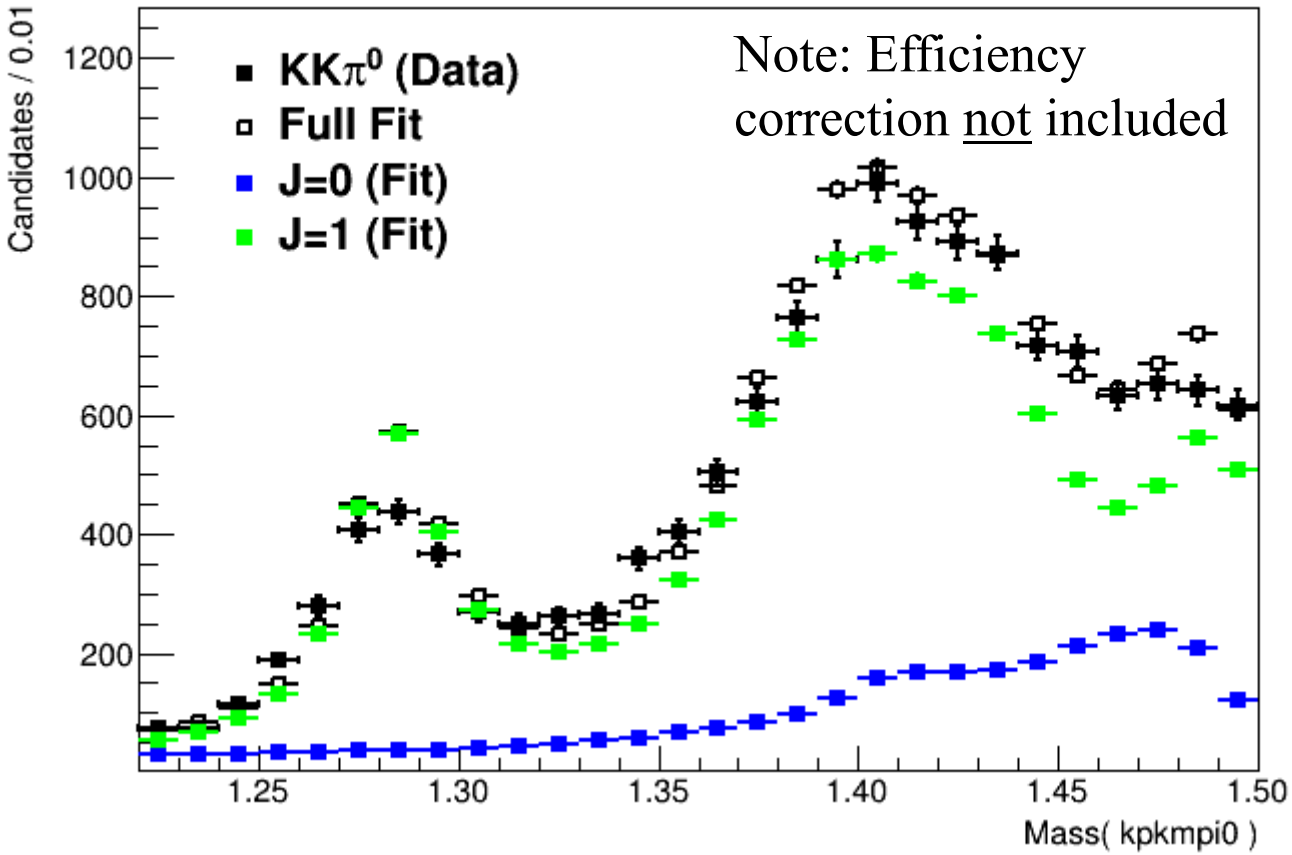
PWA mass-dependent fit



PWA mass-dependent fit

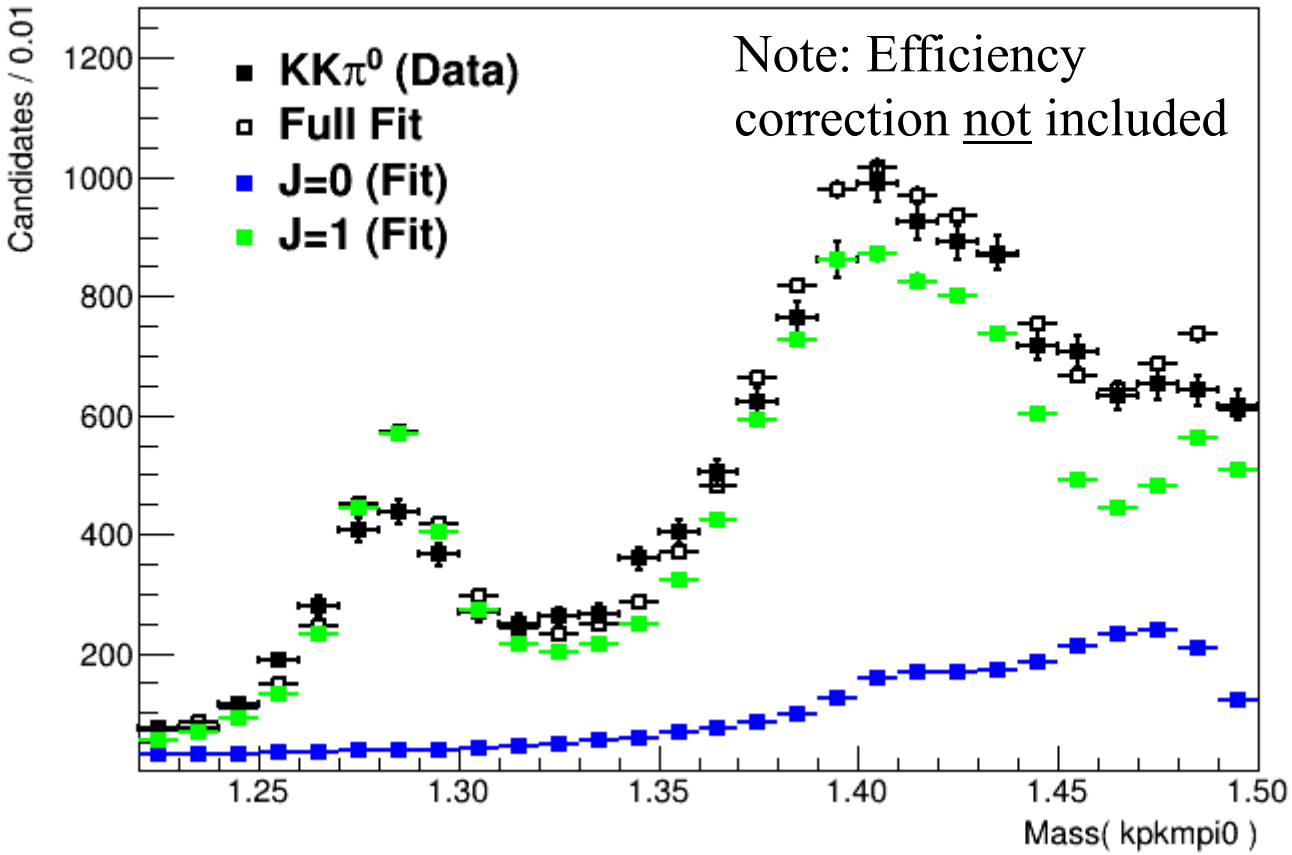


PWA mass-dependent fit



- Used fit parameters from above fit to simulate signal using gen_amp

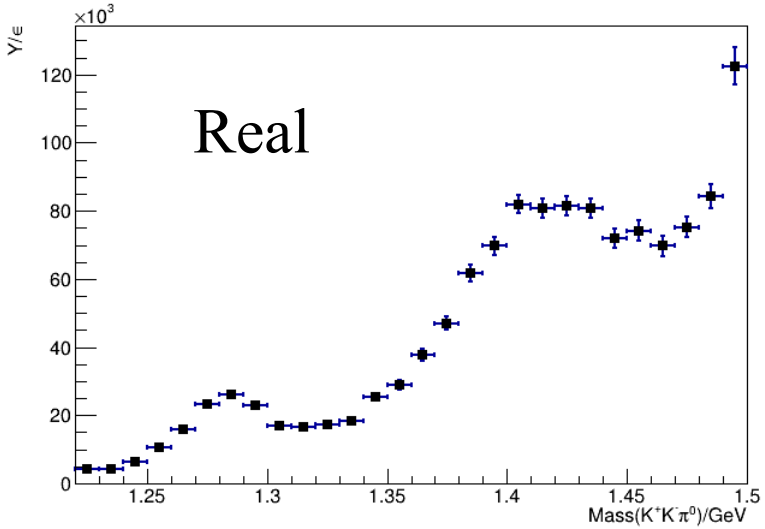
PWA mass-dependent fit



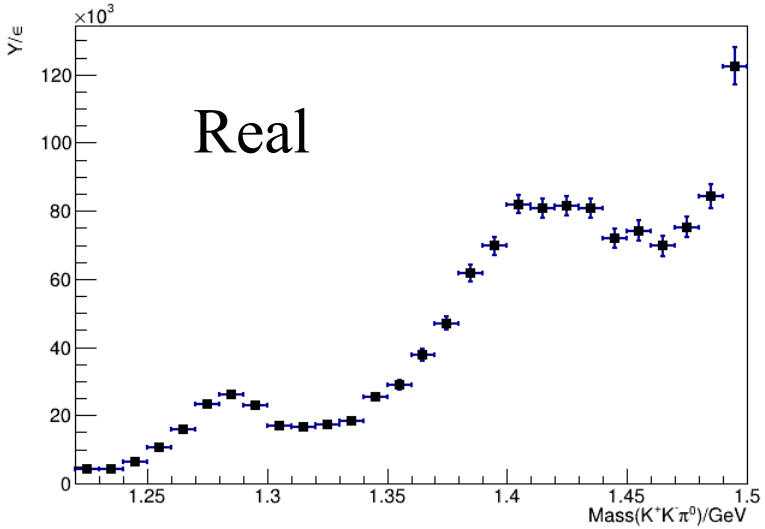
- Used fit parameters from above fit to simulate signal using gen_amp
- Did mass-independent fit using the gen_amp simulation to help verify leakage assumption

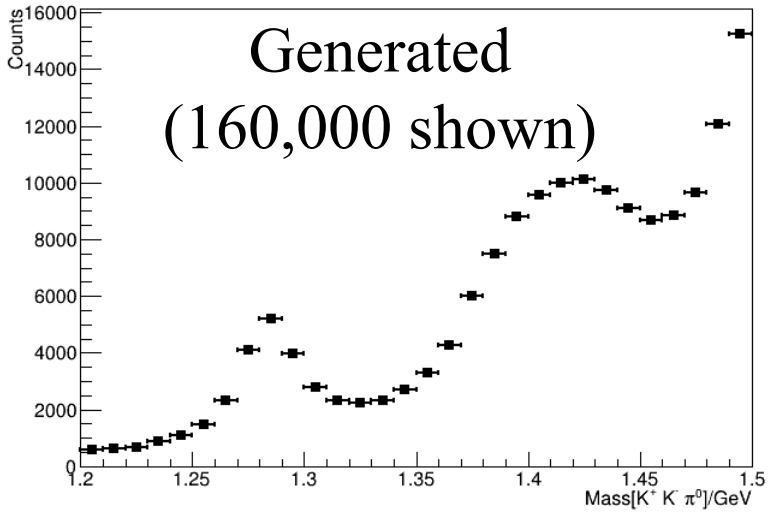
Comparison of Mass[$K^+K^-\pi^0$] between efficiency corrected real data and generated (gen_amp)

Comparison of Mass[$K^+K^-\pi^0$] between efficiency corrected real data and generated (gen_amp)

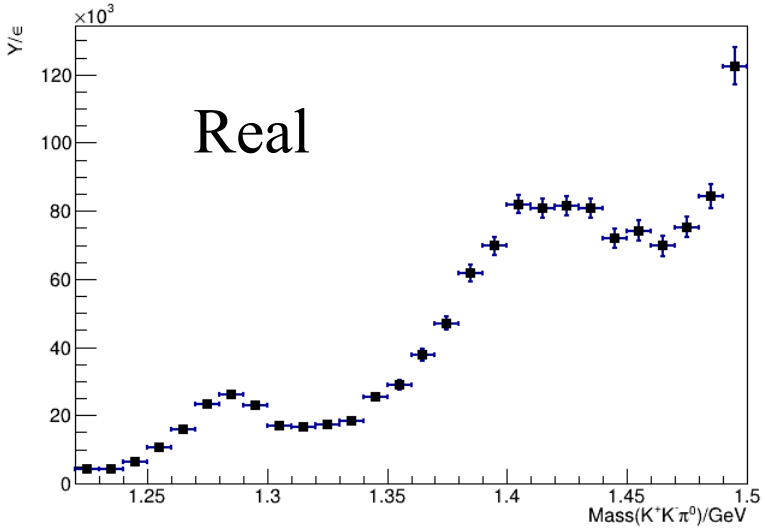


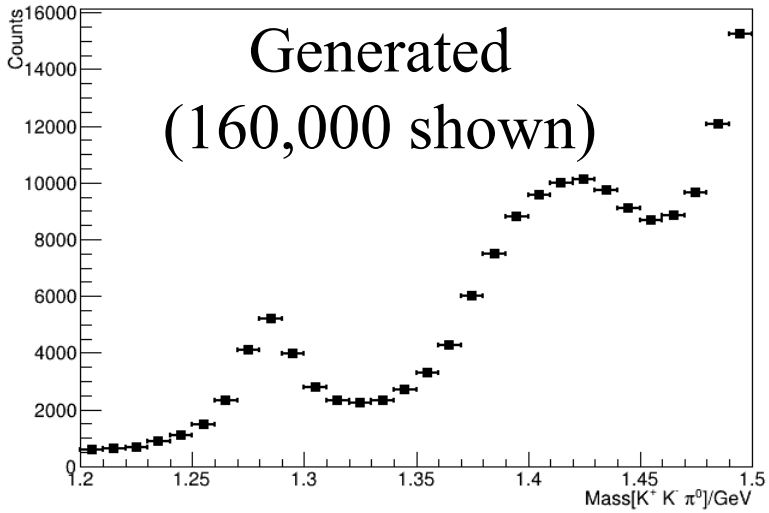
Comparison of Mass[$K^+K^-\pi^0$] between efficiency corrected real data and generated (gen_amp)





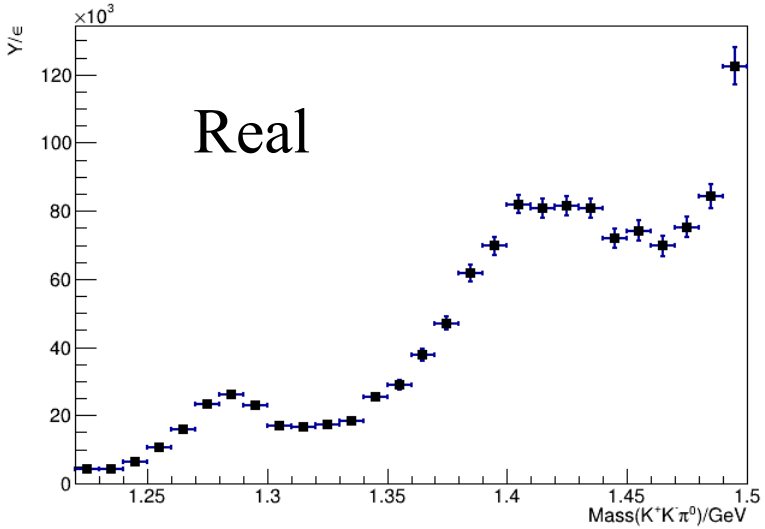
Comparison of Mass[$K^+K^-\pi^0$] between efficiency corrected real data and generated (gen_amp)

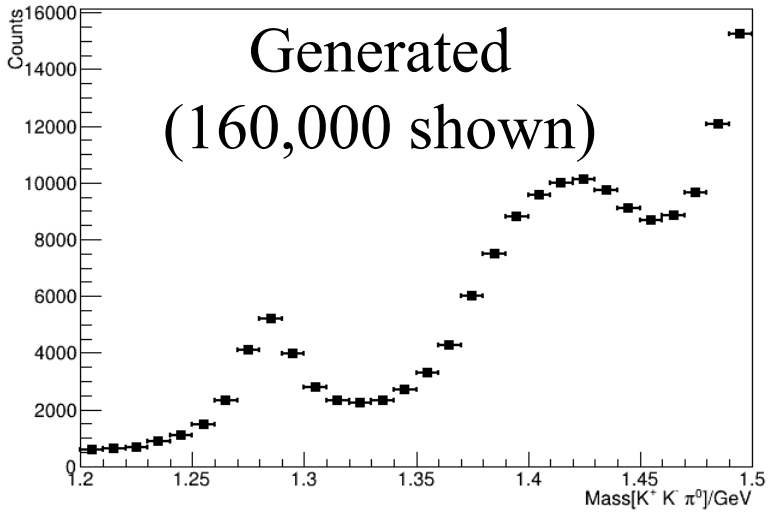




- Integral of efficiency corrected real data = 1.3 million

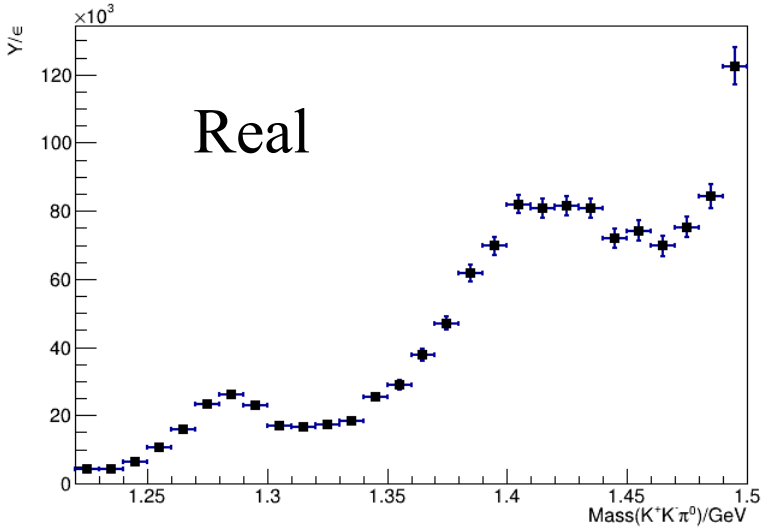
Comparison of Mass[$K^+K^-\pi^0$] between efficiency corrected real data and generated (gen_amp)

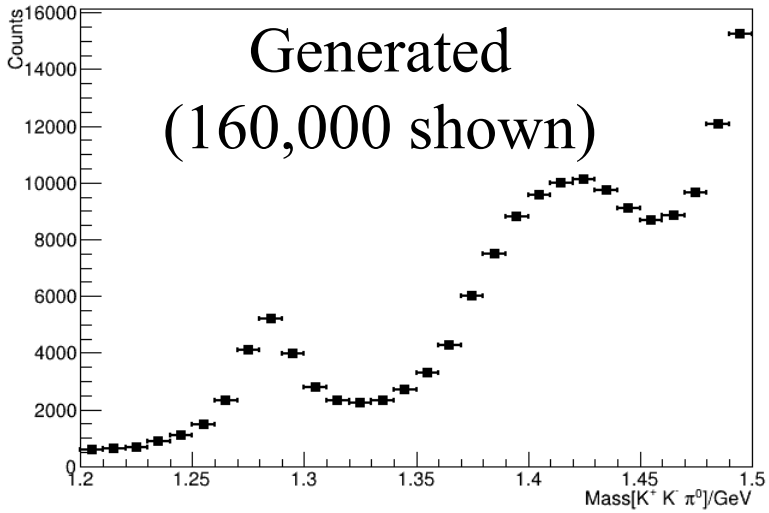




- Integral of efficiency corrected real data = 1.3 million
- More than enough generated data pushed through glueX simulation

Comparison of Mass[$K^+K^-\pi^0$] between efficiency corrected real data and generated (gen_amp)

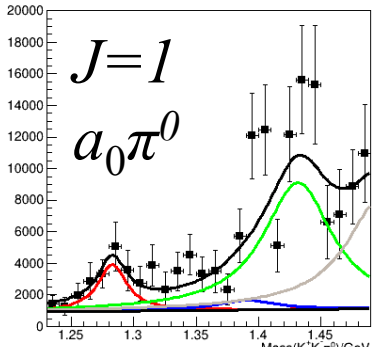




- Integral of efficiency corrected real data = 1.3 million
- More than enough generated data pushed through glueX simulation
- Next step was : PWA of the gen_amp data as though it was real

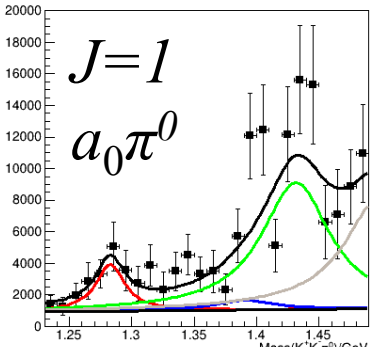
Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

REAL

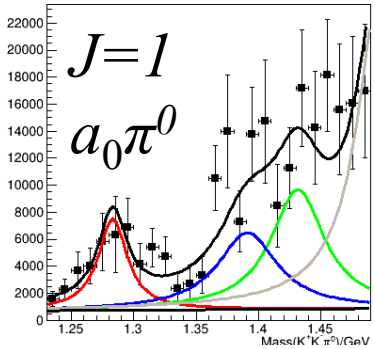


Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

REAL



FAKE

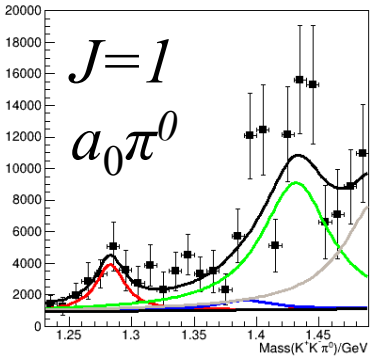


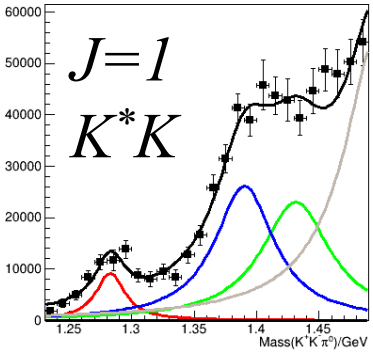
Note:

- $h_1 \rightarrow a_0\pi^0$ (**Blue**) was not generated

Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

REAL





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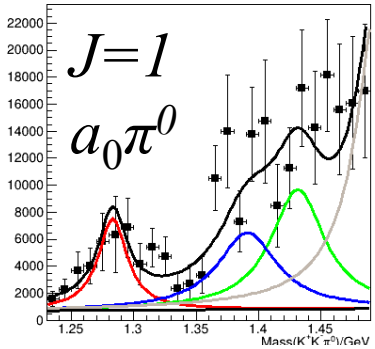

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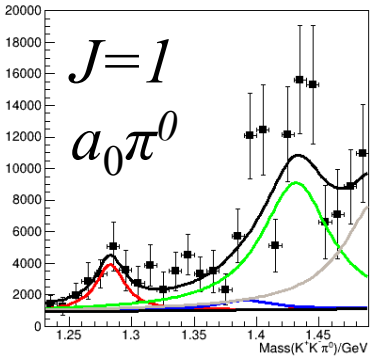
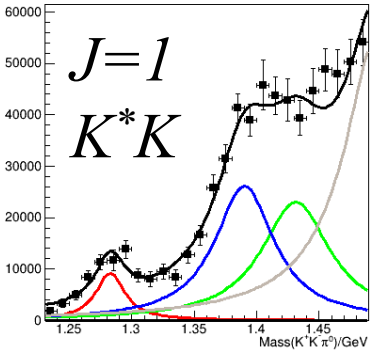
Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

REAL





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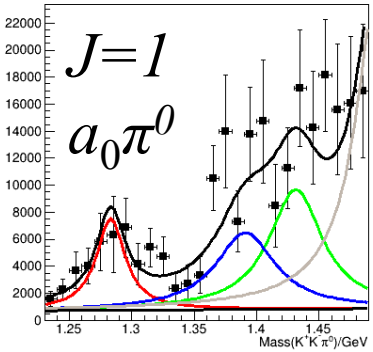

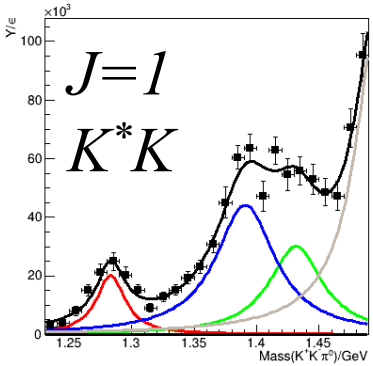

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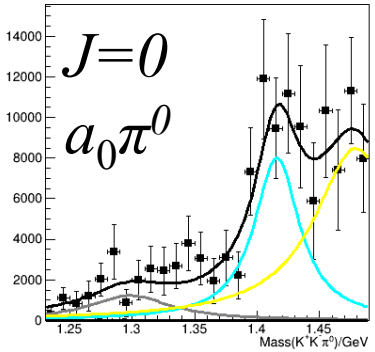
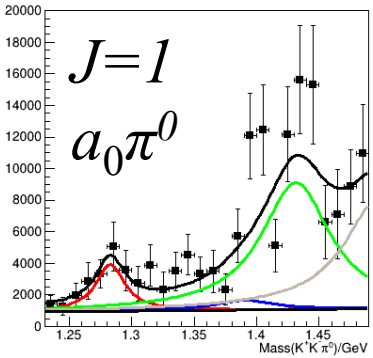
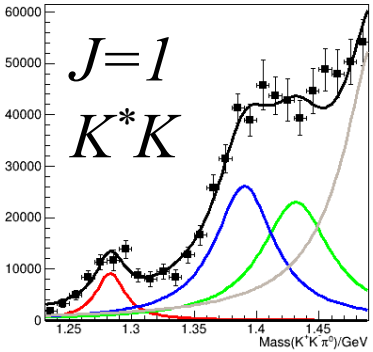
Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

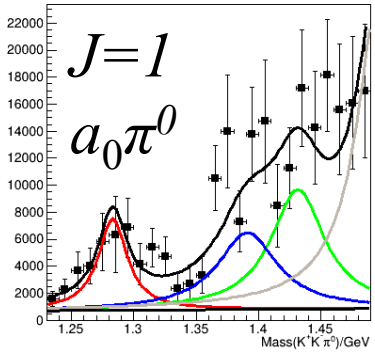
REAL

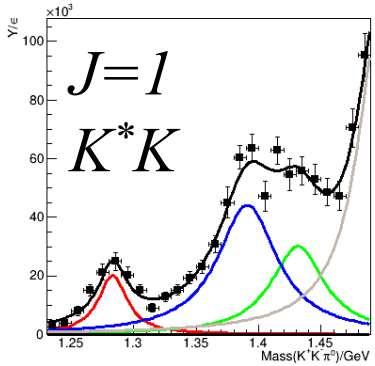






FAKE



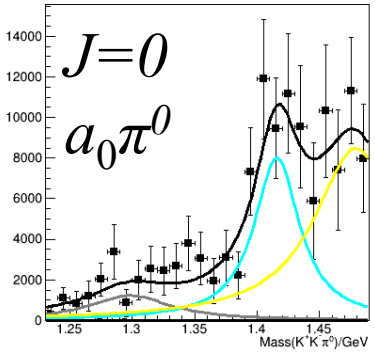


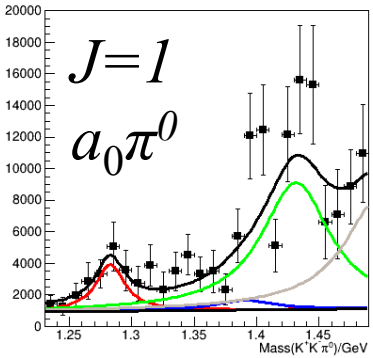
Note:

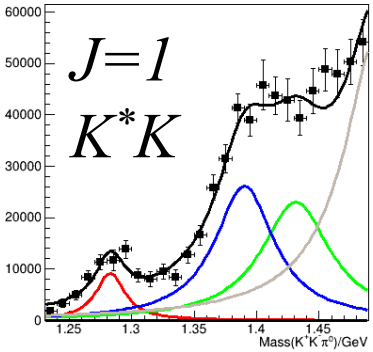
- $h_1 \rightarrow a_0\pi^0$ (**Blue**) was not generated

Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

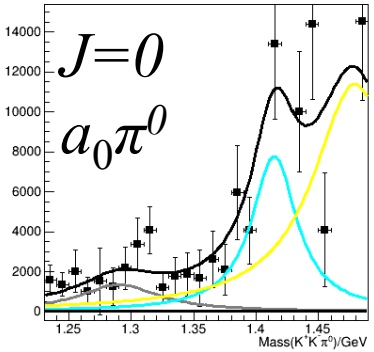
REAL

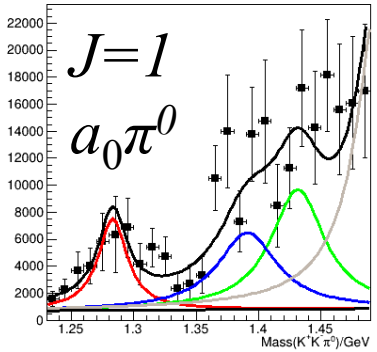


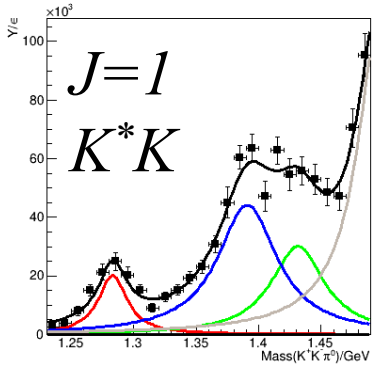




FAKE





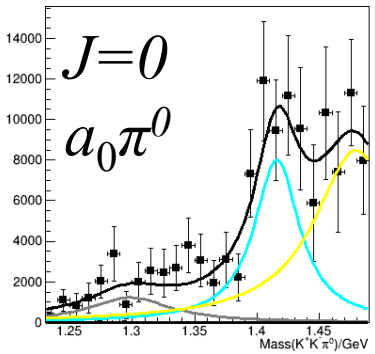


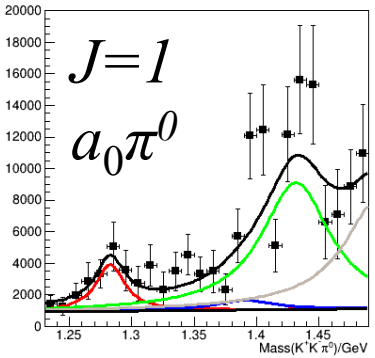
Note:

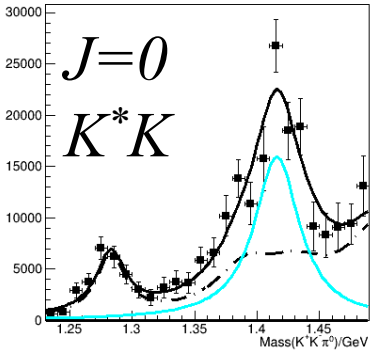
- $h_1 \rightarrow a_0\pi^0$ **[Blue]** was not generated
- $f_1(1285)$ [Gray] was not generated

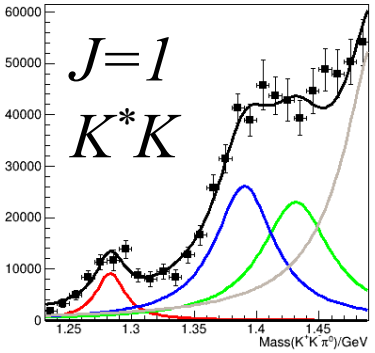
Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

REAL

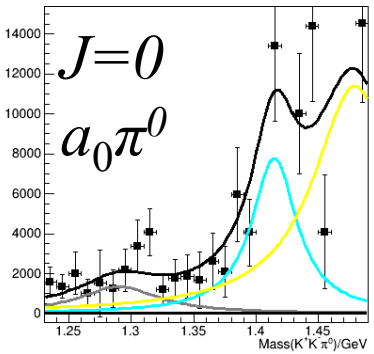


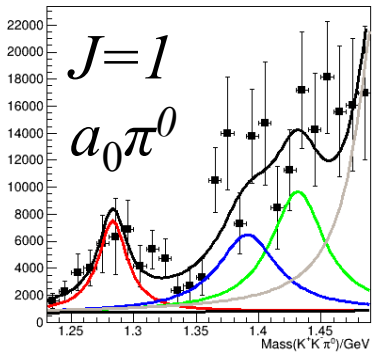


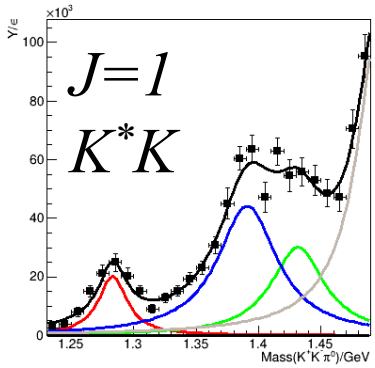




FAKE





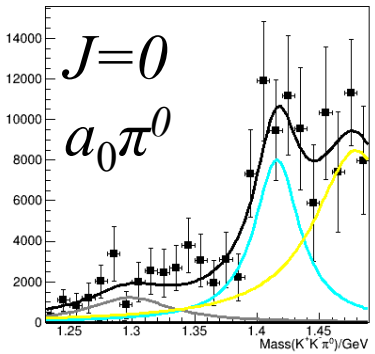


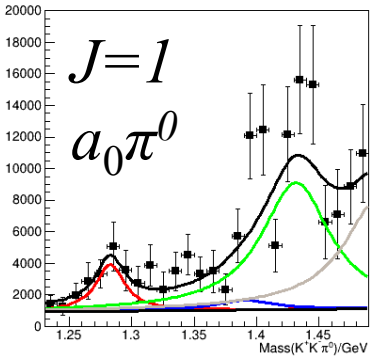
Note:

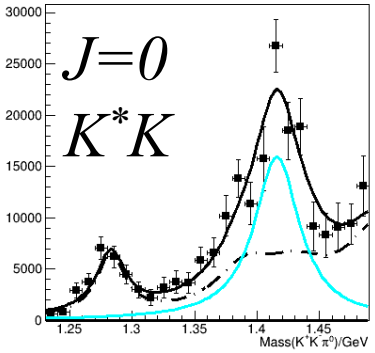
- $h_1 \rightarrow a_0\pi^0$ **[Blue]** was not generated
- $f_1(1285)$ [Gray] was not generated

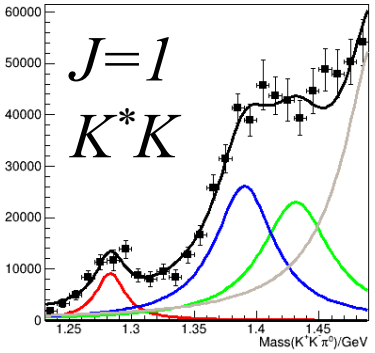
Comparison of Real to Fake: Mass[$K^+K^-\pi^0$]

REAL

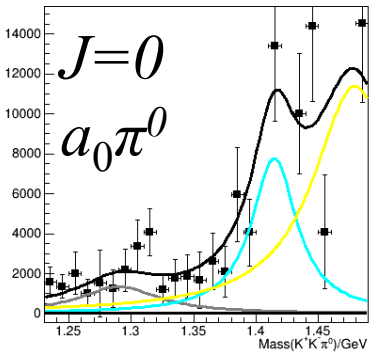


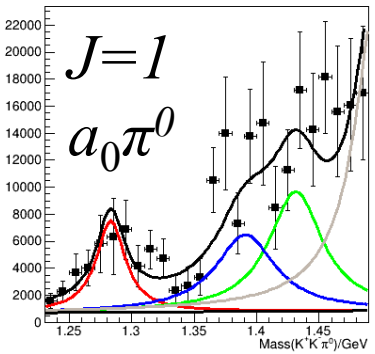


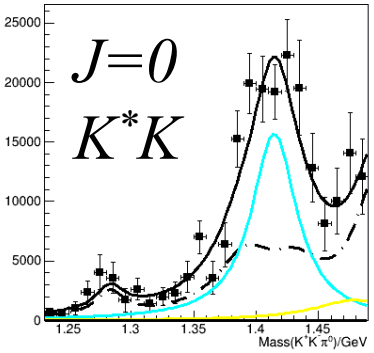


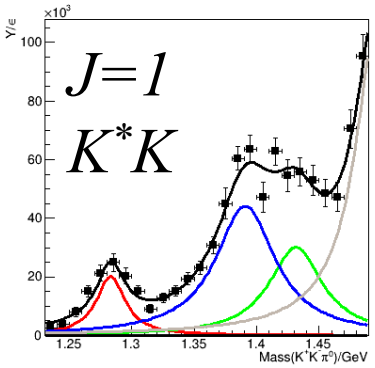


FAKE









Note:

- $h_1 \rightarrow a_0\pi^0$ **[Blue]** was not generated
- $f_1(1285)$ [Gray] was not generated
- Assumed leakage (dashed-dotted lines) looks similar ☺

Title