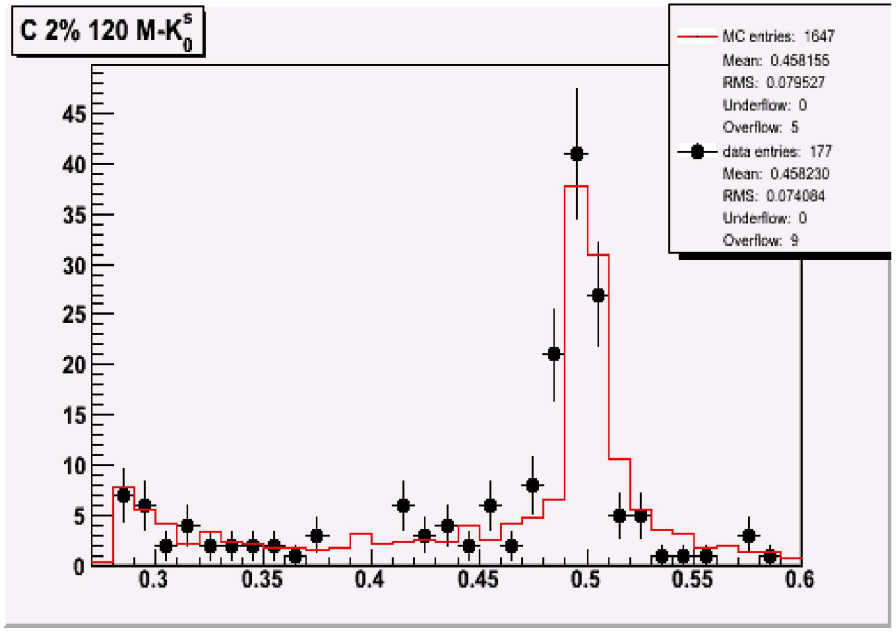
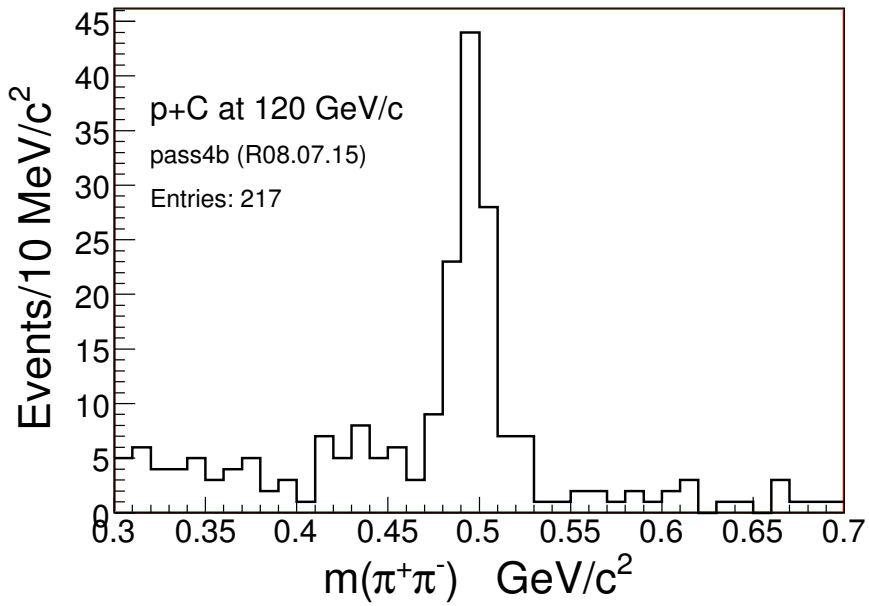
# comparing with K.L. result: update

Update the cut for secondary vertex position:

$Z_{Svtx} > Z_{Pvtx}$ (before) and $Z_{Svtx} > Z_{tgt}$ (now)

(after all cuts)
C 2% 120




9

21+41+27=89

23+44+28=95 (before: 69)

Left plot: KL presentation at Aug.8, 2008. right plot: My codes using pass4b data (from enstore) and R08.07.15

# comparing with K.L., continue

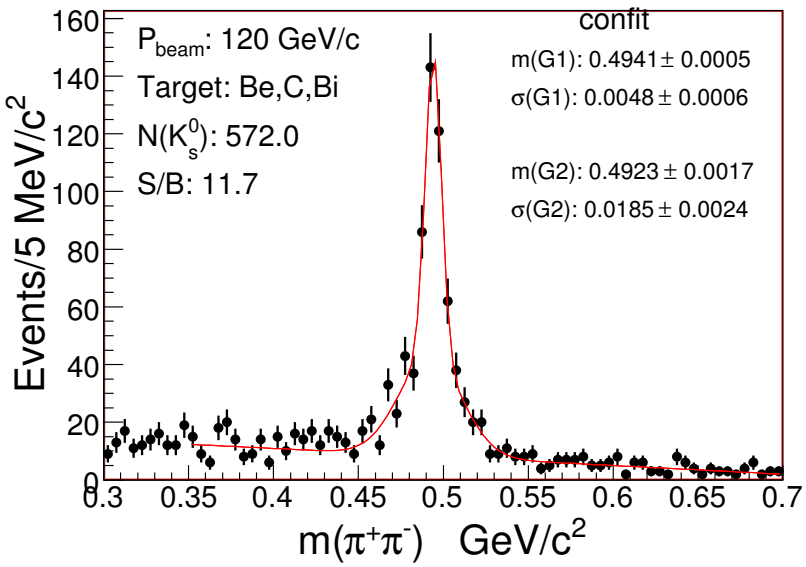
| Cut name | KL | TN |
|---|---|---|
| software release | R08.07.15 | R08.07.15 |
| evt$\rightarrow$NBTrk==1 | 401989 | 402678 |
| bm radius$<$1.2 | - | 391599 |
| Is primary vtx? | - | 238463 |
| nTrk in Pvtx $\geq$3 | 217194 | 211613 |
| goodness fit $\geq$0.05 | 173135 | - |
| gof$\geq$0.001+ nTPC$\geq$5 | - | 169977 |
| vtx position $\lvert X, Y \rvert$ $<$1 | 169862 | - |
| vtx XY rad$<$1.5 | | 169330 |
| -4$<$ $Z_{vtx}$ $<$6 | 160772 | 160201 |

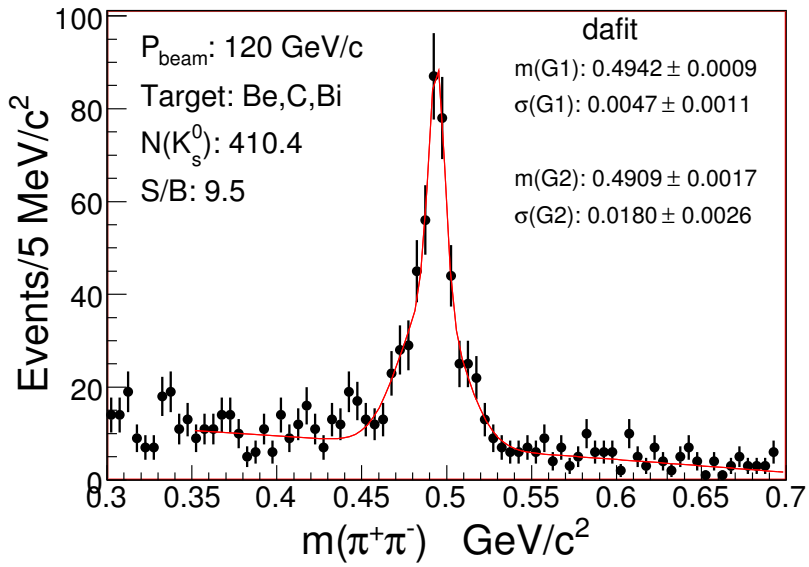
Table 1: Primary vertex selection

| Cut name | KL | TN-prev | TN-now |
|---|---|---|---|
| nTrk in S-vtx is 2 | 11180 | 11124 | 11124 |
| $Z_{Svtx} > Z_{Pvtx}$ | 9356 | 6612 | 9525 |
| Is q1 + q2 = 0 | 4559 | 3203 | 4615 |
| goodness fit $\geq$0.01 | 582 | - | |
| gof$\geq$0.001+ nTPC$\geq$10 | - | 274 | 395 |
| $p_T$ prim $<$0.15 | 373 | - | |
| $p_T(\pi^+\pi^-)$ $>$0.8 | 177 | 156 | 216 |

Table 2: Secondary vertex selection

# combined data from Be+C+Bi targets: update

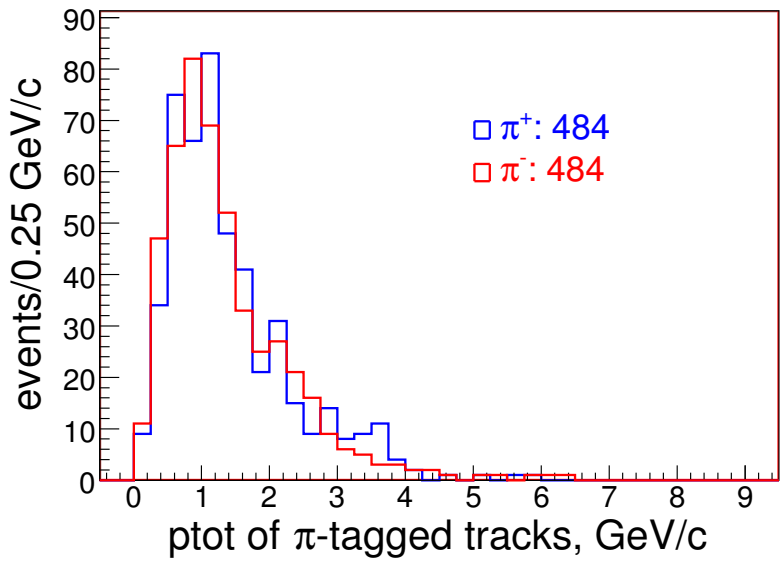


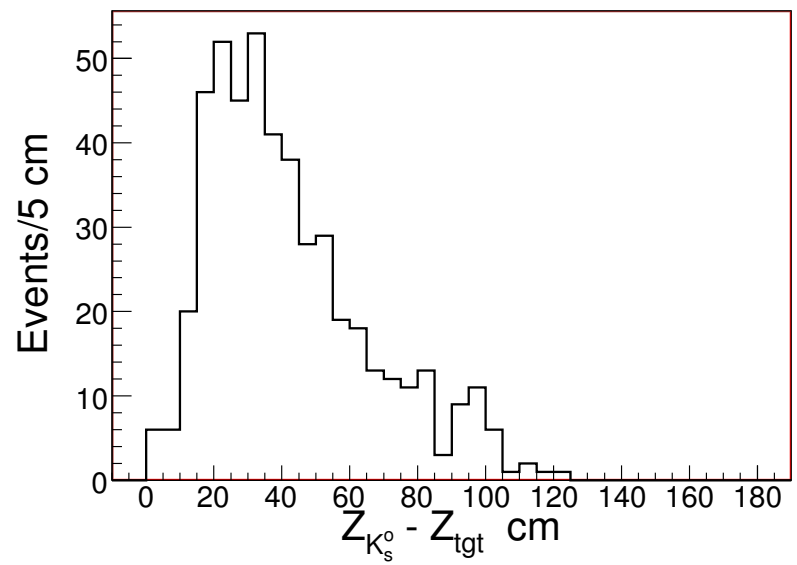




$K^o_s \rightarrow \pi^+\pi^-$ decay reconstruction with “confit” (left) and “dafit” (right) vertex methods.

Purity of selected pions from $K^o_s$ decays: 11.7/(1+11.7)=0.92

# $K_s^o \rightarrow \pi^+\pi^-$ decays, continue

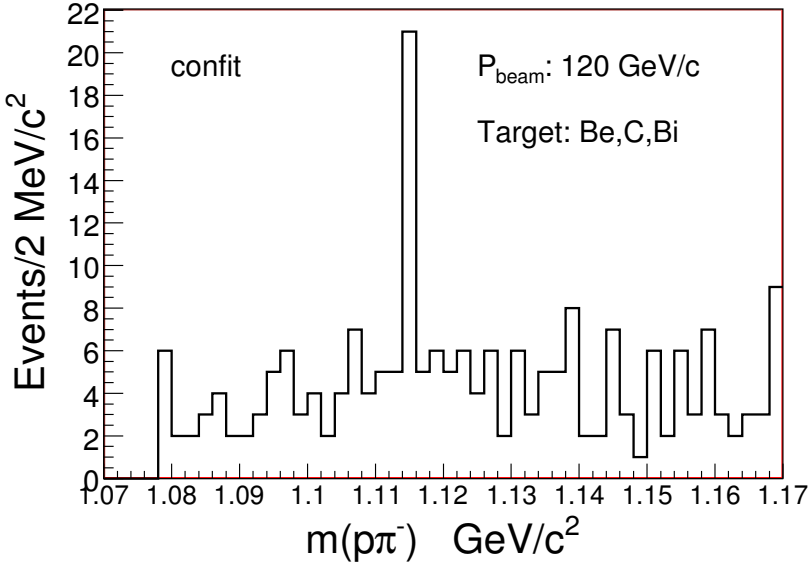


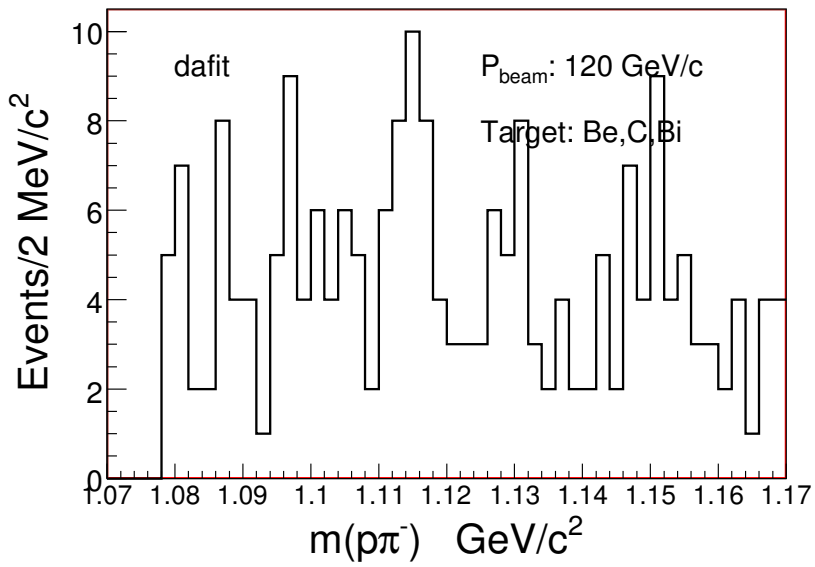




Momentum (left) of $\pi^+\pi^-$ pair tracks and they vertex Z positions (right).

Both plots are from $K_s^o$ mass peak within $\pm$15 MeV/c$^2$.

# $\Lambda^o \rightarrow p\pi^-$ decays: thin targets at 120 GeV/c

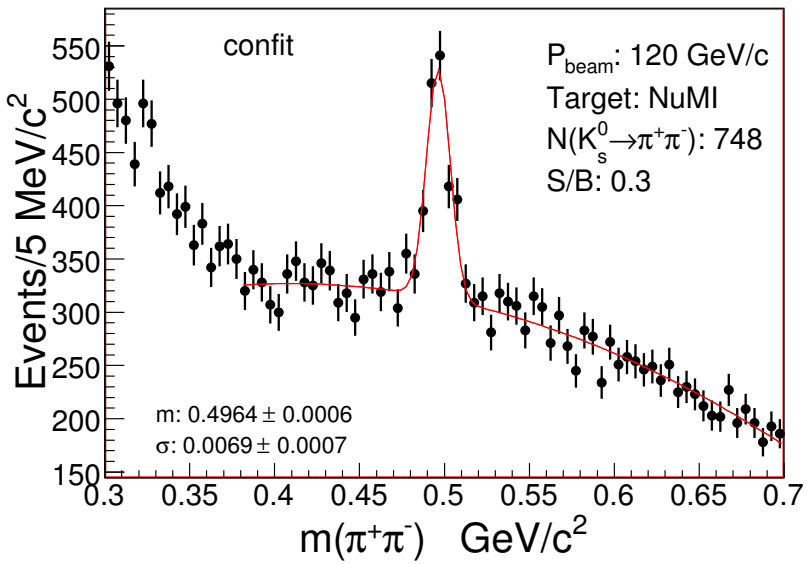


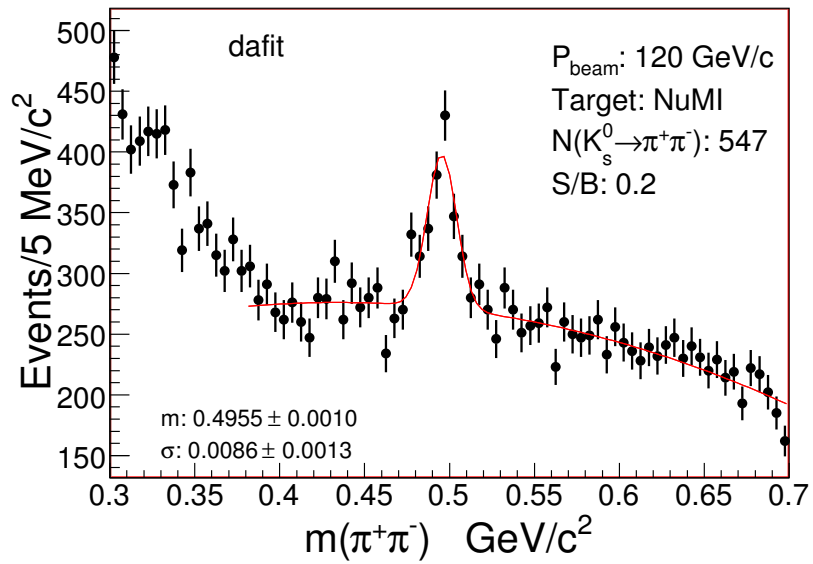




$\Lambda^o \rightarrow p\pi^-$ decay reconstruction with “confit” (left) and “dafit” (right)

# $K_s^o \rightarrow \pi^+\pi^-$ reco: NuMI target

For the long targets (e.g.:NuMI) the requirement for the primary vertex is unreasonable - so it dropped. As a result - high combinatoric background.



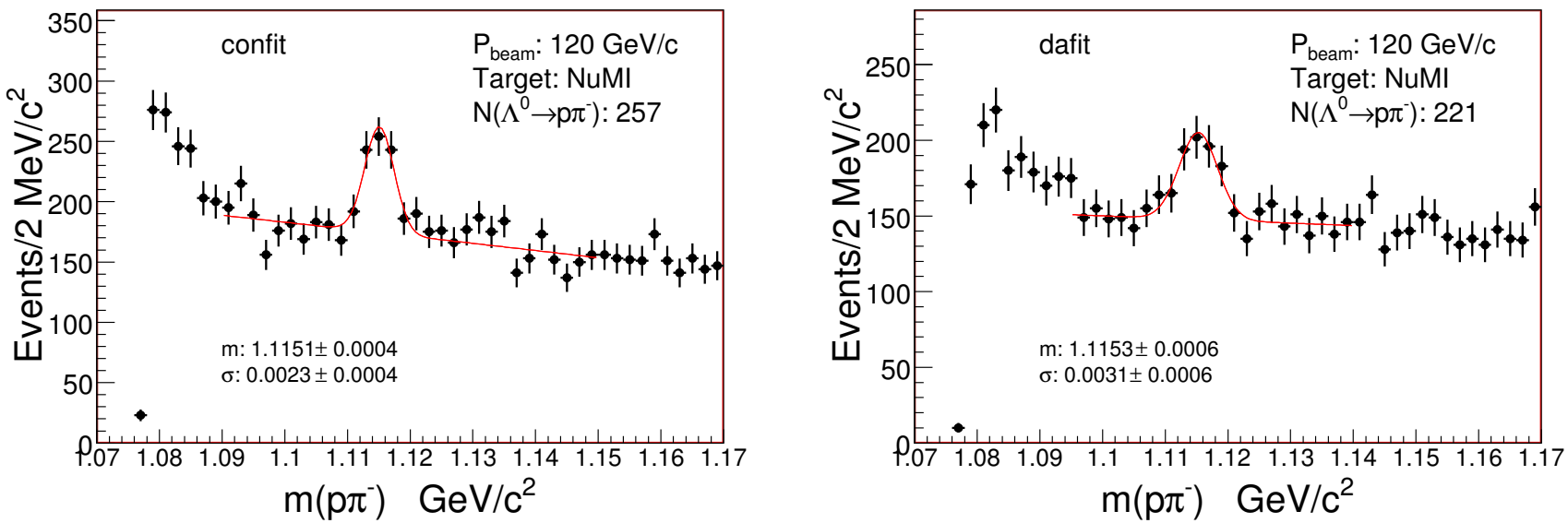




$K_s^o \rightarrow \pi^+\pi^-$ decay reconstruction with “confit” (left) and “dafit” (right) vertex methods.

m($K_s^o$) PDG: 0.4976 GeV/c$^2$

# $\Lambda^o \longrightarrow p\pi^-$ reco: NuMI target

For the long targets (e.g.:NuMI) the requirement for the primary vertex is unreasonable - so it dropped. As a result - high combinatoric background.




$\Lambda^o \longrightarrow p\pi^-$ decay reconstruction with “confit” (left) and “dafit” (right)

m($\Lambda^o$) PDG: 1.11568 GeV/c$^2$

back-up slides

# $K_s^o$ selection: thin targets

| Cut name | Value | comments |
|---|---|---|
| evt→NBTrk | 1 | number of beam tracks |
| Radius (XY) | <1.2 cm | relative to center of tgt |

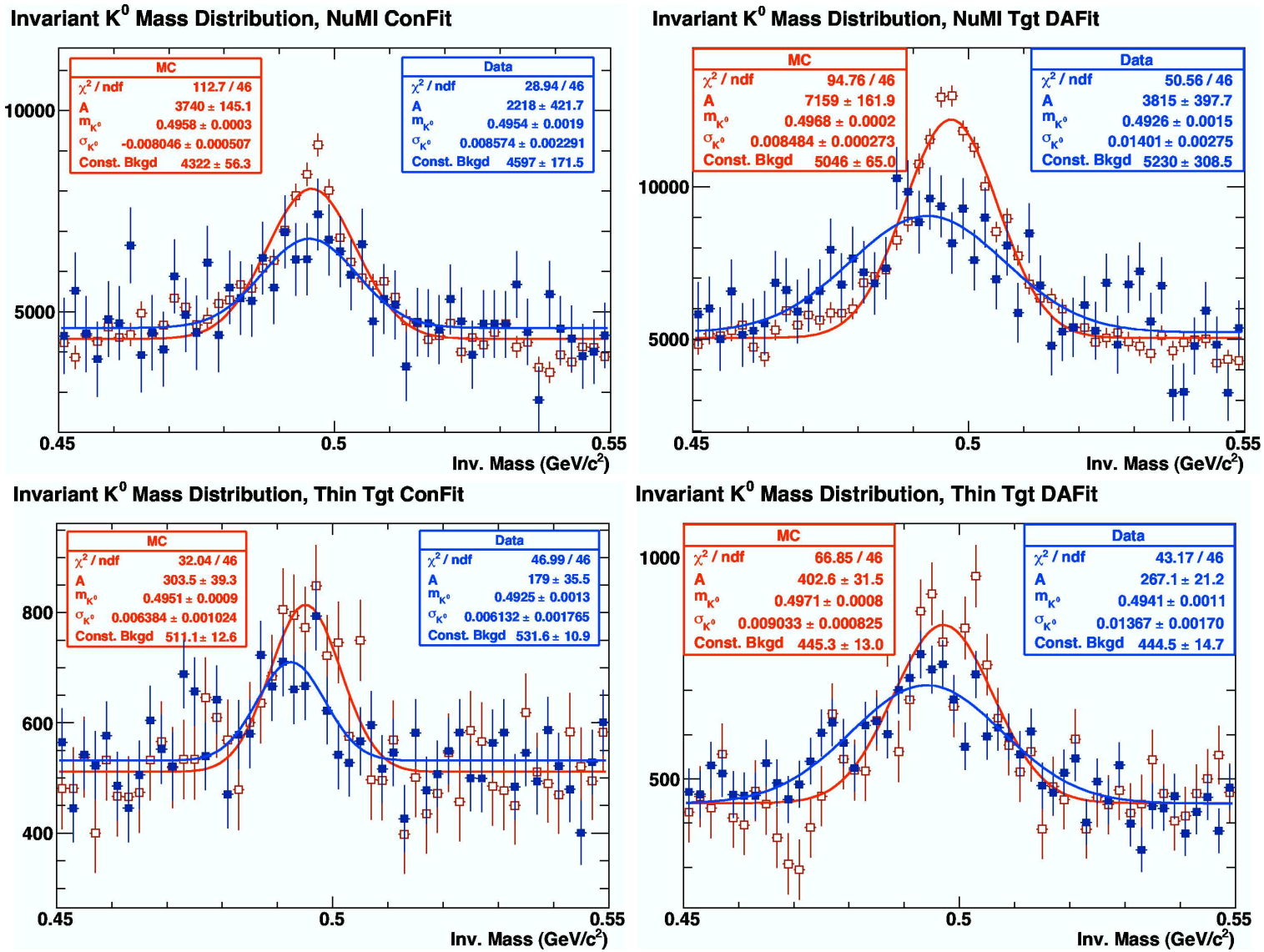
Table 3: Beam track selection

| Cut name | Value | comments |
|---|---|---|
| vtx→vtxtype | 1 | select the primary vertex |
| vtx→ntrk | ≥3 (as KL) | no.of trks per primary vtx |
| trk→ntpchit | ≥5 | no.of TPC hits |
| trk→gof | ≥0.001 | goodness of fit |
| vtx XY radius | <1.5 cm | relative to center of tgt |
| vtx Z pos | -4< $Z$ <6 cm | relative to center of tgt |

Table 4: Primary vertex and its track selections

| Cut name | Value | comments |
|---|---|---|
| vtx→vtxtype | 2 | select the sec. vertex |
| vtx→ntrk | 2 | no.of trks per sec. vtx |
| $Z_{sec}$ | $Z_{sec} > Z_p$ | sec. vtx downstream |
| trk→ntpchit | ≥10 | no.of TPC hits |
| $q_1 + q_2$ | 0 | opposite sign pair |
| $p_T(K_s^o)$ | ≥0.01 GeV/c | |
| $p_{tot}(K_s^o)$ | ≥0.8 GeV/c | same as K.Ludwick |

Table 5: Secondary vertex and its track selections

# Jon's $K_s^o$ reco plots

Top: NuMI target, bottom: thin targets. Left: confit, right: dafit