

# Current Status

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# To summarize my analysis

- Items for cross section calculation
  - List up for parameters.
  - Check in detail for CDC efficiency.
- ~~$d(K^-, n)''X''$  shift in MC~~  
due to treatment of forward neutron analysis.
- Detector resolutions

CDC →  $K^0$  peak. → Estimated by Run68 MC sim.  
NC →  $d(K^-, n\pi^+\pi^-)''X'', d(K^-, n\pi^+)''X'', d(K^-, n\pi^-)''X''$ .  
 $\sigma 150ps \sim 200ps$   $\sigma = 160ps, 170ps$  files was made,  
fitting was not finished.
- Background from  $d(K^-, n\pi^-\pi^+)''X''$  tails
  - Systematic study for  $d(K^-, n\pi^+\pi^-)''X''$  gate.  
 $\sigma = 3.0$ (almost same default),  $\sigma = 2.5$ ,  $\sigma = 2.0$  analysis was finished.
- Summarize my analysis.
  - NC performance check (run and seg dependence).

# Scaling Factor

- Luminosity

$$L = N_{beam} N_{target} \text{Eff}_{DAQ} \text{Eff}_{Trigger}$$

$$N_{target} = I(10\text{cm}) \times \rho(0.169\text{g/cm}^3) \times N_A / N_d$$

$N_{beam} N_{DAQ} N_{trigger}$  were estimated run-by-run.

- Neutron Efficiency

$\text{Eff}_{NC} = 0.317 \pm 0.016$  by  $K^- d \rightarrow K^0 n$  reaction (RUN62)

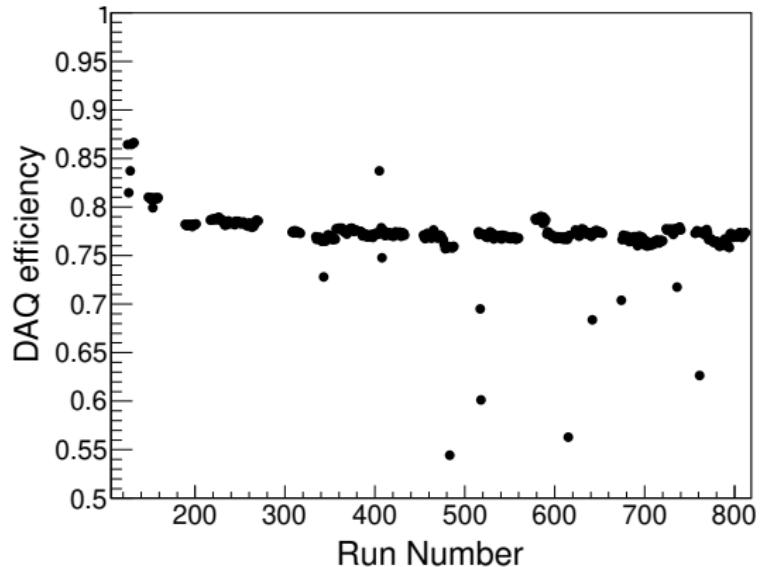
$\text{Overkill}_{CVC \cup PC} = 0.081 \pm 0.007$  (RUN78)

- CDC efficiency

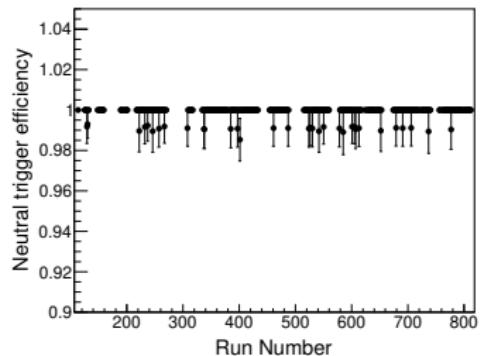
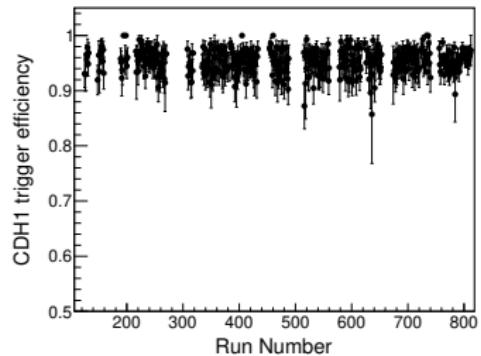
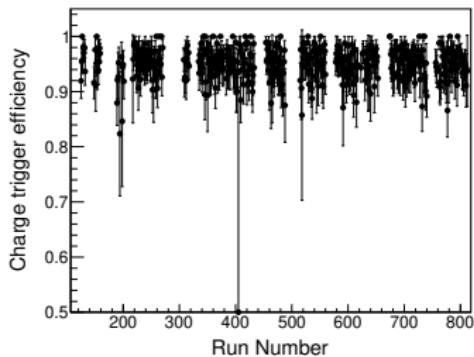
RUN68 IH and CDH was used as trigger counters  $\sim 0.977 \pm 0.004$

RUN78 was estimated from the value that CDC layer1 was used instead of IH.

# DAQ efficiency

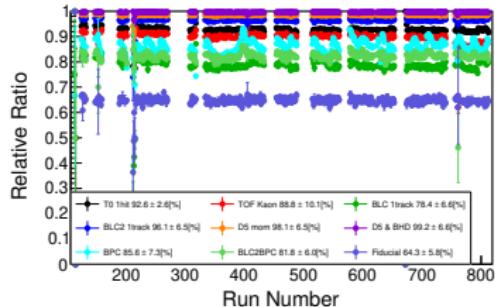


$$d(K^-, n) = \text{Neutral} \otimes \text{CDH1}$$
$$d(K^-, p) = \text{Charge} \otimes \text{CDH1}$$

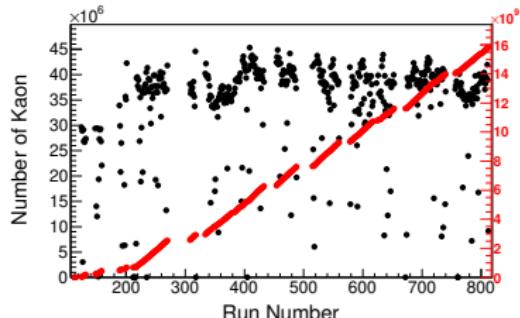


# Kaon Number

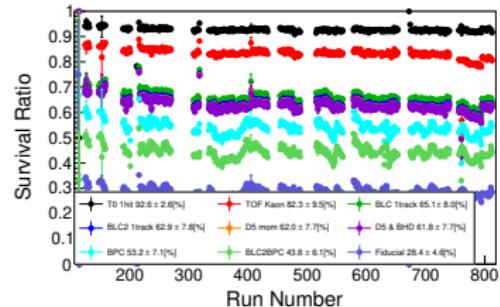
## Relative Ratio



## Irradiated Kaon Number

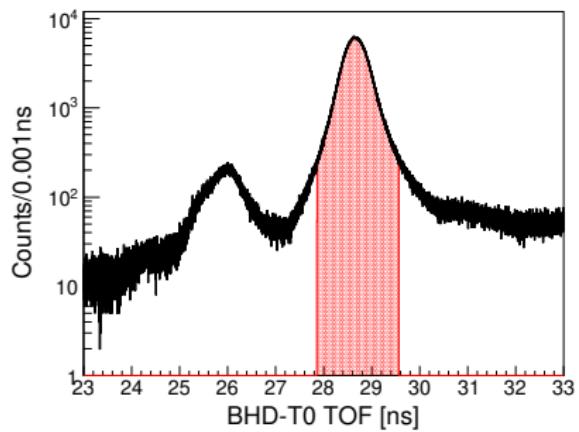
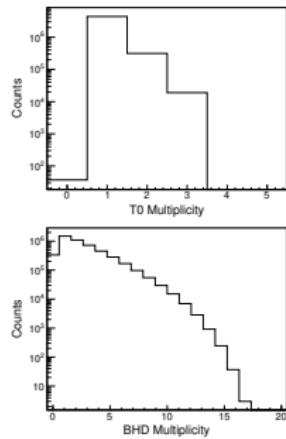


## Survival Ratio

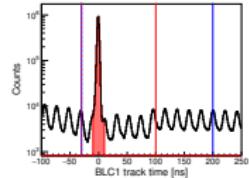


$15.8 \pm 0.3$  G kaon were irradiated on liquid-deuterium target.

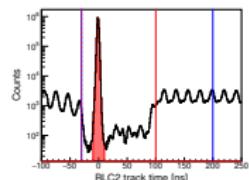
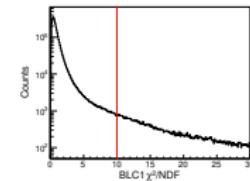
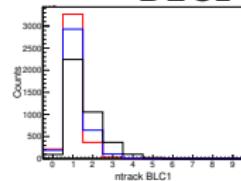
# BHD-T0 analysis



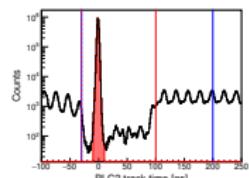
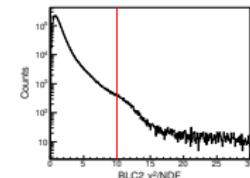
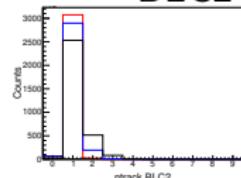
# BLC1 and BLC2



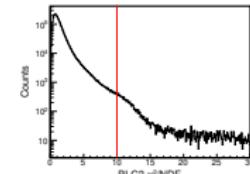
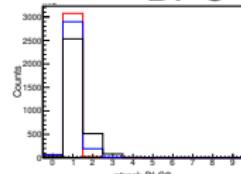
BLC1



BLC2

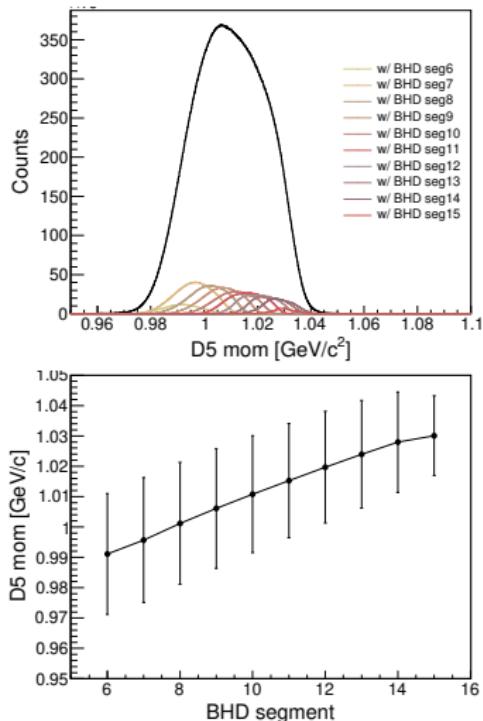


BPC



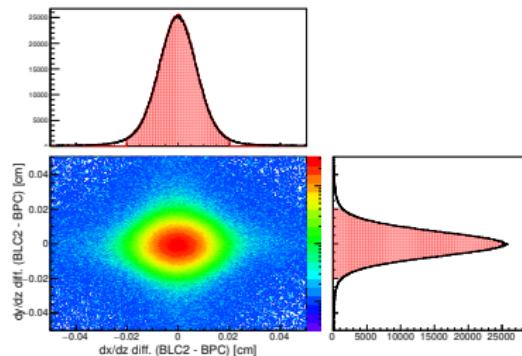
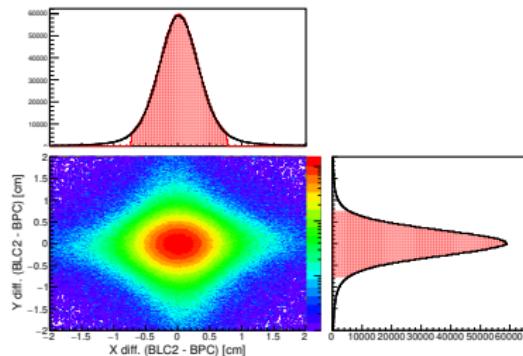
BLC was selected  $-30 \sim 100$  time window.  
BLC  $\chi^2/\text{NDF} < 10$  was selected.

# Beam momentum analysis by D5



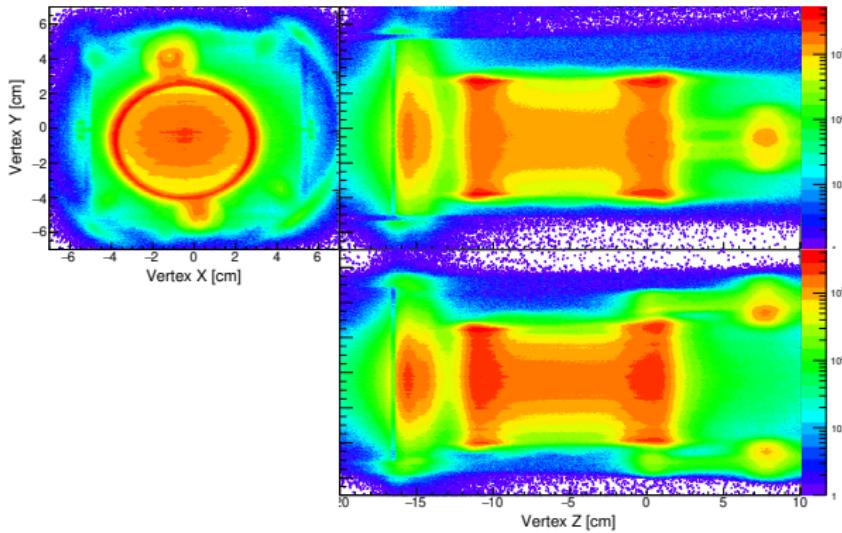
D5 momentum has a correlation about BHD segment.

# BLC2 and BPC connection

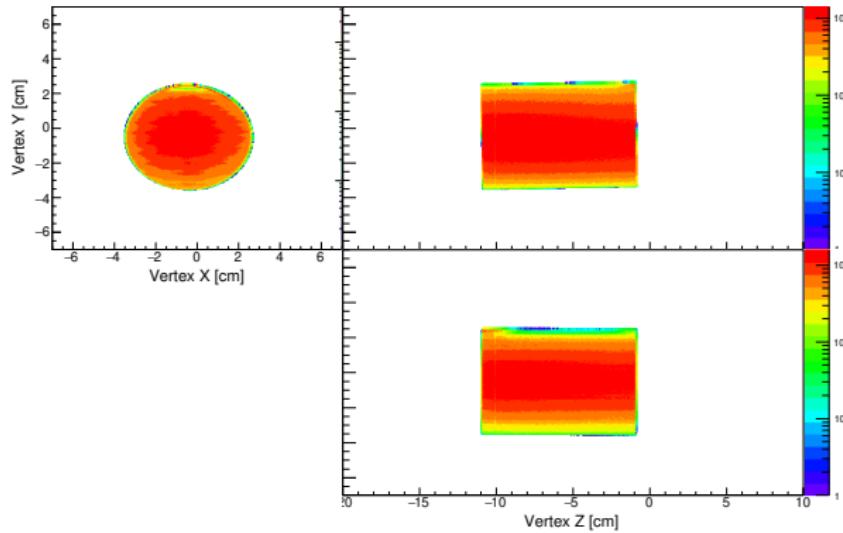


BLC2 and BPC position was connected at center of both.

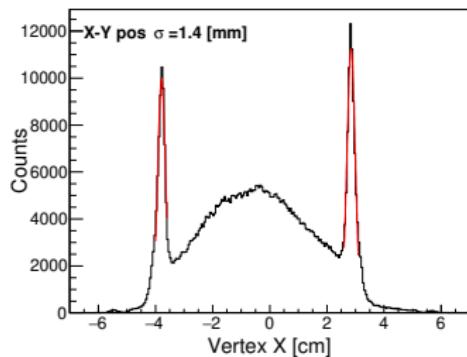
# Vertex image by CDS and BPC



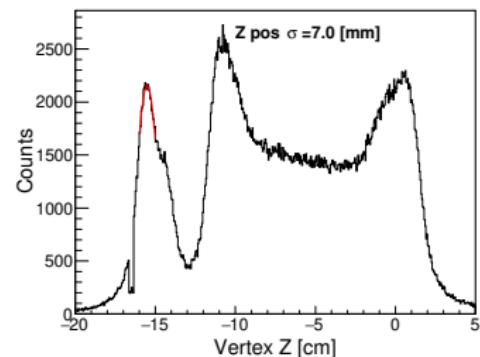
# Vertex image by CDS and BPC (Vertex cut)



# Vertex resolution

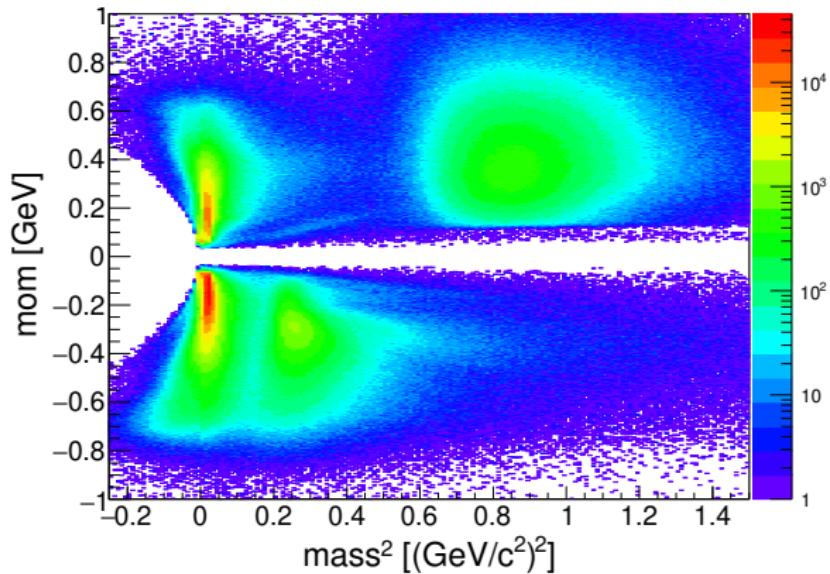


Y range was selected  
 $-5.5 \sim -5$  [mm]

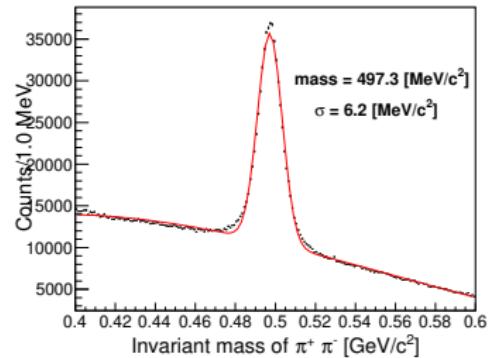
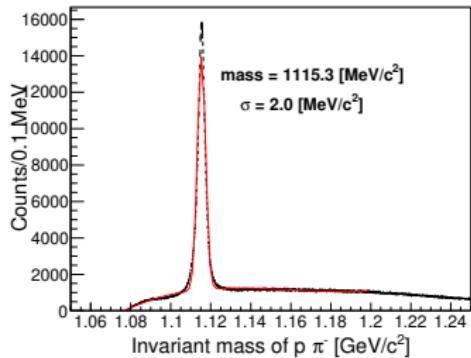


$Z = 0$  was selected [mm]  
resolution was evaluated by DEF.

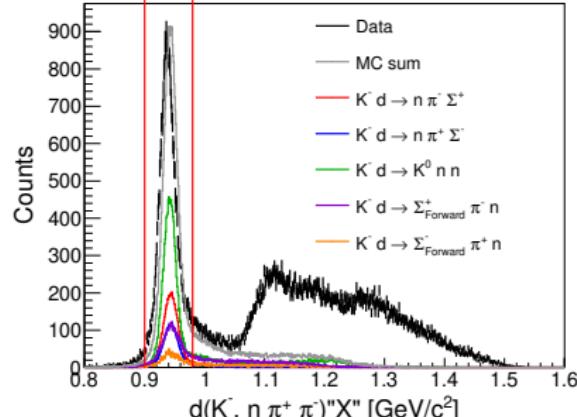
# CDS mass<sup>2</sup> vs momentum



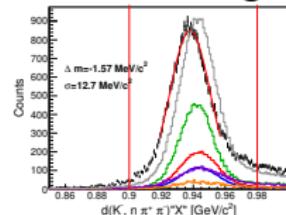
# Invaraint mass by CDS



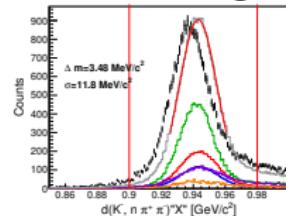
# $d(K^-, n\pi^+\pi^-)''X''$ data and MC (MC shifted)



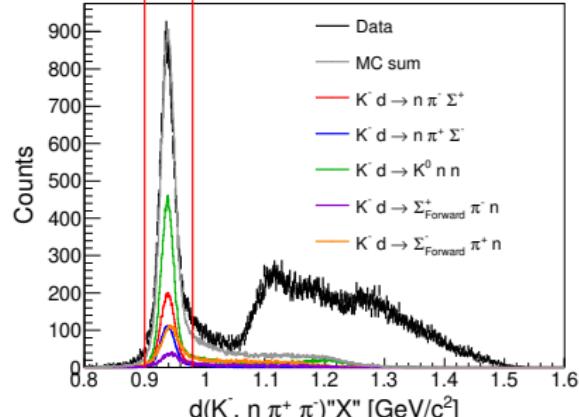
Data fitting



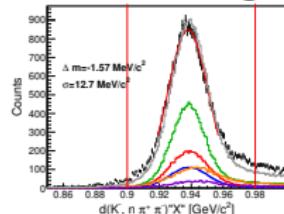
MC fitting



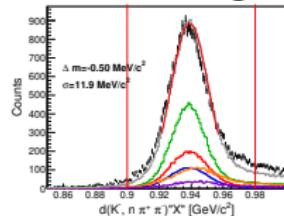
# $d(K^-, n\pi^+\pi^-)''X''$ data and MC (NC $\sigma = 150ps$ )



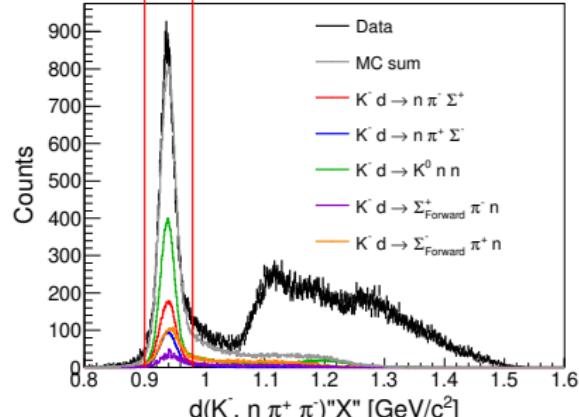
Data fitting



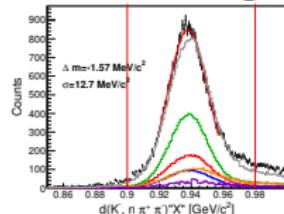
MC fitting



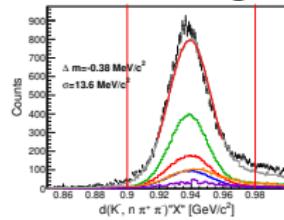
# $d(K^-, n\pi^+\pi^-)''X''$ data and MC (NC $\sigma = 200ps$ )



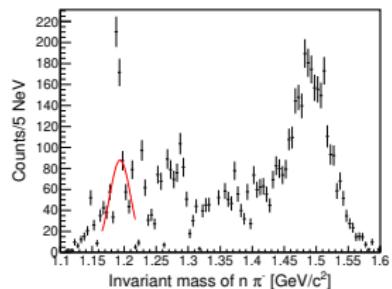
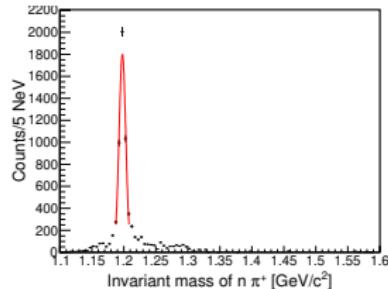
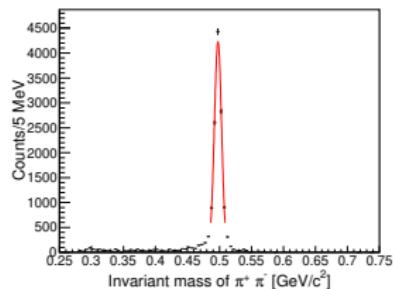
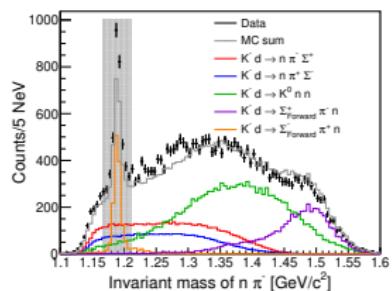
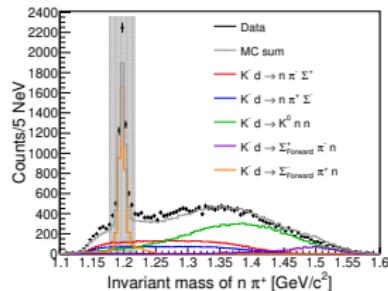
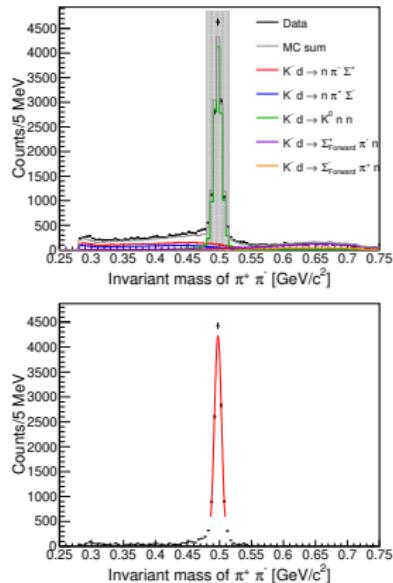
Data fitting



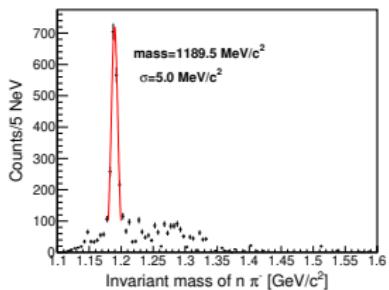
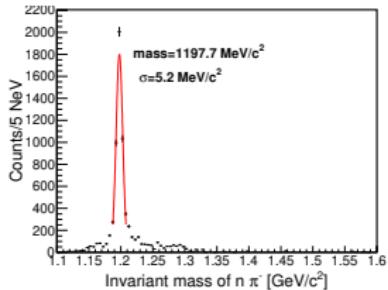
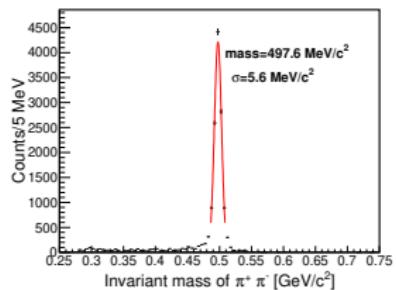
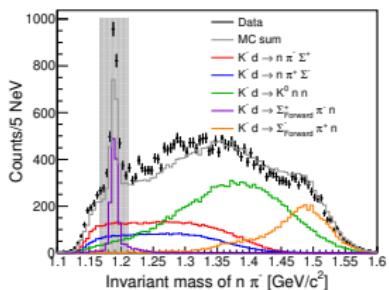
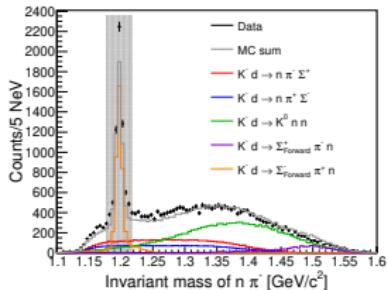
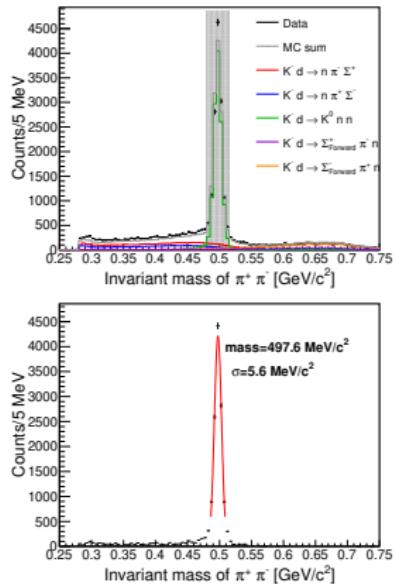
MC fitting



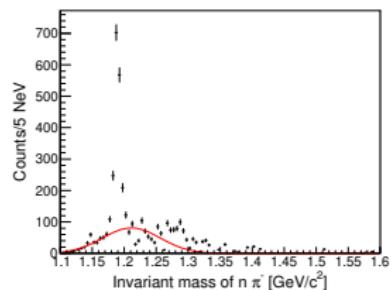
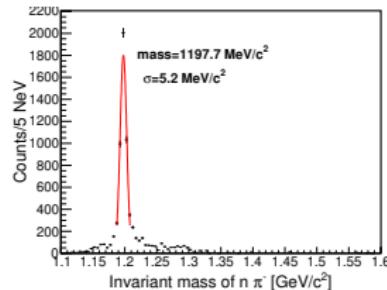
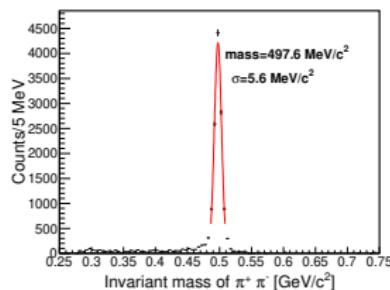
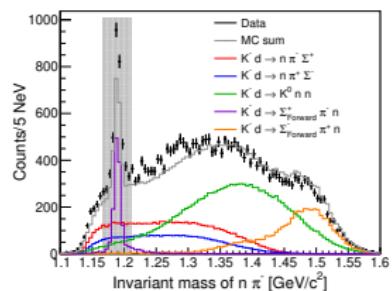
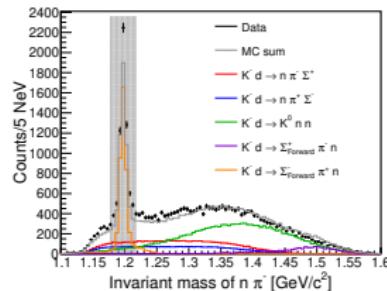
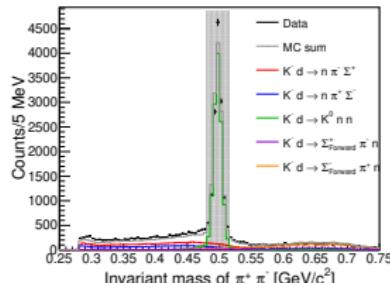
# Fitting of invariant masses (MC shifted)



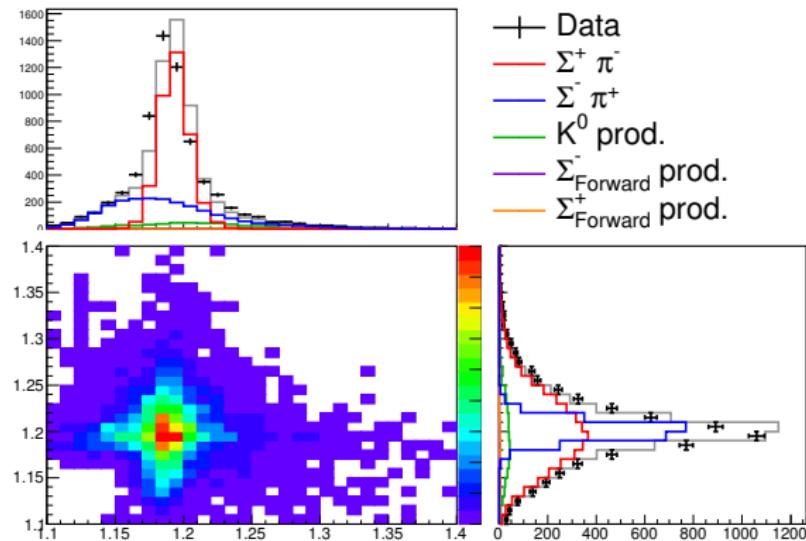
# Fitting of invariant masses



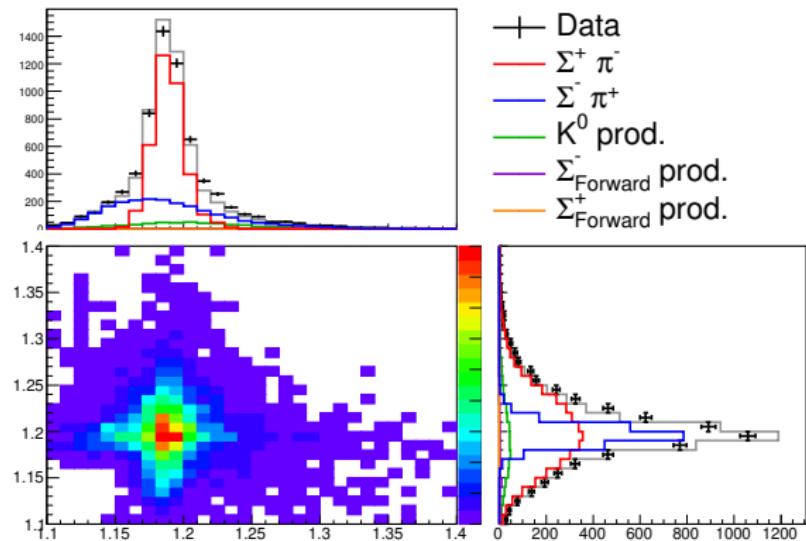
# Fitting of invariant masses (NC $\sigma = 200\text{ps}$ )



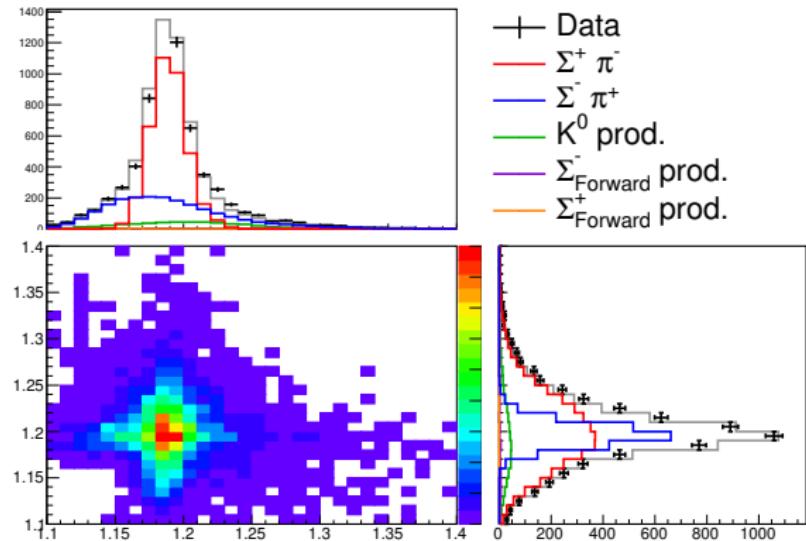
# Template Fittig (All result summed) (MC shifted)



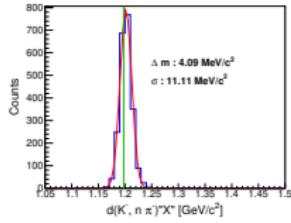
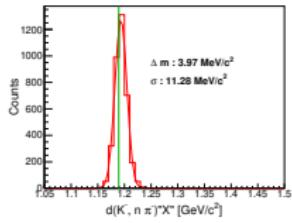
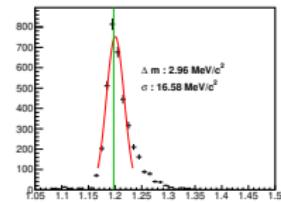
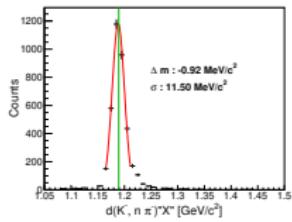
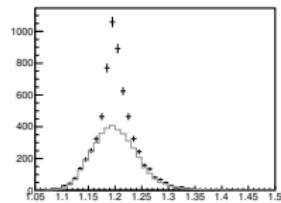
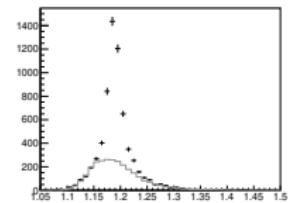
# Template Fittig (All result summed) (NC $\sigma = 150ps$ )



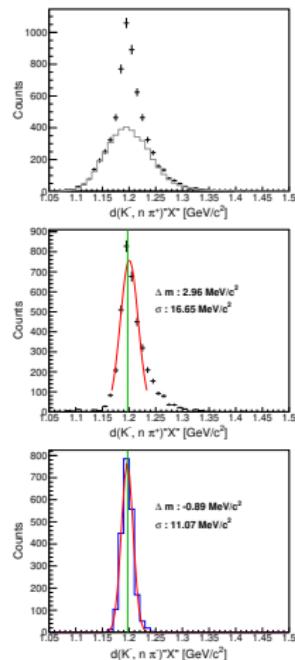
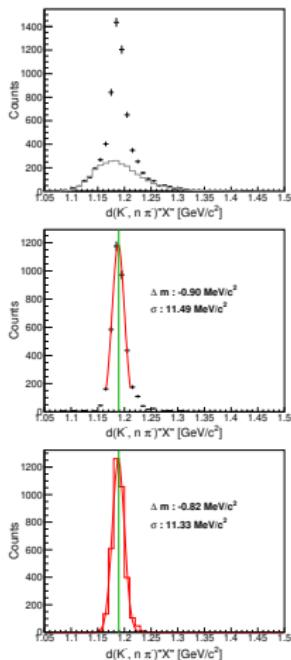
# Template Fittig (All result summed) (NC $\sigma = 200ps$ )



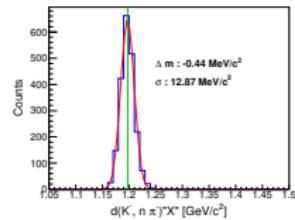
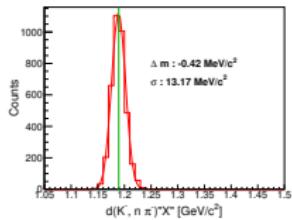
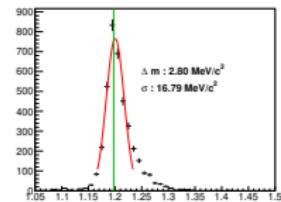
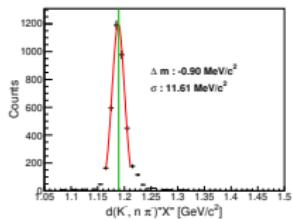
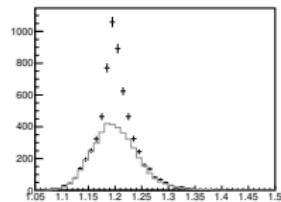
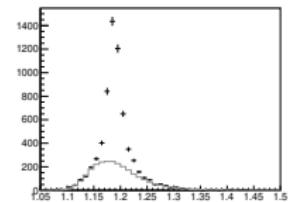
# $d(K^-, n\pi)''\Sigma''$ Fitting (MC shifted)



# $d(K^-, n\pi)^*\Sigma^*$ Fitting (NC $\sigma = 150\text{ps}$ )

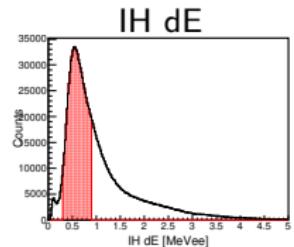
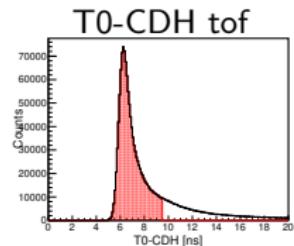
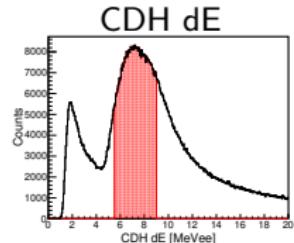
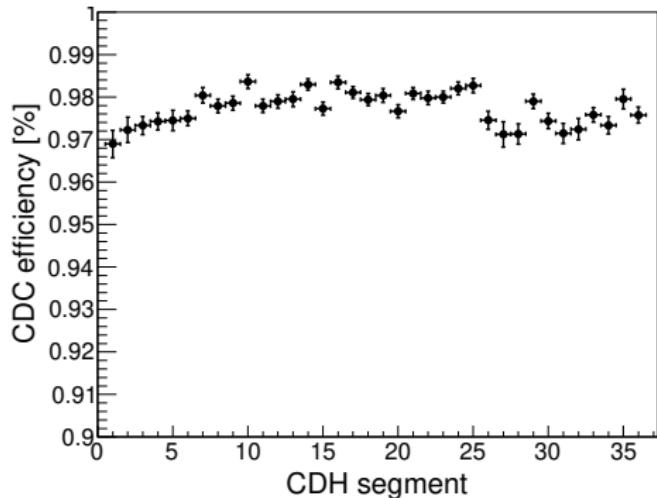


# $d(K^-, n\pi)''\Sigma''$ Fitting (NC $\sigma = 200ps$ )



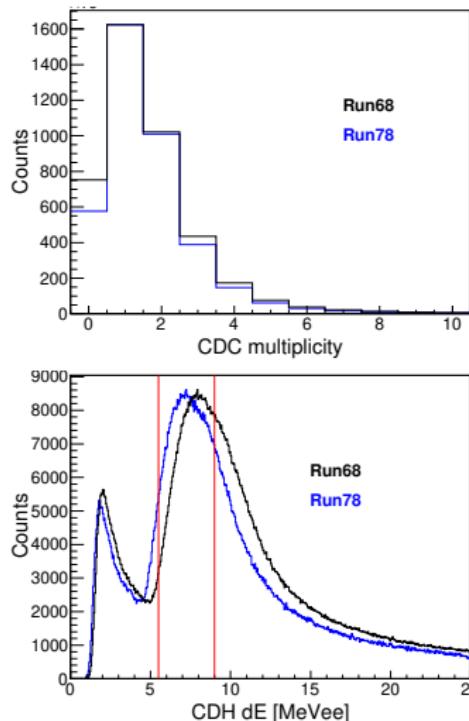
Back up

# CDC efficiency (RUN68) using CDH and IH

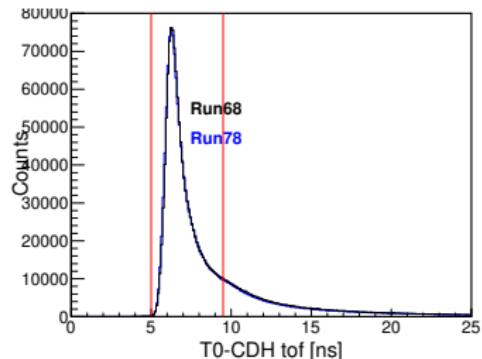


Trigger Counters used IH and CDH.

# Trigger event for RUN78

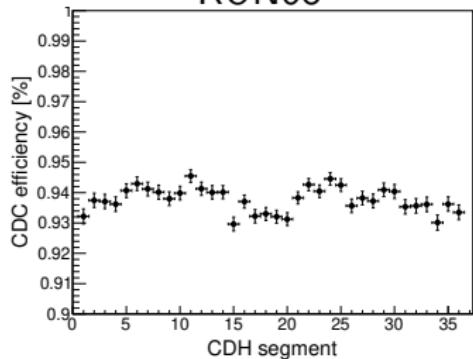


Red Lines indicate trigger event selection.  
CDC layer1 is selected only 1hit.  
CDH dE is a bit shifted.  
→ Selection range shuld be tuned.

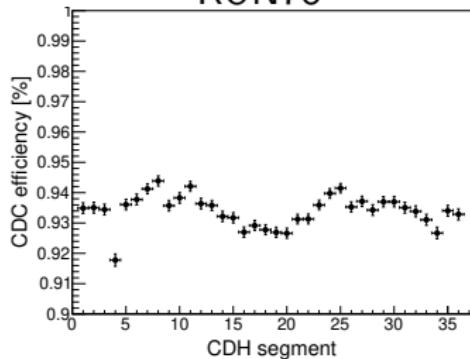


# CDC efficiency (CDC lay1 trigger)

RUN68



RUN78



$93.8 \pm 0.4\%$

$93.4 \pm 0.5\%$

Almost consistent with RUN68 & RUN78.  
Trigger condition has not tuned very fine.