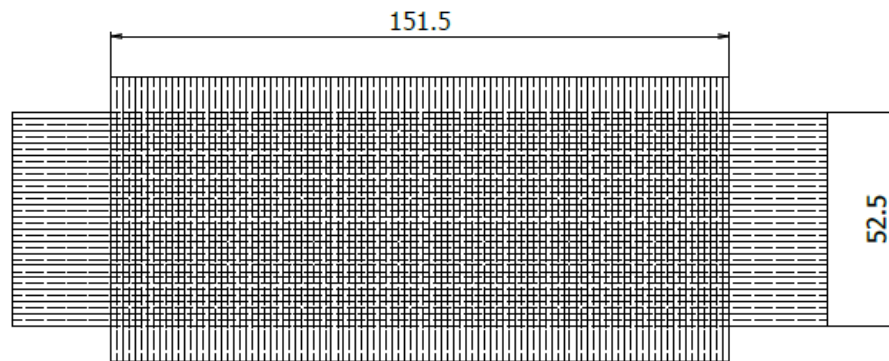


# Fiber target simulation for S-2S experiment

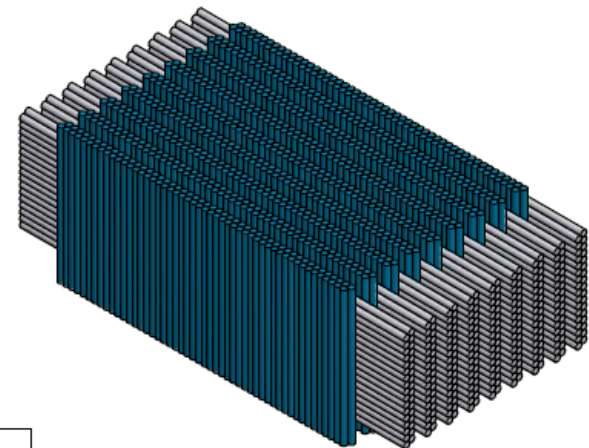
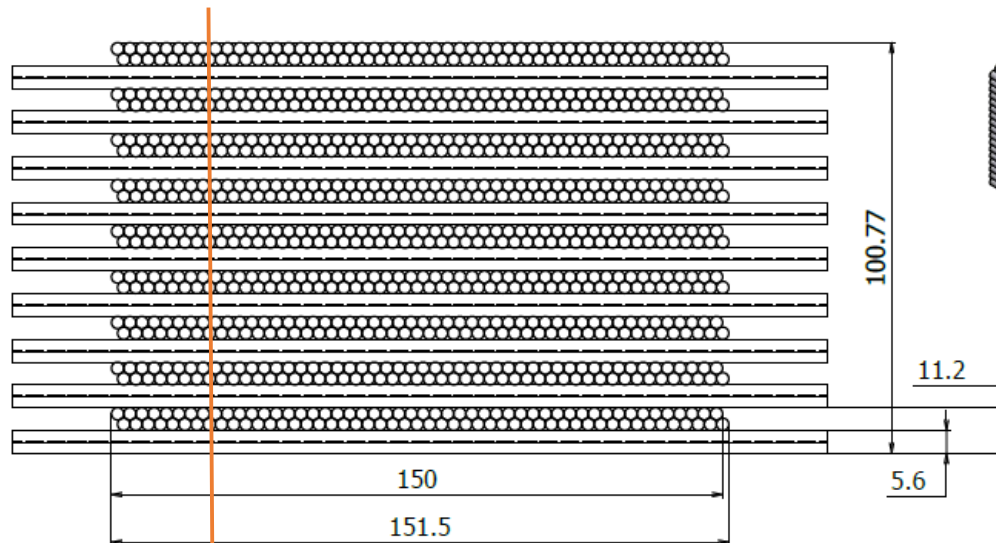
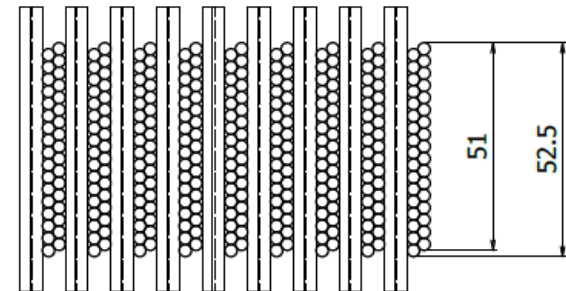
Toshiyuki Gogami

2015/10/15

# Setup in the simulation

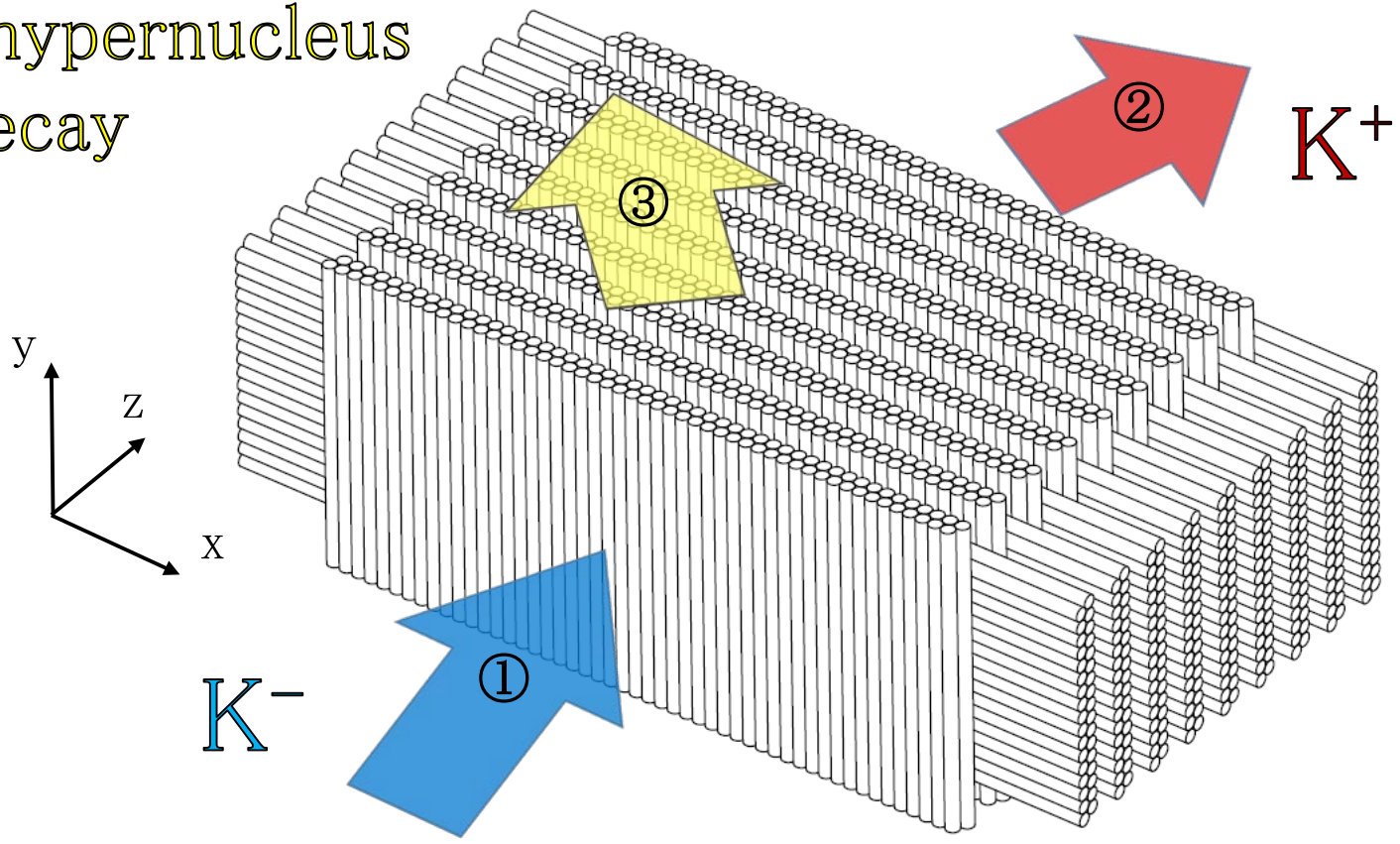


SIDE view

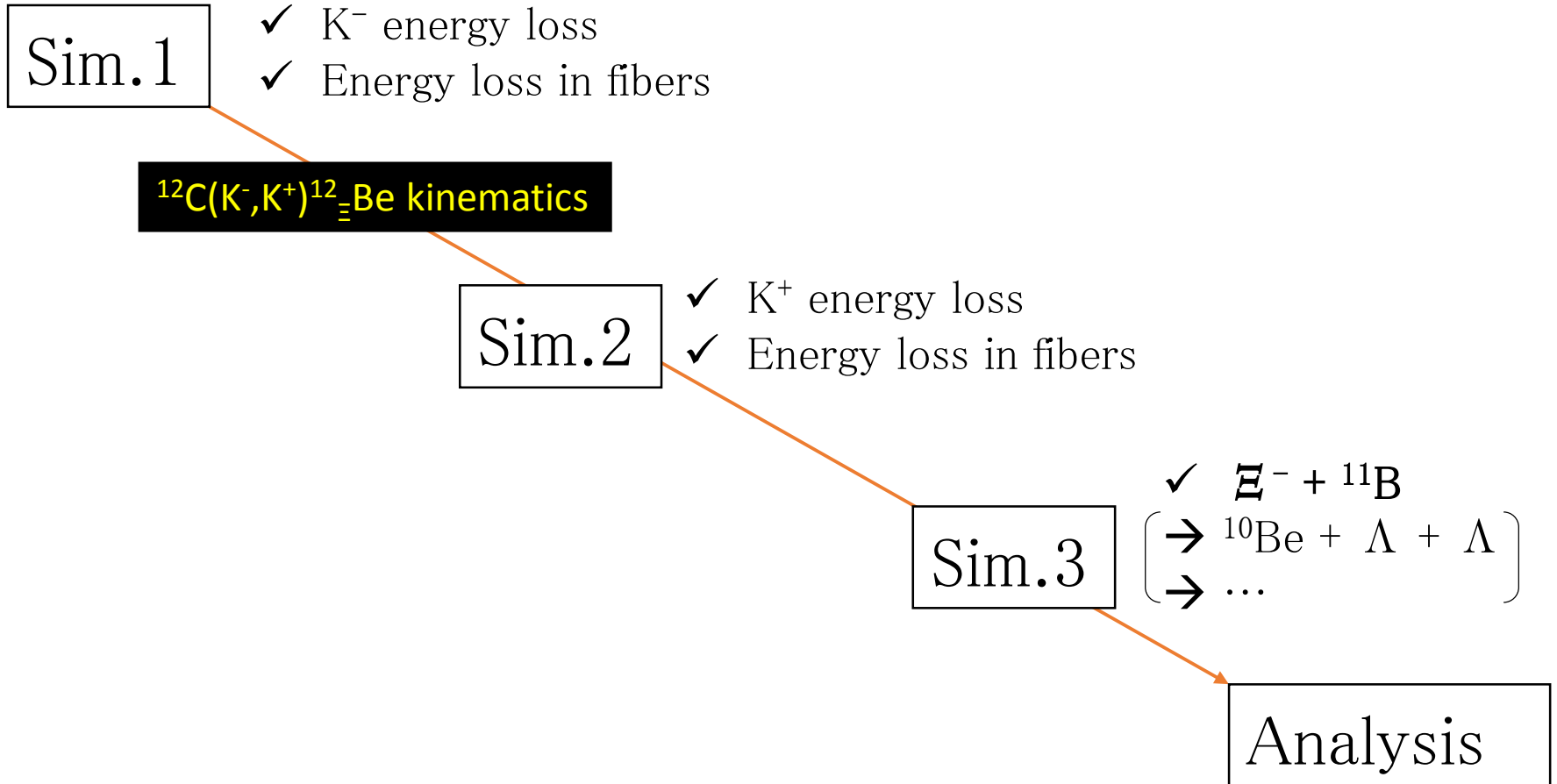


# Geant4 Monte Carlo Simulation

$\Xi^-$  hypernucleus  
→ Decay



# Simulation Flow



# Assumptions in the simulation

## Assumption

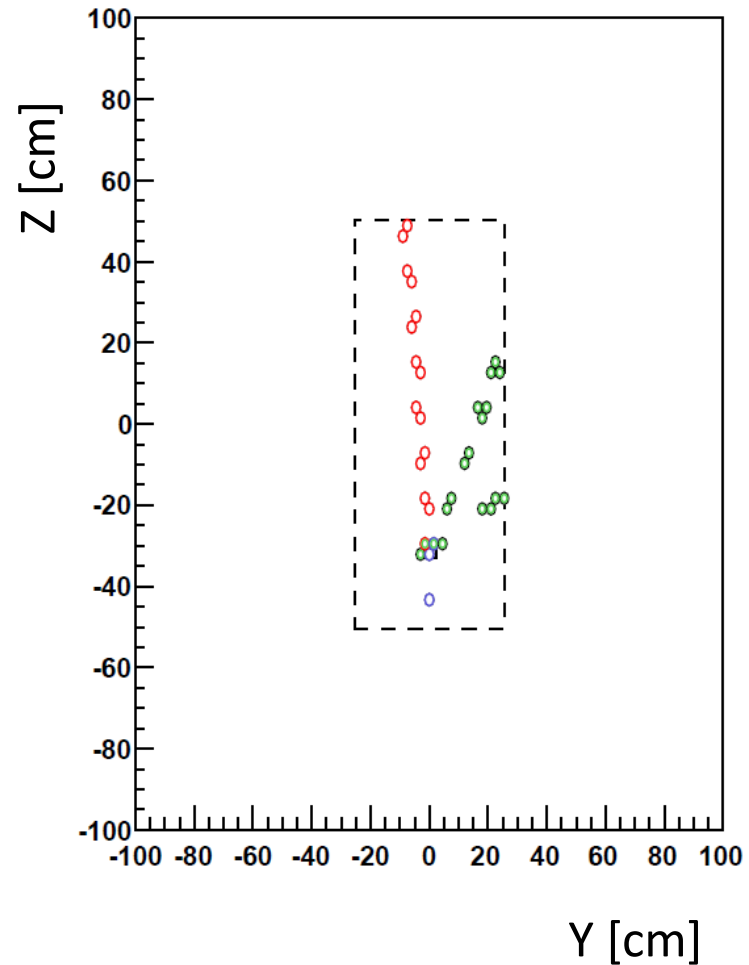
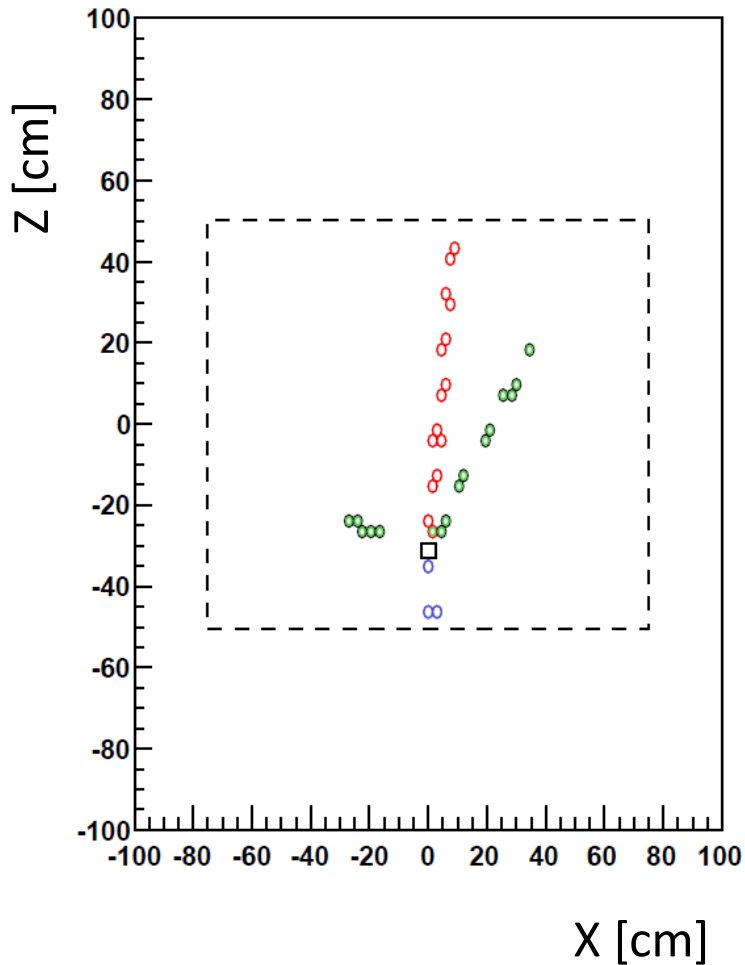
- $p_{\{K^-\}}$ : 1.8 GeV/c
- Incident  $K^-$  angle: 0 deg
- $\Xi$  production point: Random in z-axis, but zero for x and y
- $\Delta p/p$  for  $K^-$ :  $10.0E^{-4}$
- $\Delta p/p$  for  $K^+$ :  $5.0E^{-4}$

# Event display (1)

Blue:  $K^-$  related

Red:  $K^+$  related

Black + Green: Xi hyp. related.

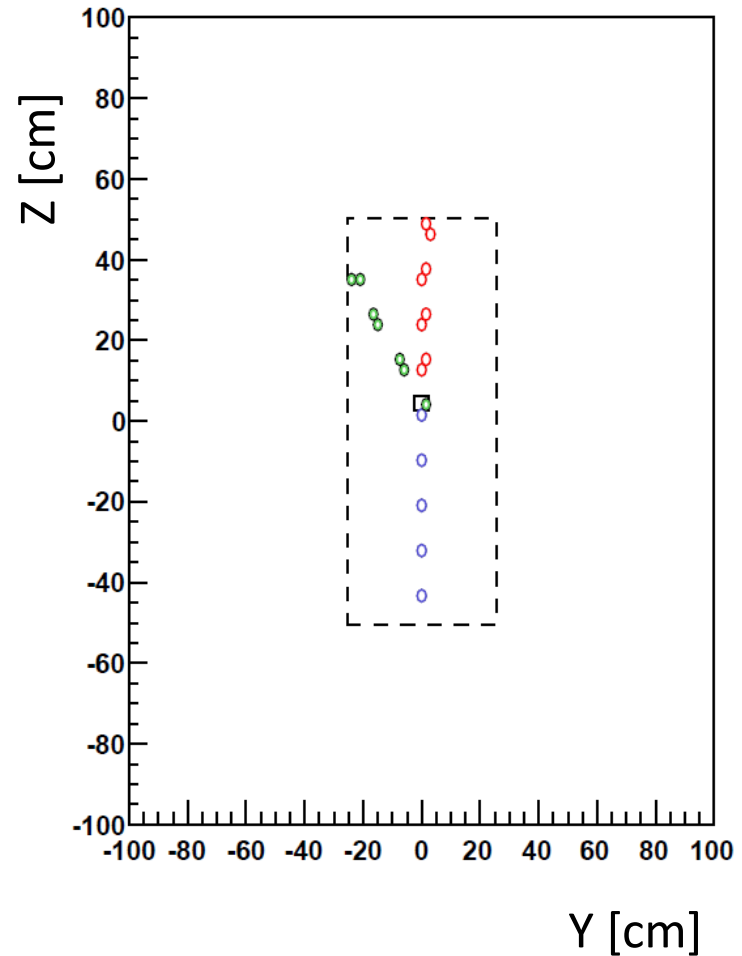
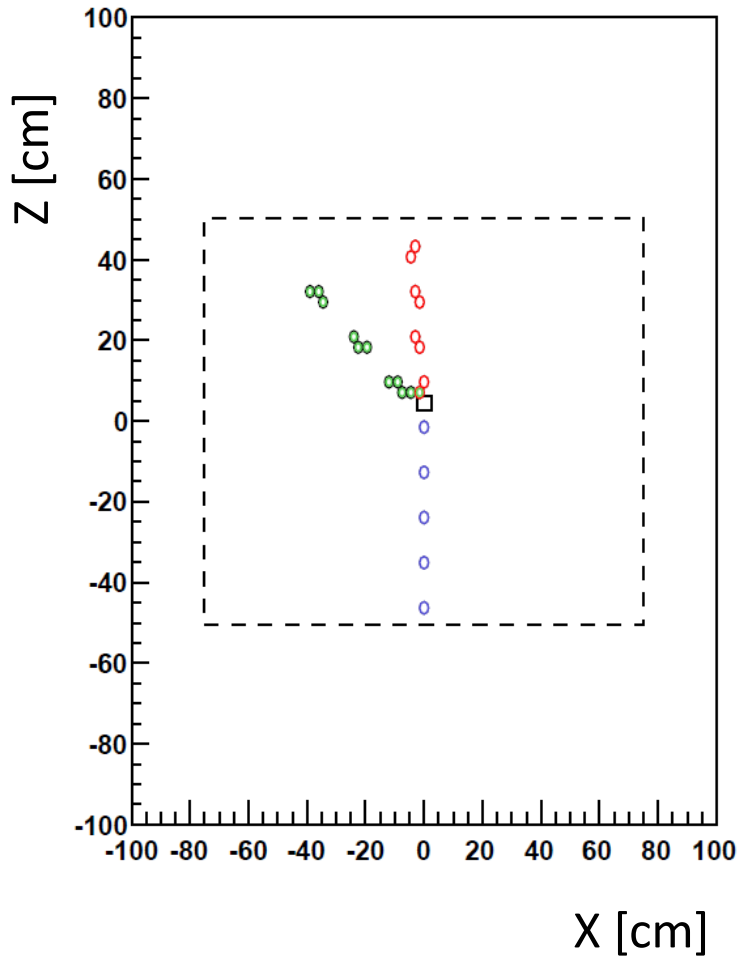


# Event display (2)

Blue:  $K^-$  related

Red:  $K^+$  related

Black + Green: Xi hyp. related.

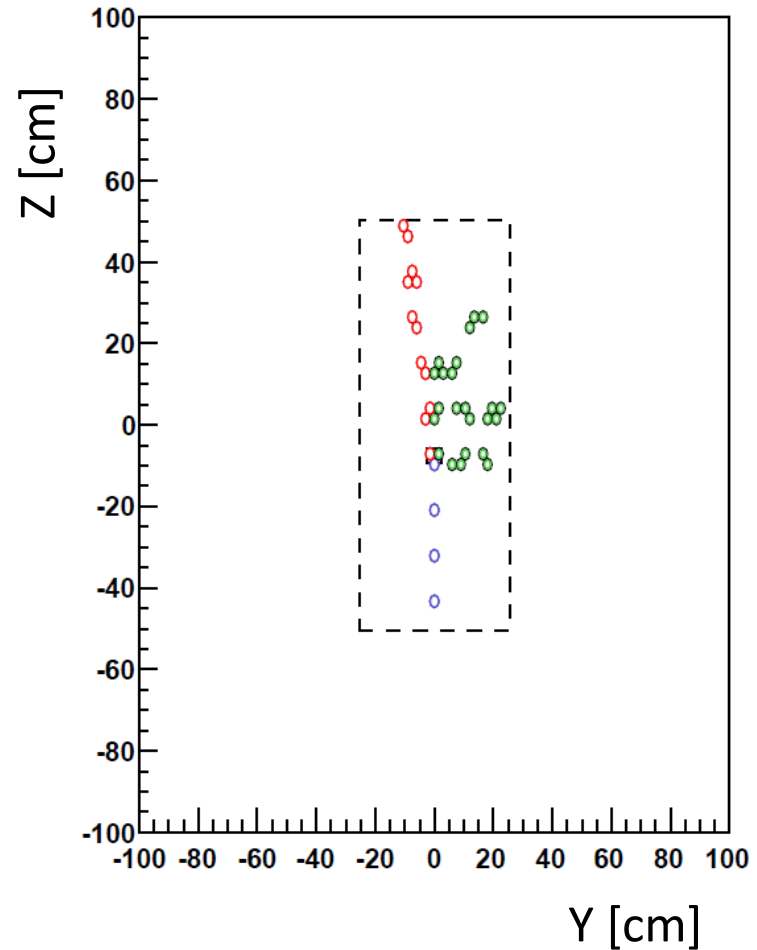
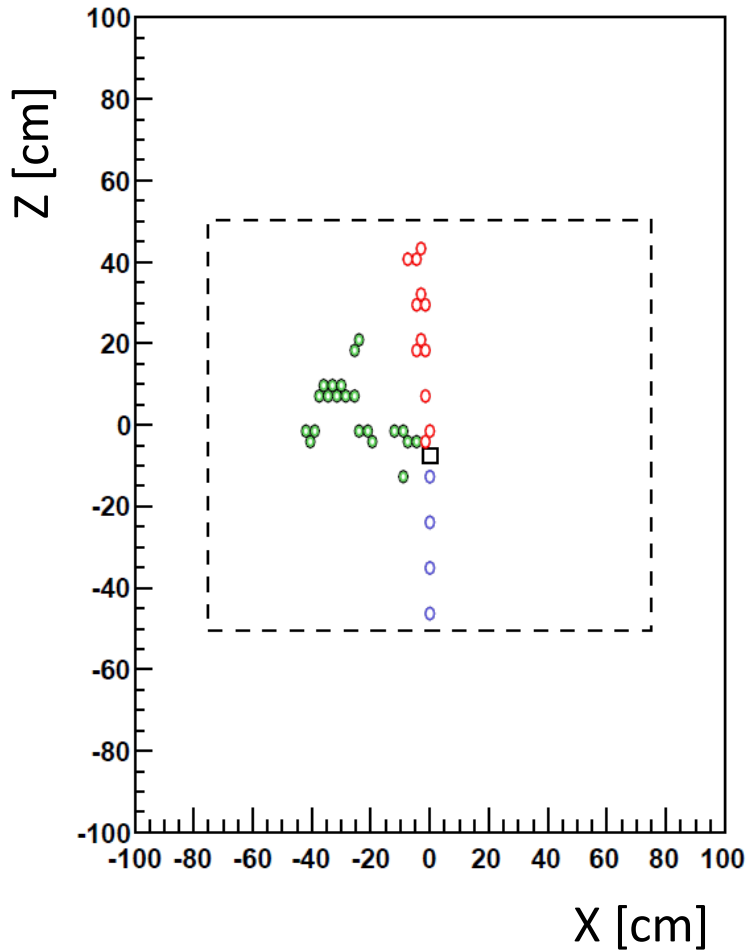


# Event display (3)

Blue:  $K^-$  related

Red:  $K^+$  related

Black + Green: Xi hyp. related.



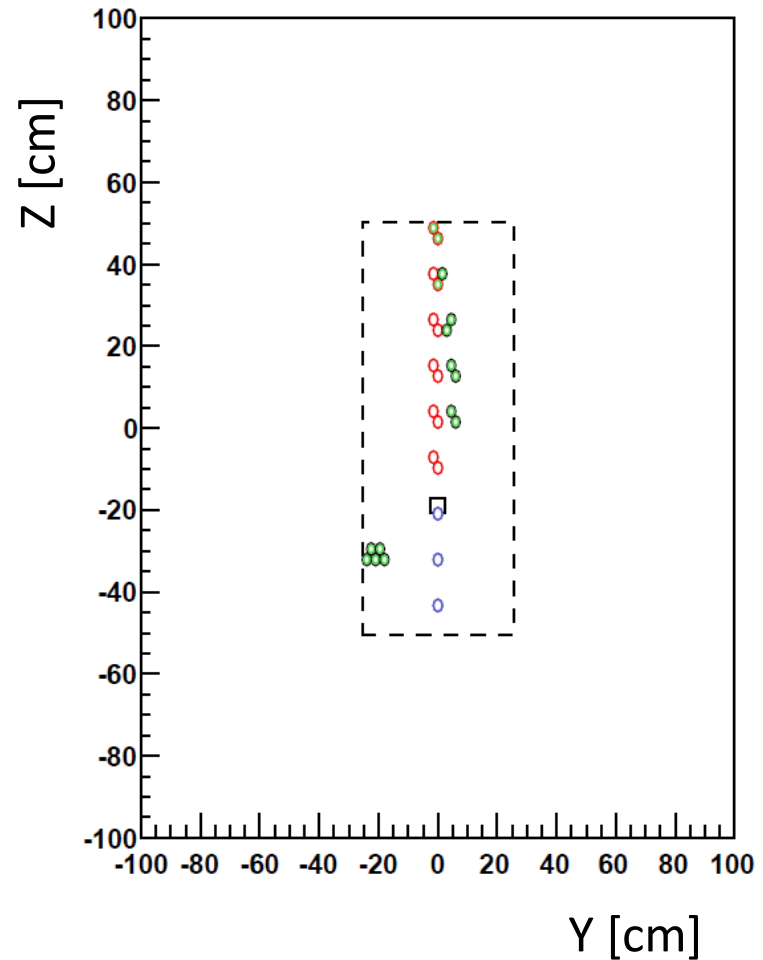
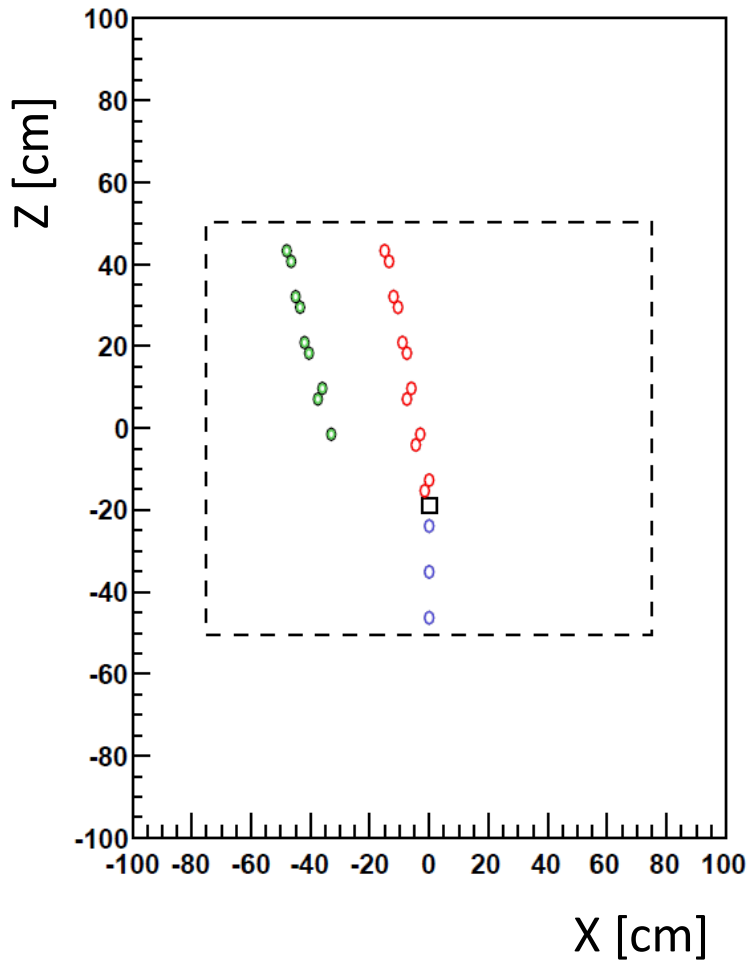


# Event display (4)

Blue:  $K^-$  related

Red:  $K^+$  related

Black + Green: Xi hyp. related.

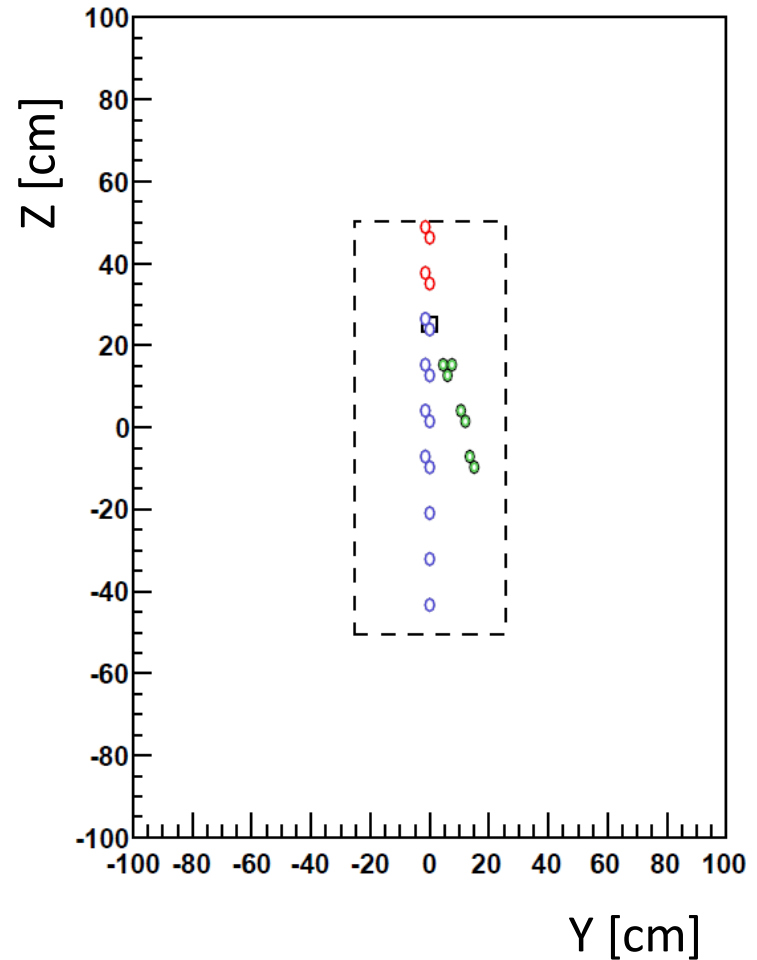
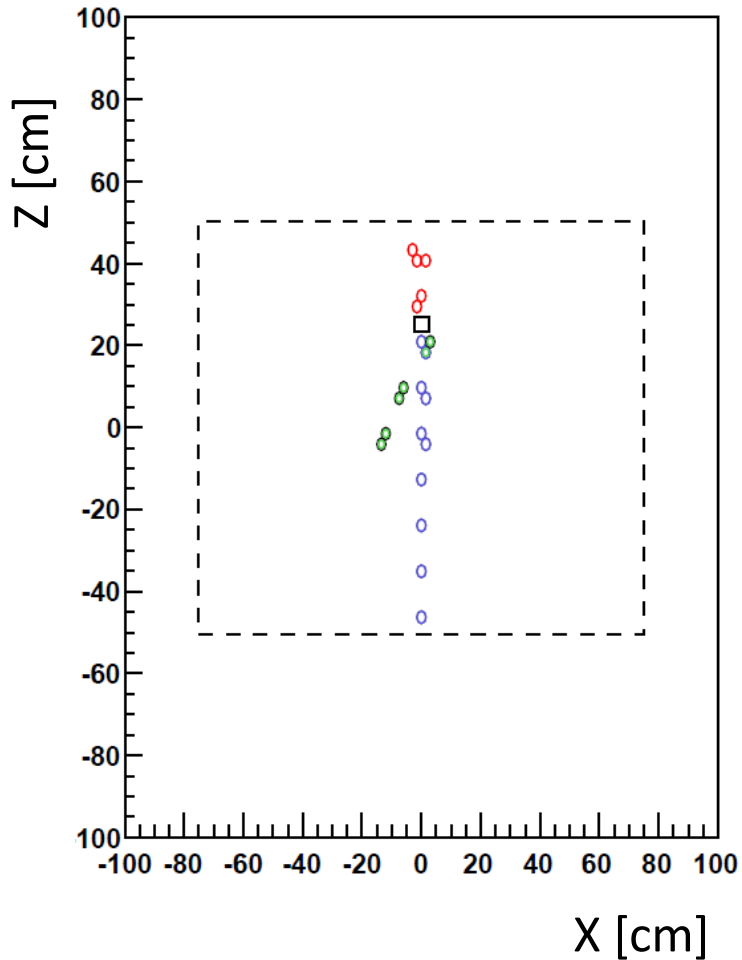


# Event display (5)

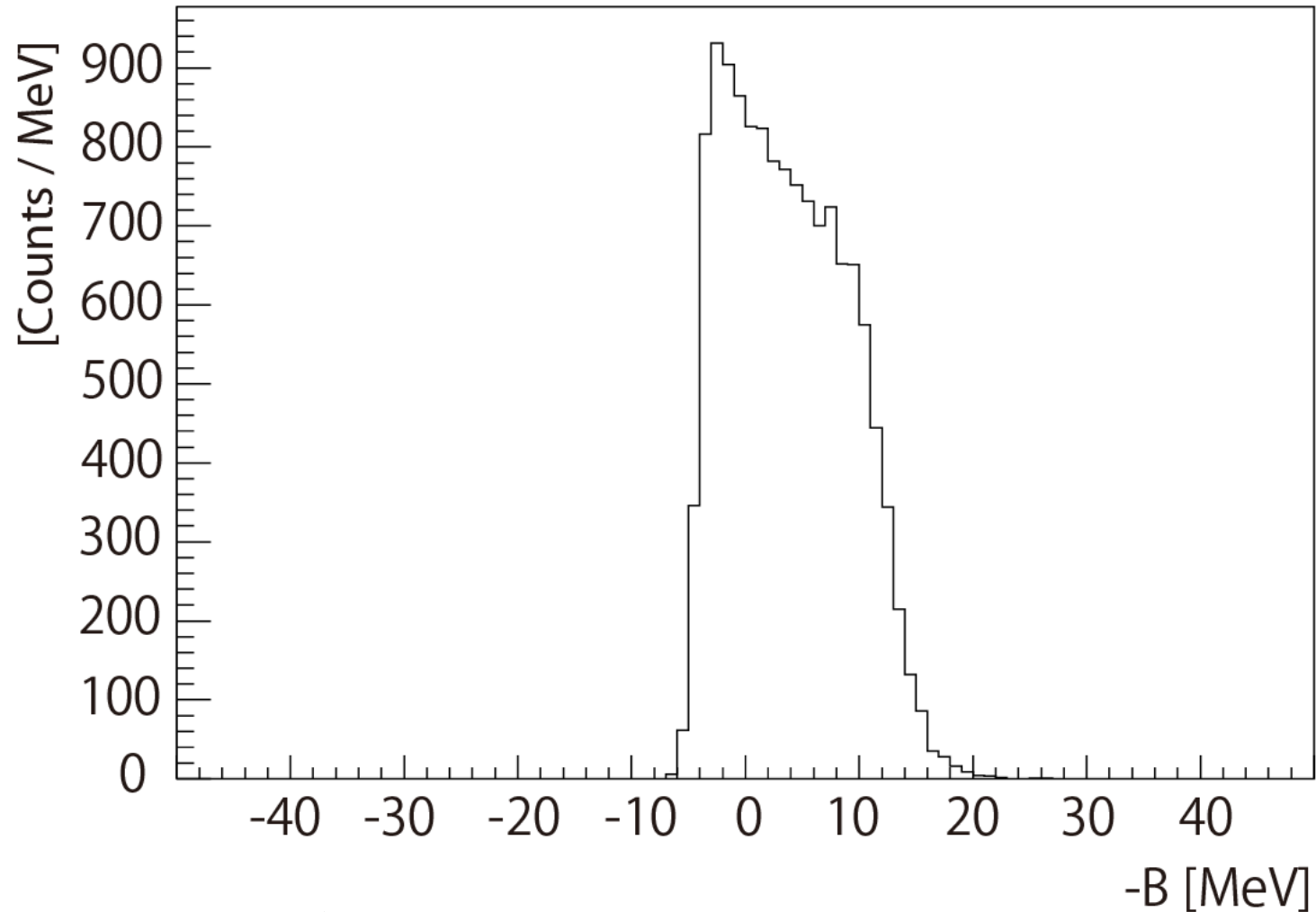
Blue:  $K^-$  related

Red:  $K^+$  related

Black + Green: Xi hyp. related.

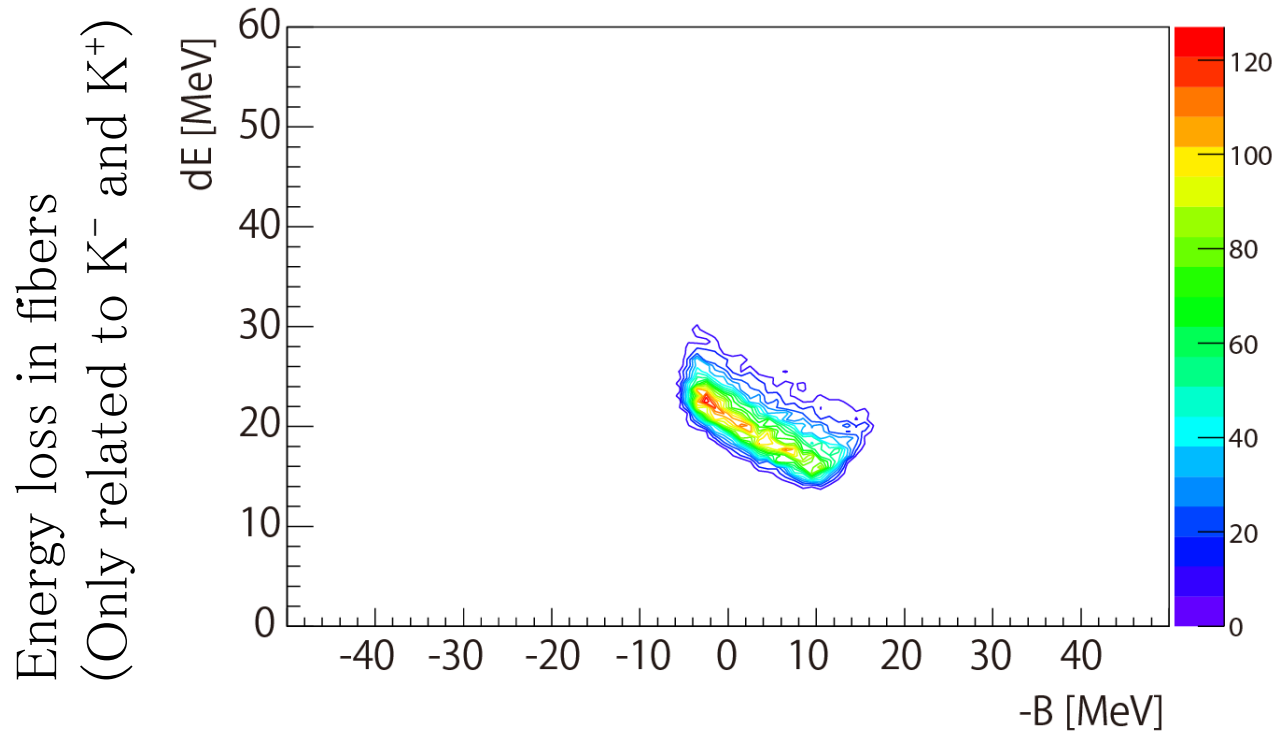


# Missing mass distribution



FWHM = 11.2 MeV by a Gaus fit

# Energy loss of $K^-$ and $K^+$ in fibers



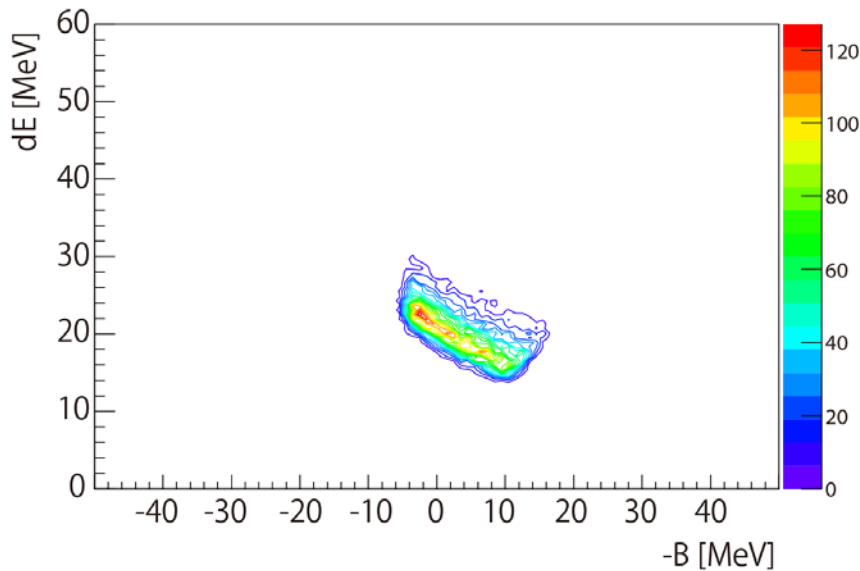
Strong correlation

→ the Missing mass can be corrected

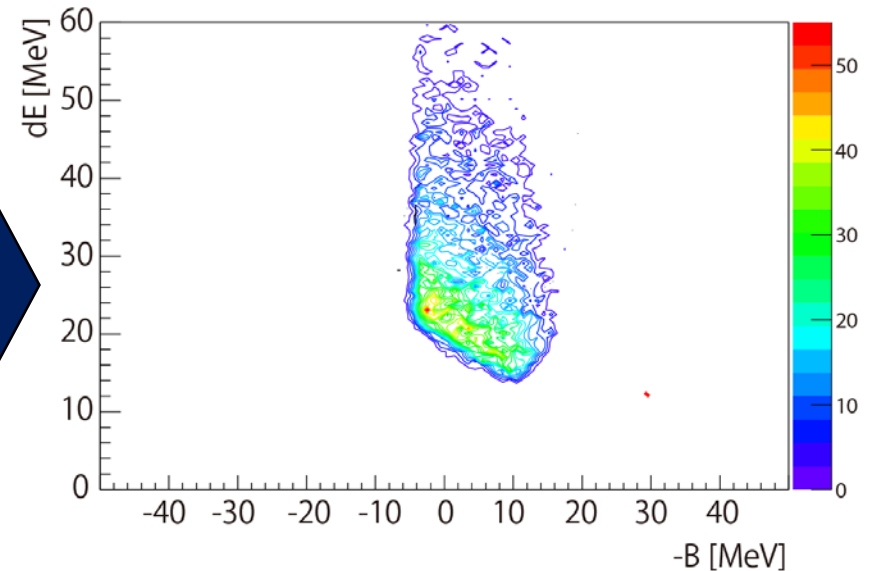
(See also: [this](#))

# Energy loss in fibers

Only dE of  $K^-$  and  $K^+$

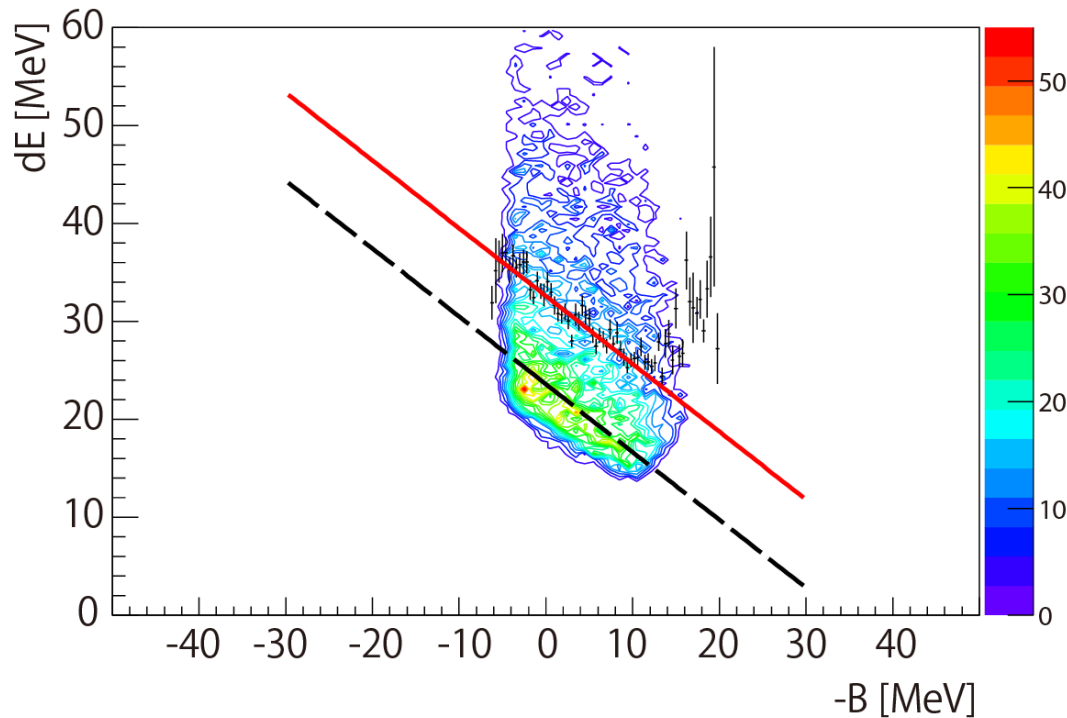


dE of  $K^-$ ,  $K^+$   
and decayed particle from Xi-hyp.



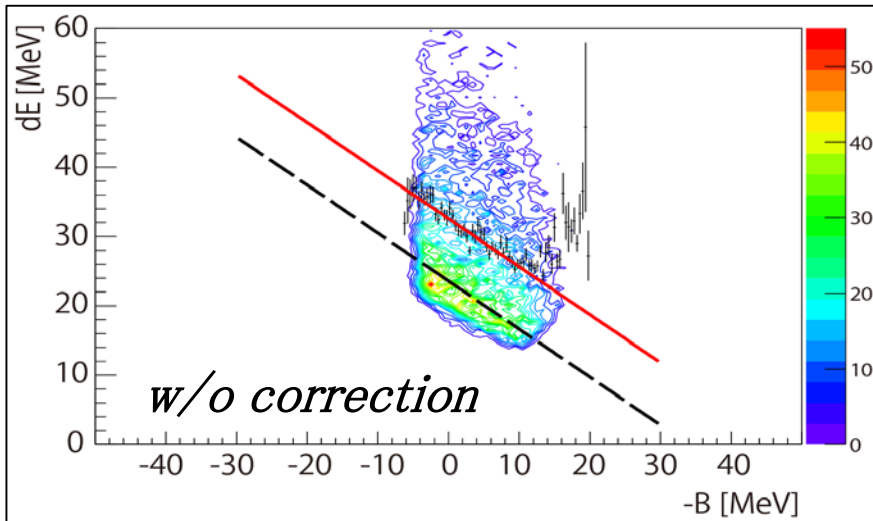
Selected hit fibers related to  $K^-$  and  $K^+$  events  
for this dE calculation.

# Simple missing mass correction



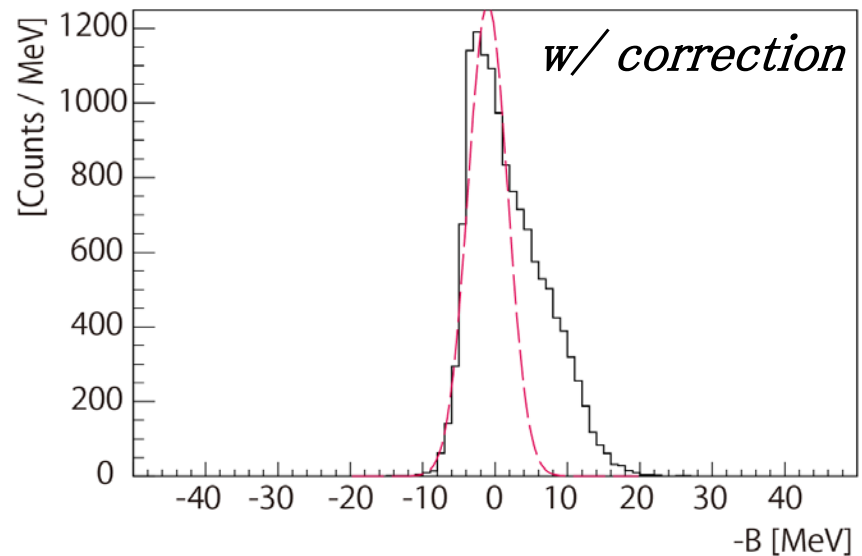
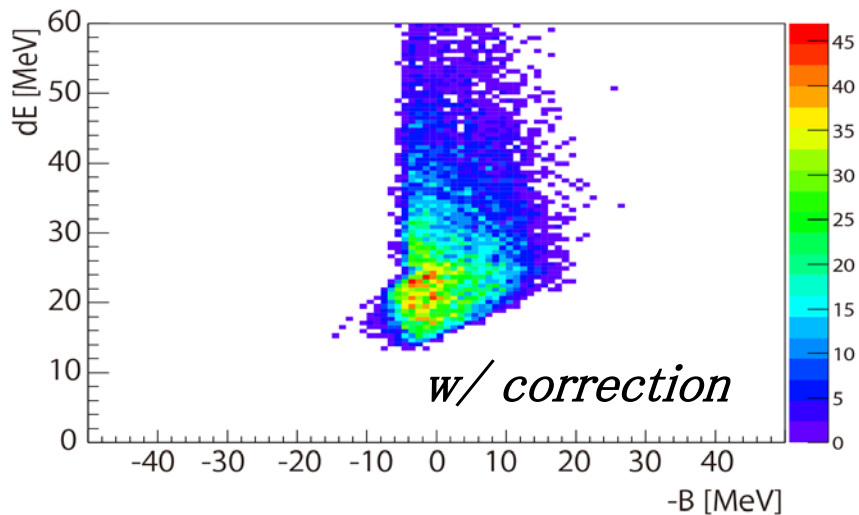
1. Fit by linear function to the distribution profile (Red line).
2. Shift was applied to the line because the red line is taken up by the large  $dE$  tail. (Black line)
3. The missing mass is corrected by the Black line. But the correction was applied only to  $dE < 26$  MeV.

# Missing mass resolution with the simple correction.

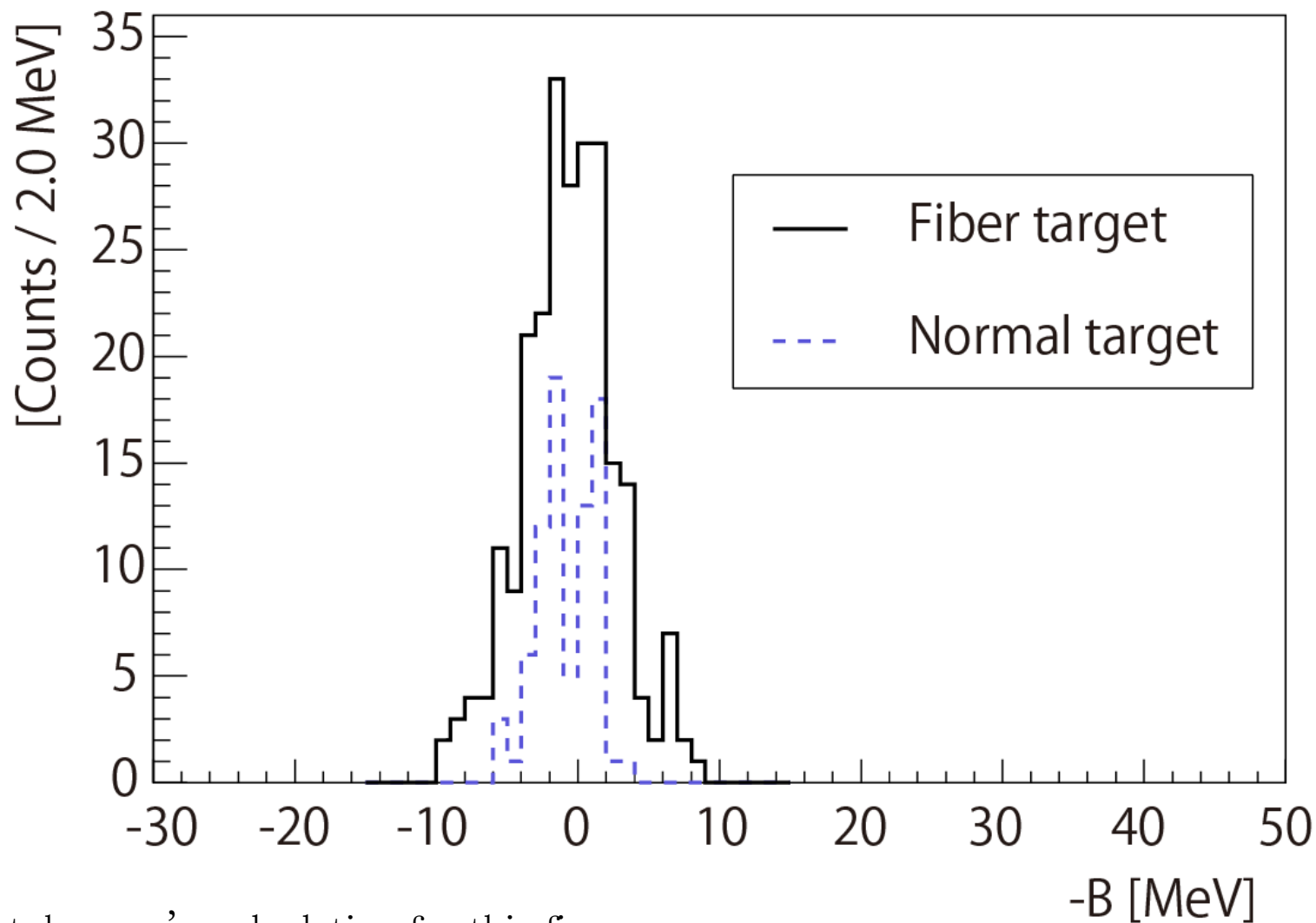


(w/o correction:  $>11$  MeV  $\rightarrow$ )

**FWHM = 6.4 MeV**



# Expected spectra between fiber target and normal target



Used Motoba-san's calculation for this figure.