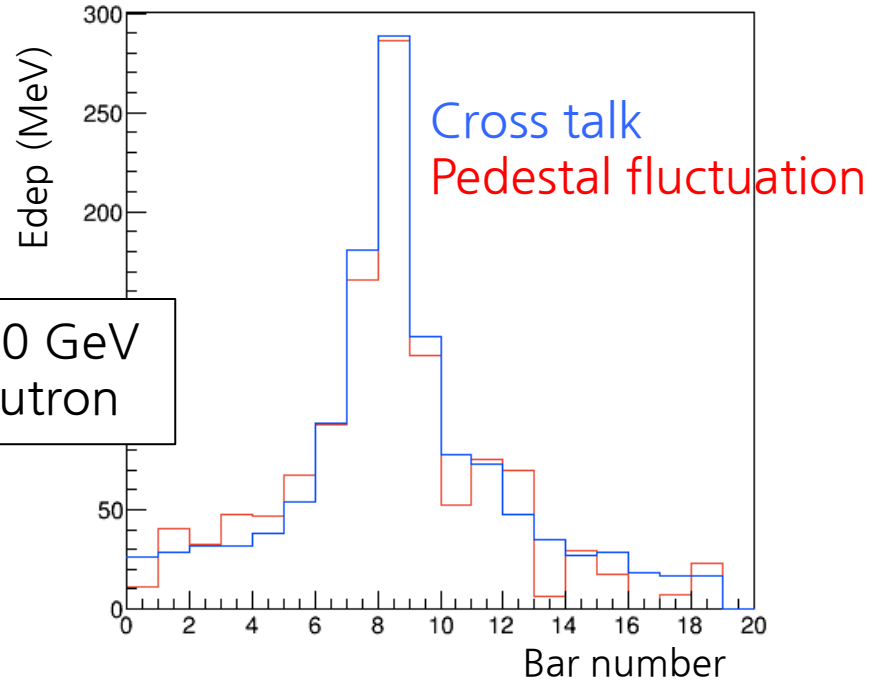
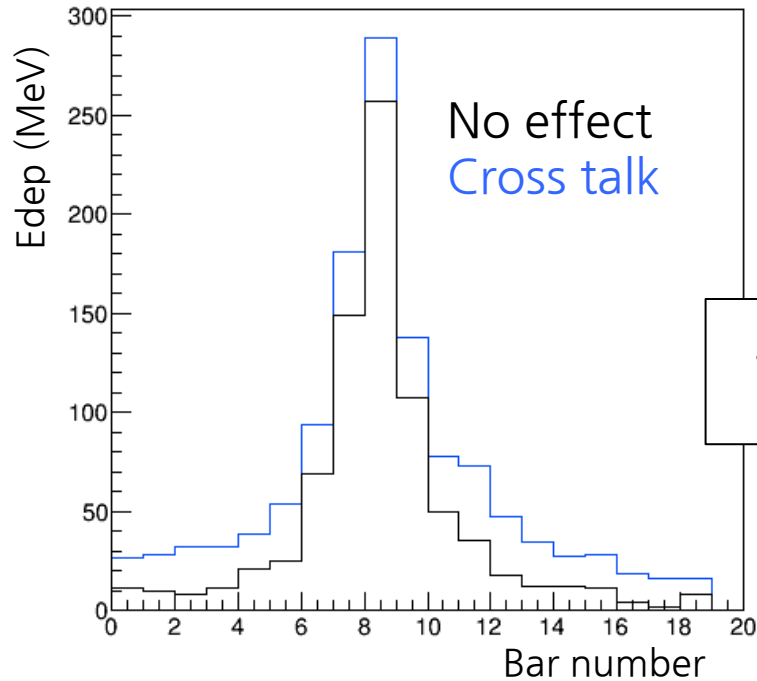


# Simulation Progress of $A_N$ Study and Effect of $\beta^*$ to $p_T$ and $A_N$

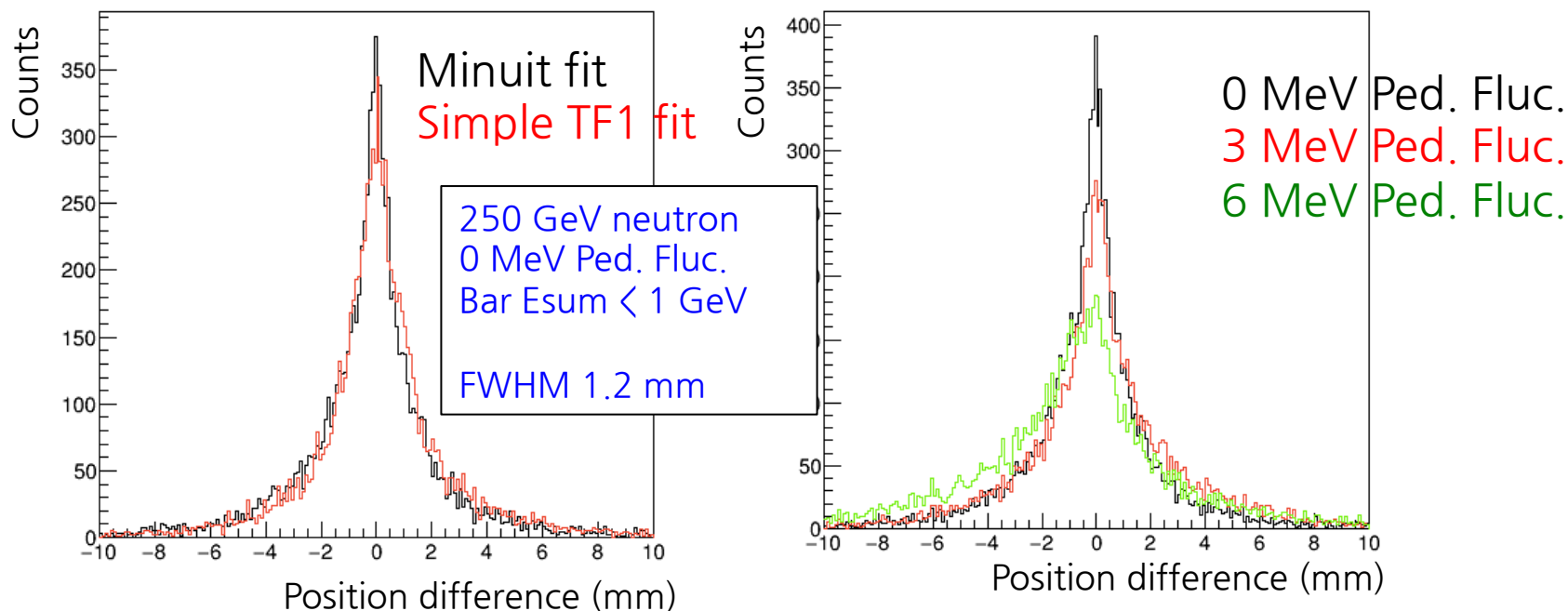
170405, Minho Kim

# Analysis Procedure



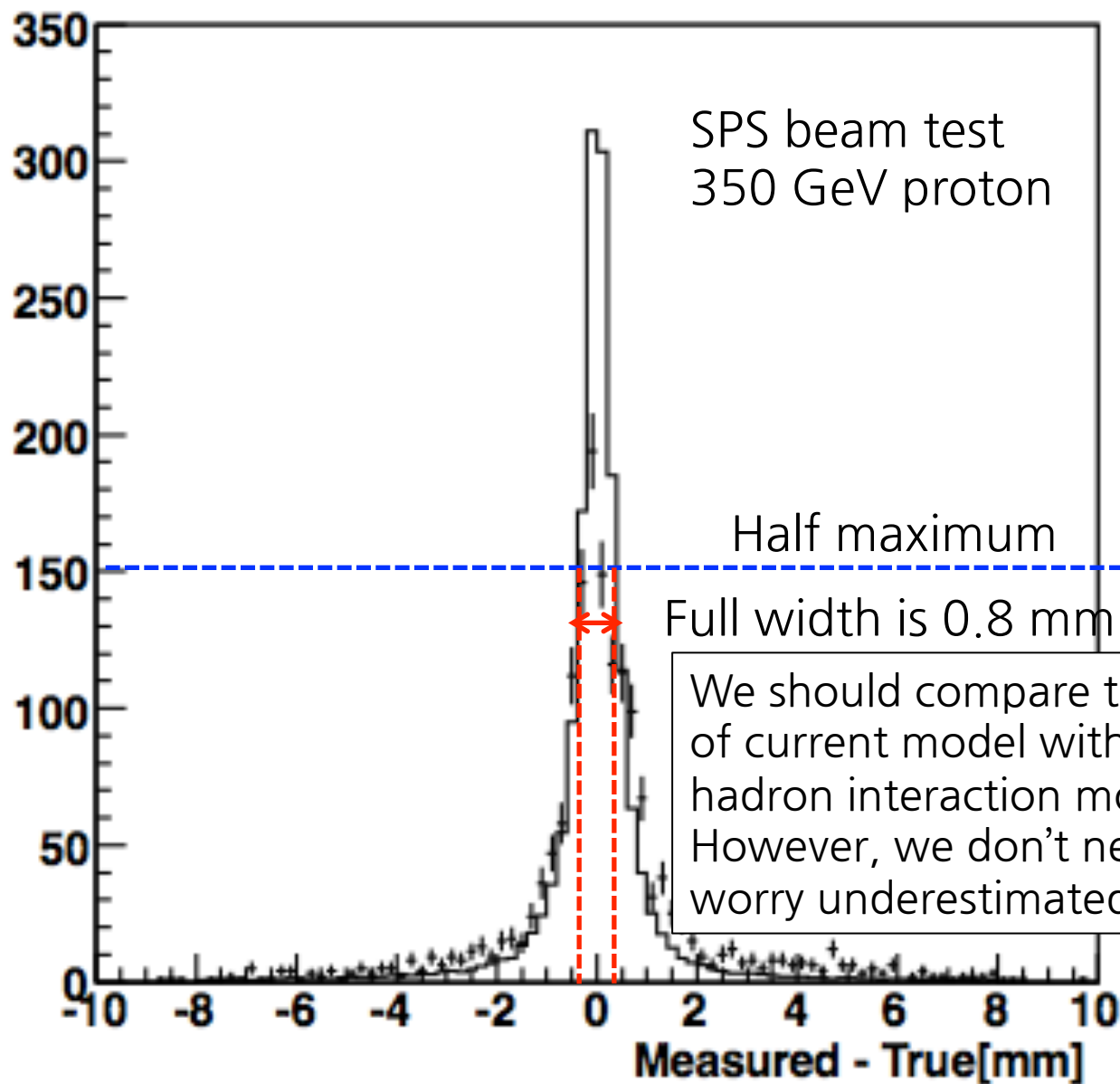
- Procedure: Raw edep → cross talk applied → pedestal fluctuation applied → cross talk correction → parameter initialization by simple fitting → Minuit fitting.
- We'll look at expected  $A_N$  smearing by different position resolution, expected  $\beta^*$  dependence of  $p_T$  resolution and also its expected  $A_N$  smearing as well.

# Position Resolution Check



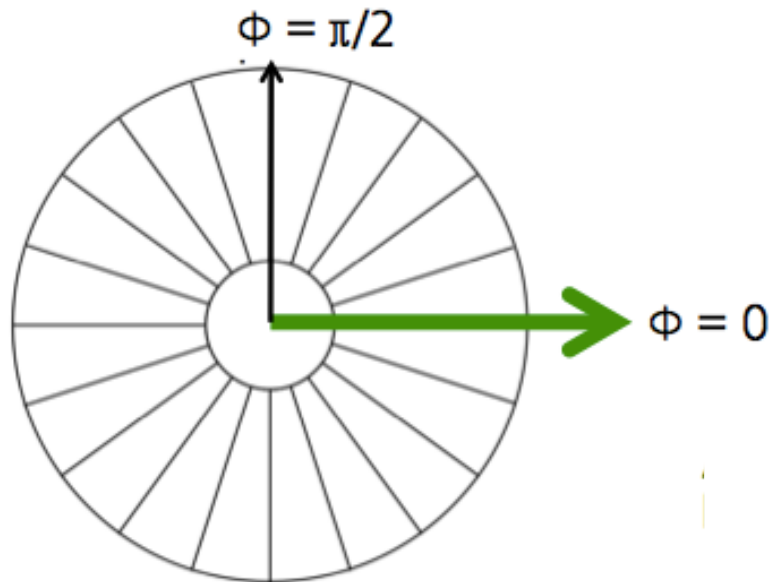
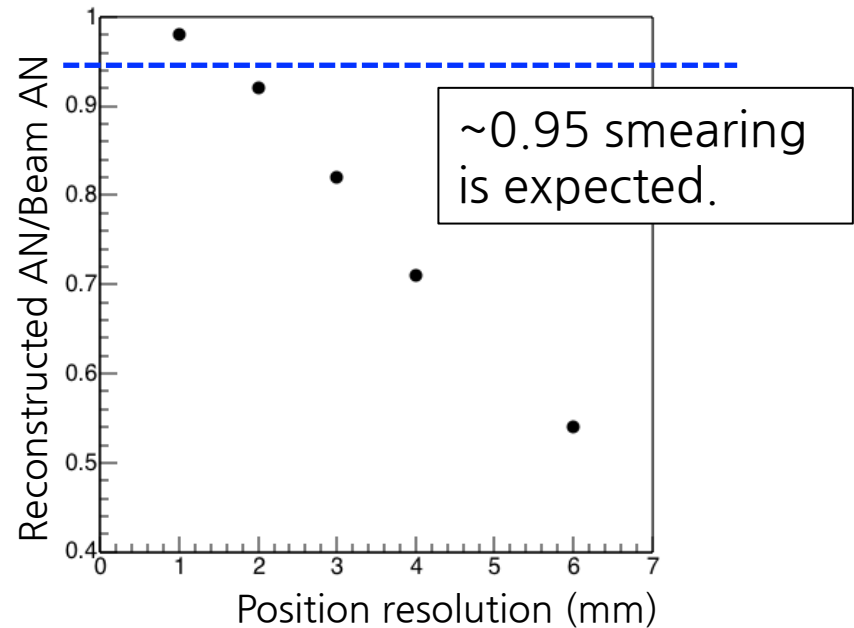
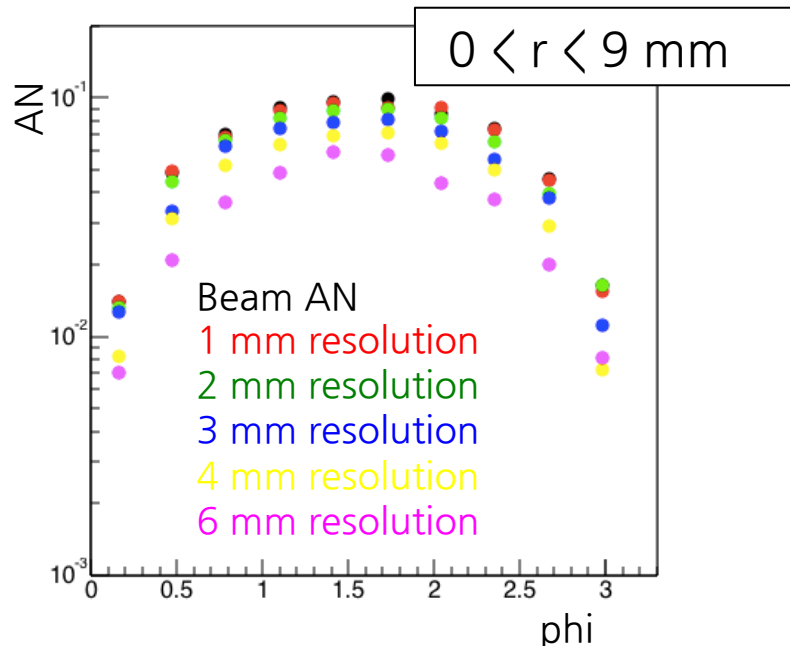
- Minuit fitting gives better FWHM than simple root fitting.
- Larger pedestal fluctuation gives worse position resolution result.
  - Newly updated variable and method is well applied.
- We can expect position resolution at RHICf, however, we don't know it yet actually. → Expected AN smearing by different resolution.

# Underestimated Position Resolution?



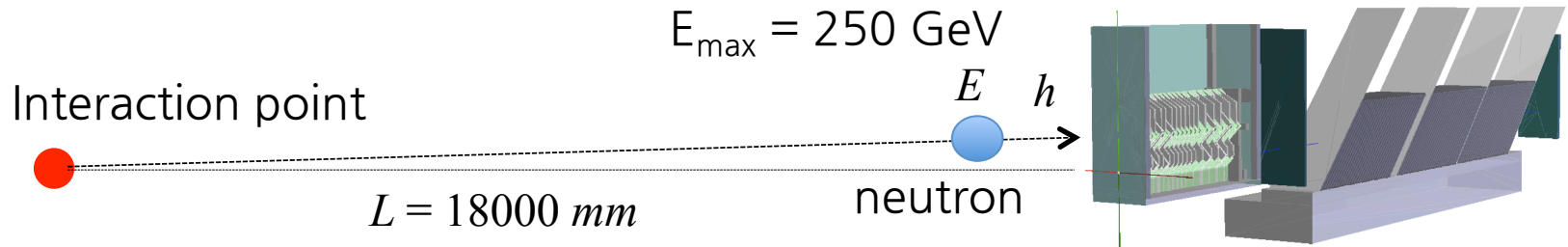
We should compare the result of current model with other hadron interaction model. However, we don't need to worry underestimated resolution?

# Expected Smearing Factor of $A_N$



- 2 million events with artificial asymmetry.
- About 0.95 is expected to smearing factor of  $A_N$ .

# $\beta^*$ Dependence of $p_T$ Resolution



$$p_T = \sqrt{E^2 - m_0^2} \frac{h}{\sqrt{L^2 + h^2}}$$

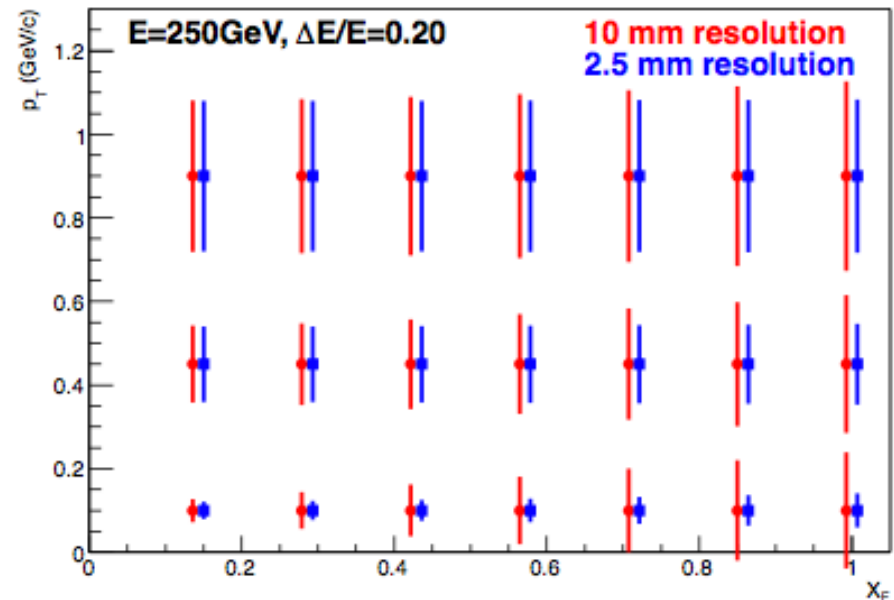
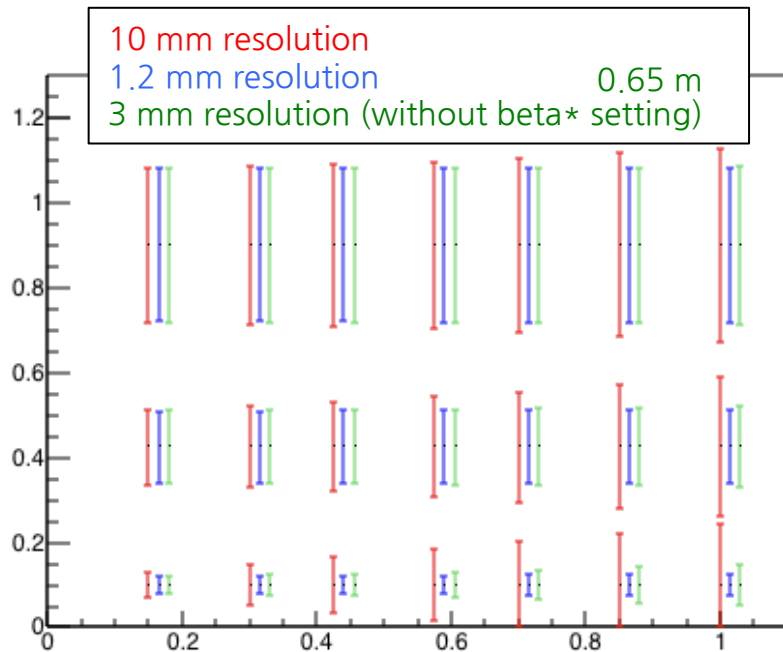
$$\rightarrow \delta p_T(E, h) = \sqrt{\left( \frac{E}{\sqrt{E^2 - m^2}} \frac{h}{\sqrt{L^2 + h^2}} \right)^2 (\delta E)^2 + \left( \sqrt{\frac{E}{E^2 - m^2}} \frac{h}{L^2 + h^2} \right)^2 (\delta h)^2}$$

substituting  $E = 250x_F$  and  $h = \frac{Lp_T}{\sqrt{E^2 - m^2 - p_T^2}}$ ,

We can get  $p_T$  resolution by  $p_T$  and  $x_F$ .

And we know that  $\delta E = 0.2E$

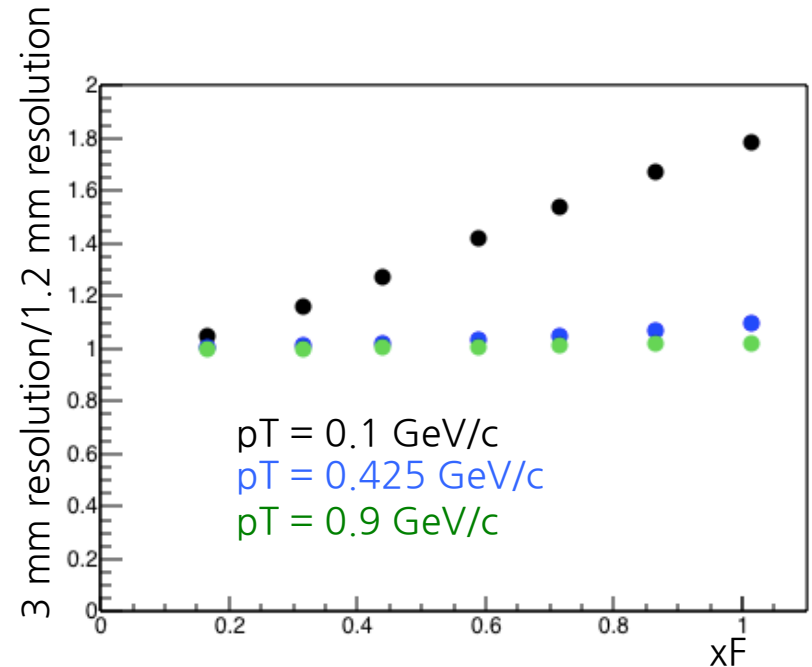
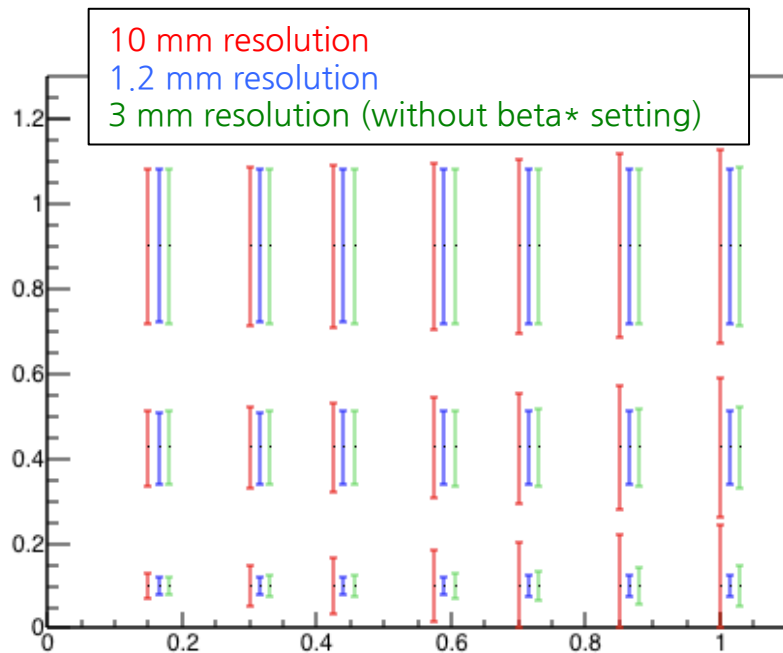
# $\beta^*$ Dependence of $p_T$ Resolution



- Error propagation reproduces well the previous result in RHICf letter of intent.
- Position resolution by angular spread was assumed as

$$\sqrt{(1.2\text{mm})^2 + (2.7\text{mm})^2}$$

# $\beta^*$ Dependence of $p_T$ Resolution



- At relatively large  $p_T$ , there is not much difference between original position resolution and worst beta star case.
- However, at relatively small  $p_T$ , maximum 1.8 times worse  $p_T$  resolution is expected.



# TO DO List

- Now, position resolution simulation is not urgent one.
- Will mainly dedicate simulation work of high priority.

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