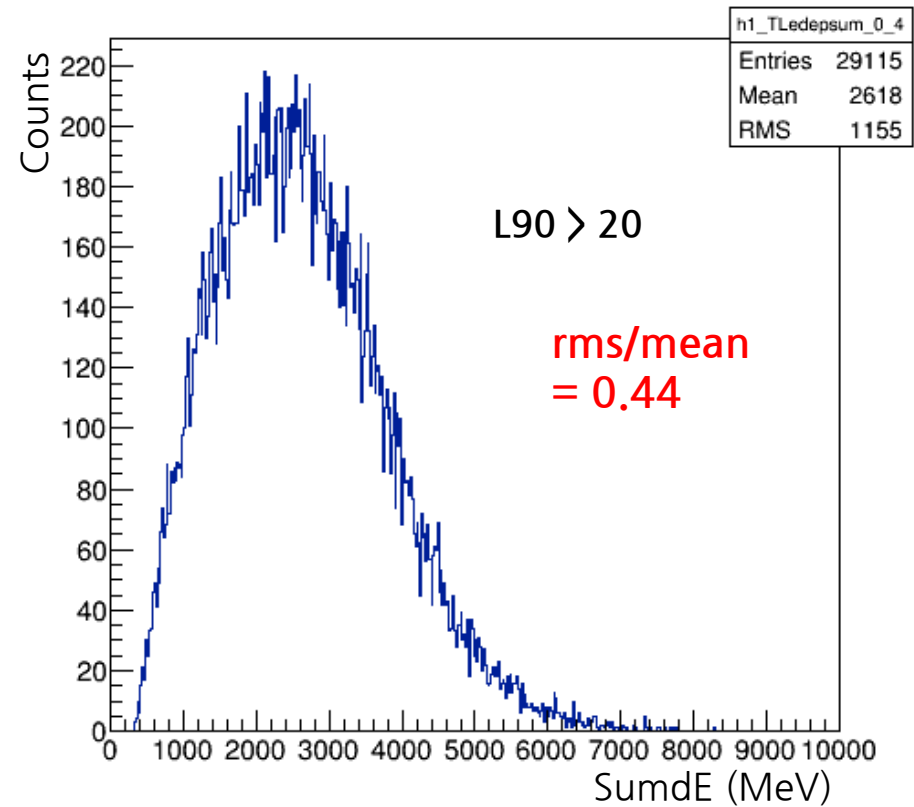
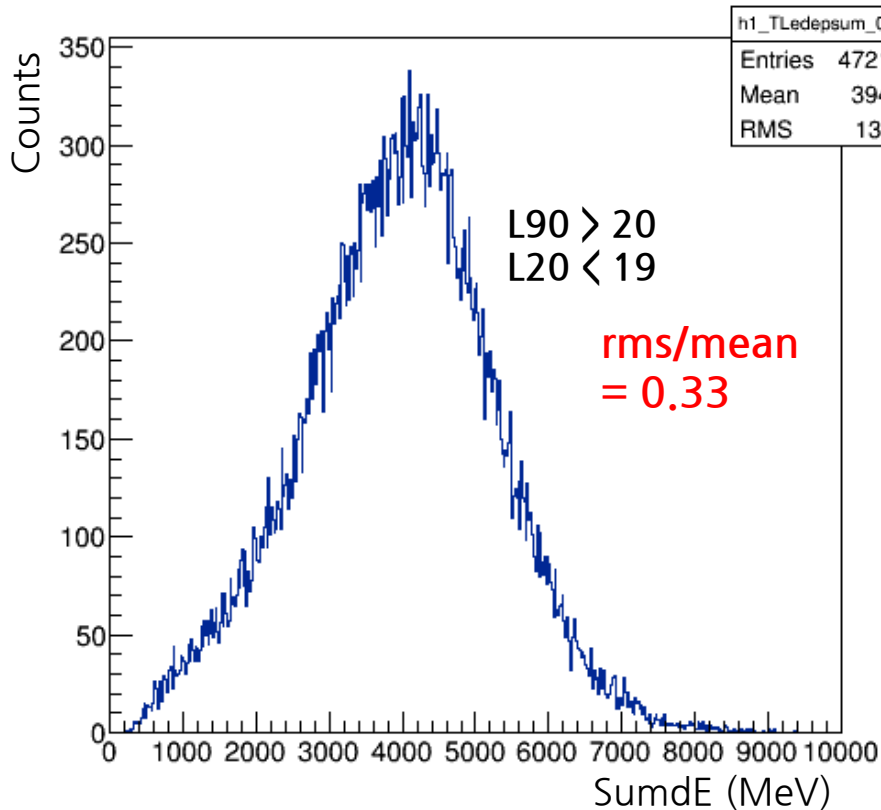


How precisely can we estimate the neutron  $A_N$  without combined analysis?

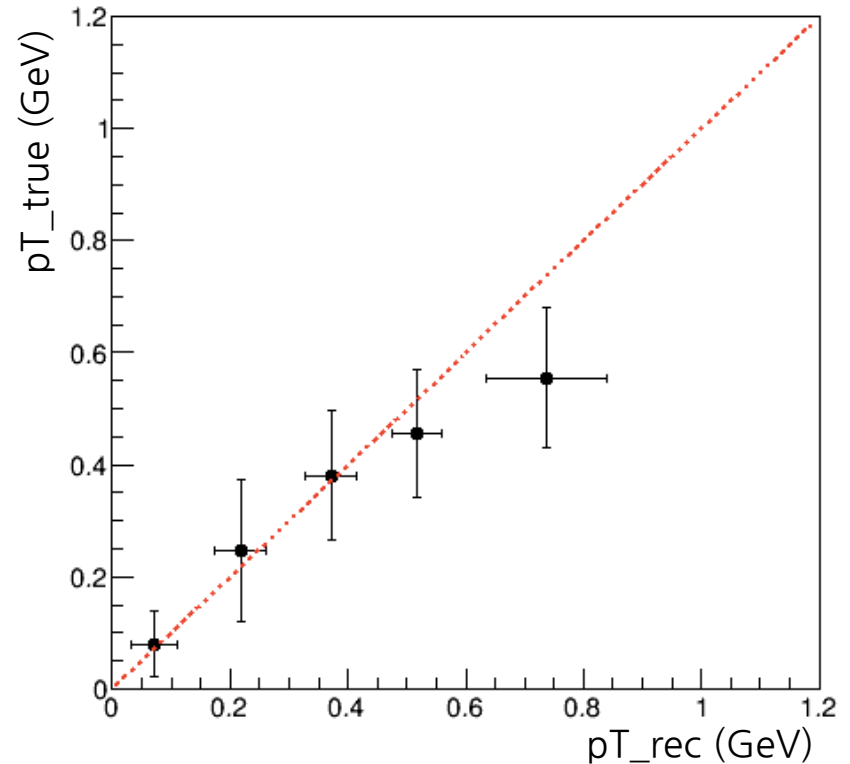
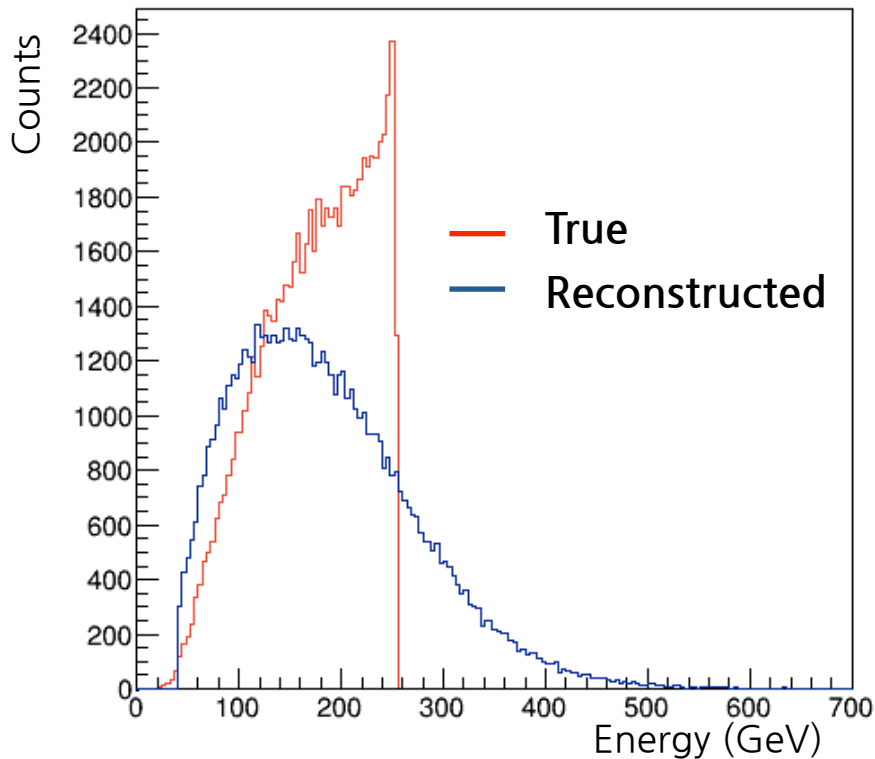
16 Sep 2020  
Minho Kim

# Remind: Neutron energy resolution improved



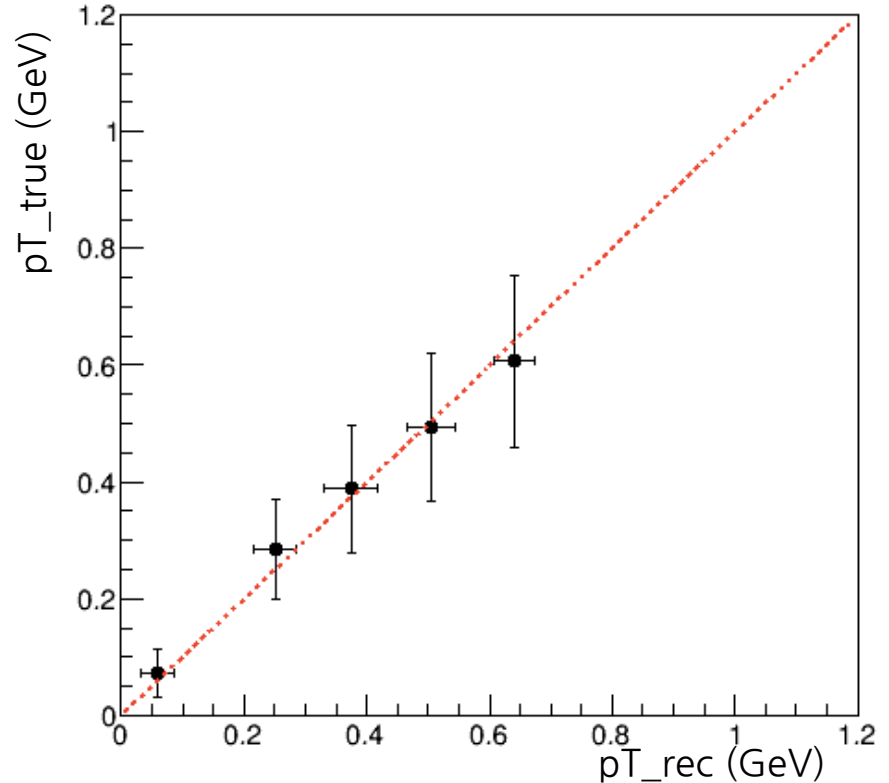
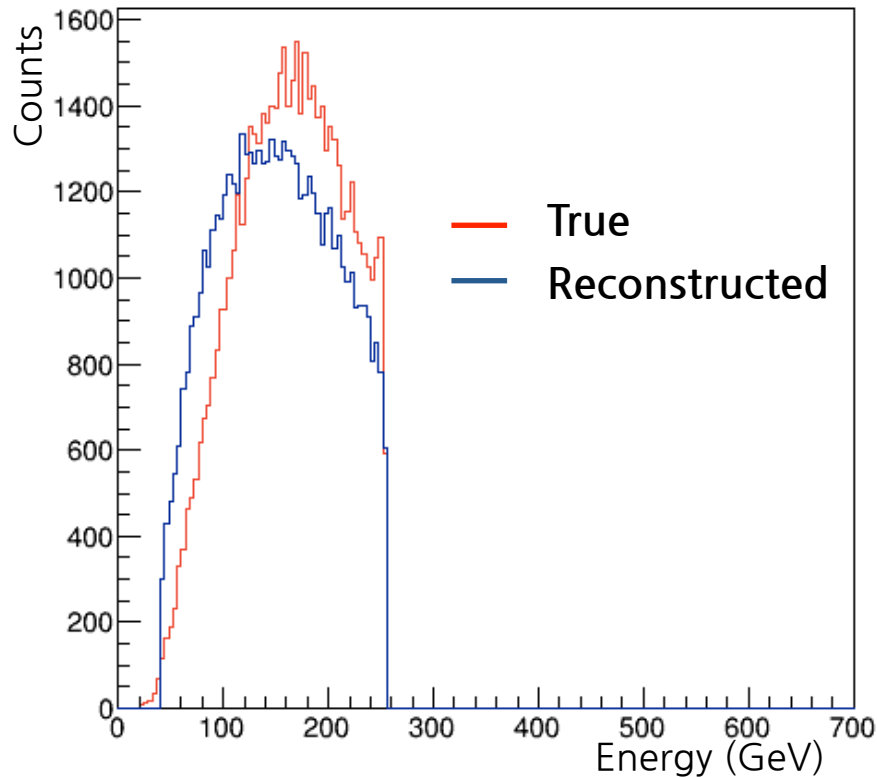
- L20 cut can make the neutron energy resolution better.
- L20 is independent of  $A_N$ . → This additional cut will not make any bias.

# Problem by the overestimation energy



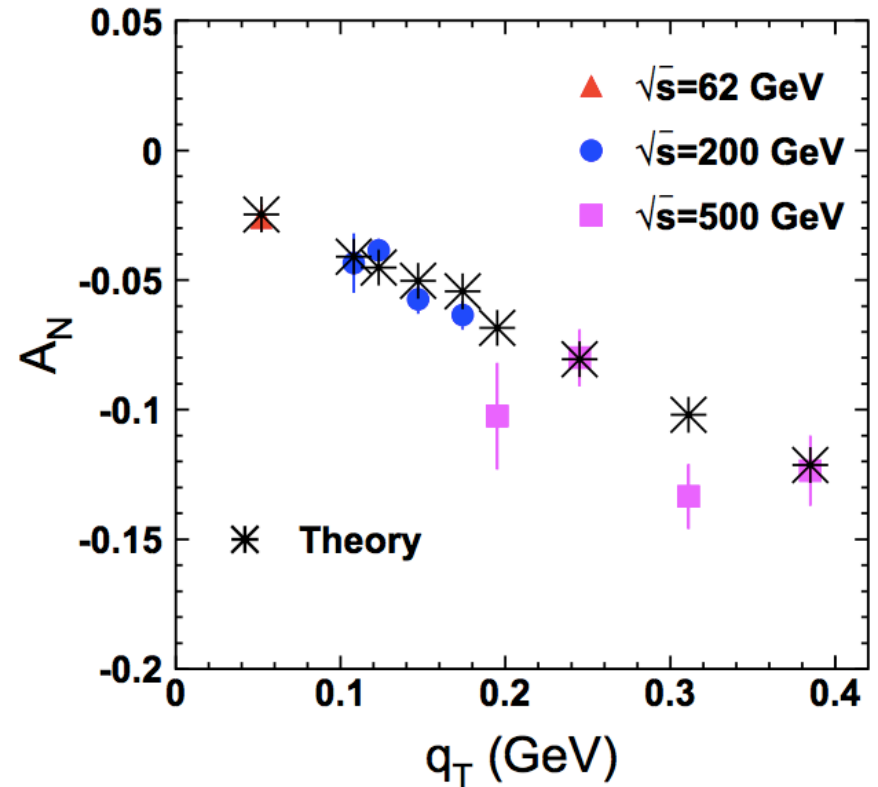
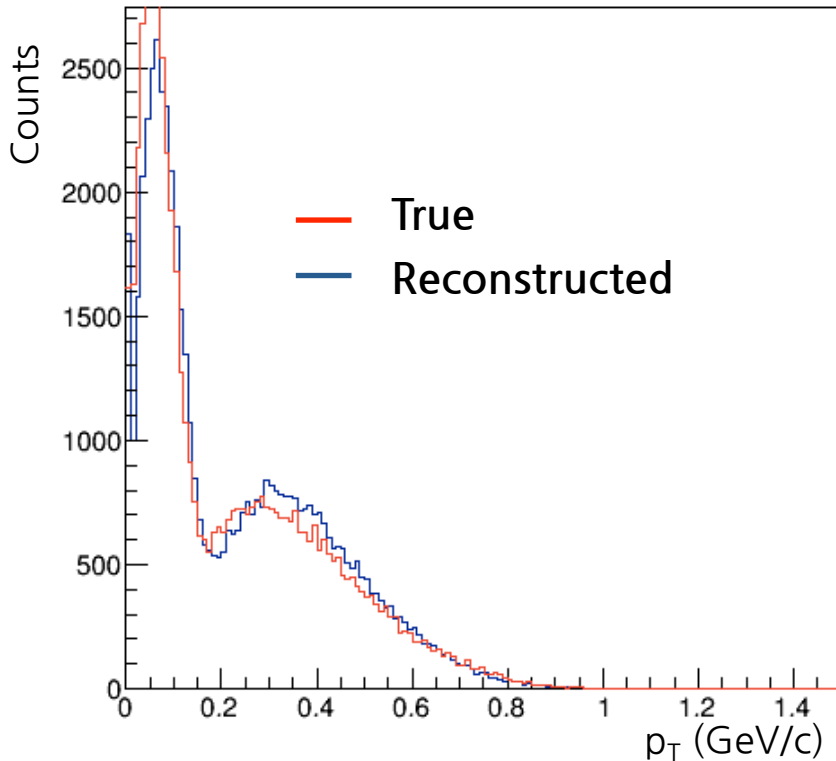
- Due to the worse energy resolution, there is energy-overestimated events larger than 255 GeV.
- These events make the  $p_T$  overestimated as well.

# Additional energy cut



- Because the energies bigger than 255 GeV is must overestimated ones, we can remove the corresponding events.
- we can get better reconstructed  $p_T$ s in higher  $p_T$  region.

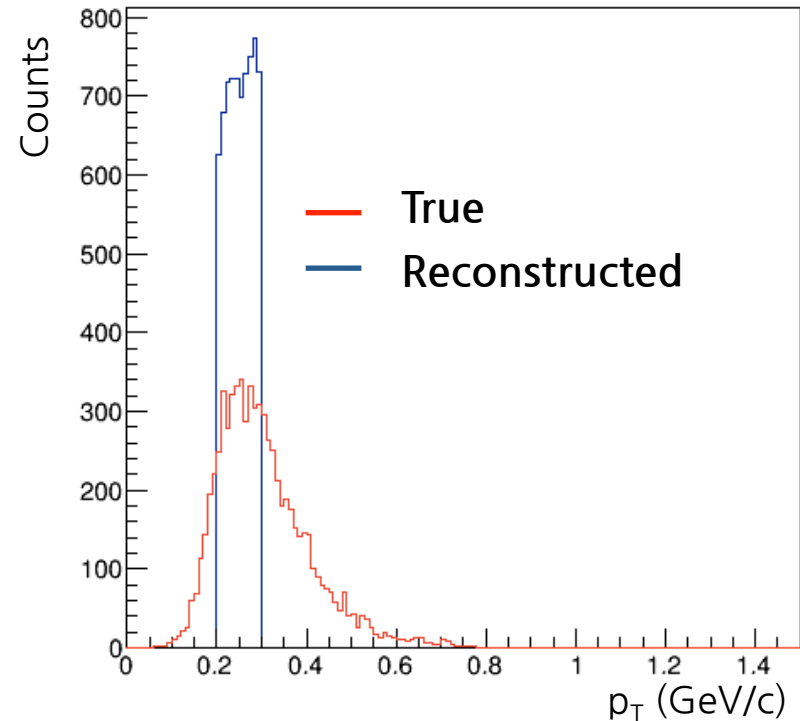
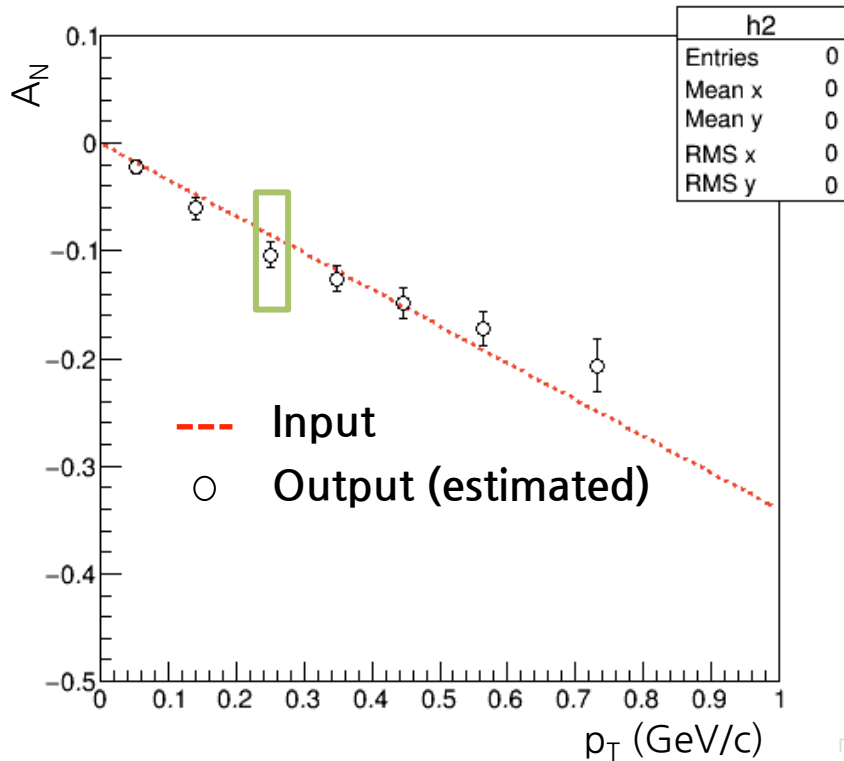
# How precisely can we estimate the $A_N$ ?



- To some extent, it looks the reconstructed  $p_T$  is reproducing the true one well.
- Assuming  $A_N = -0.34p_T$ , expected true and estimated  $A_N$ s were compared.

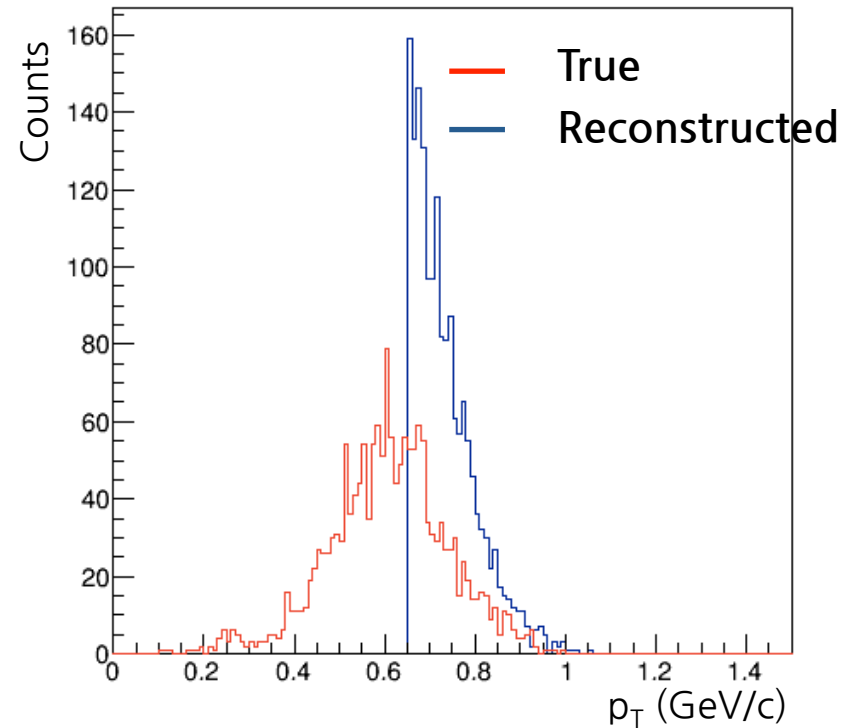
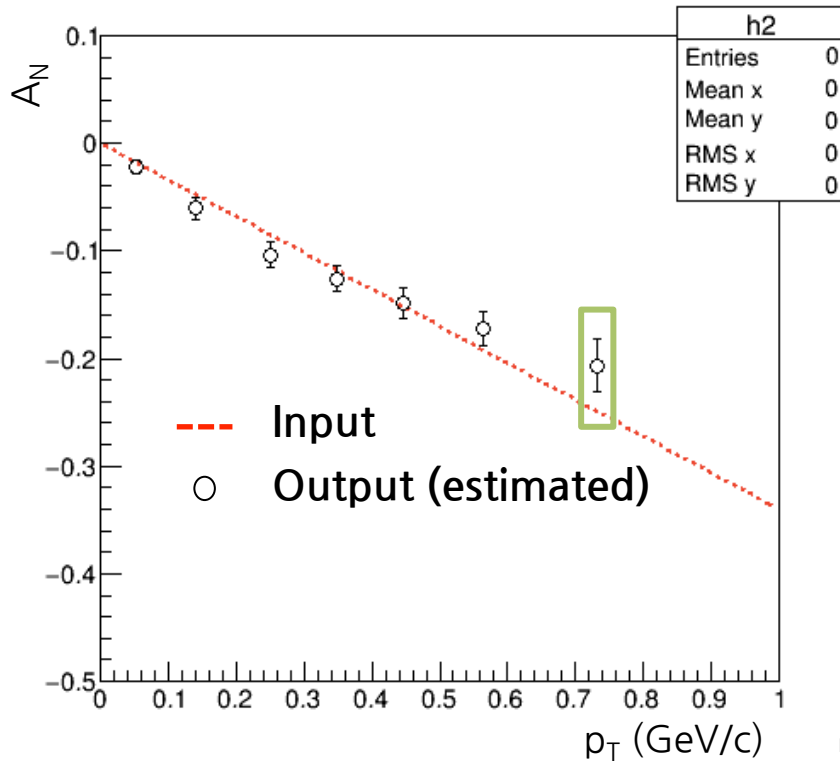
$$A_N = \Sigma(-0.34p_T)/N$$

# How precisely can we estimate the $A_N$ ?



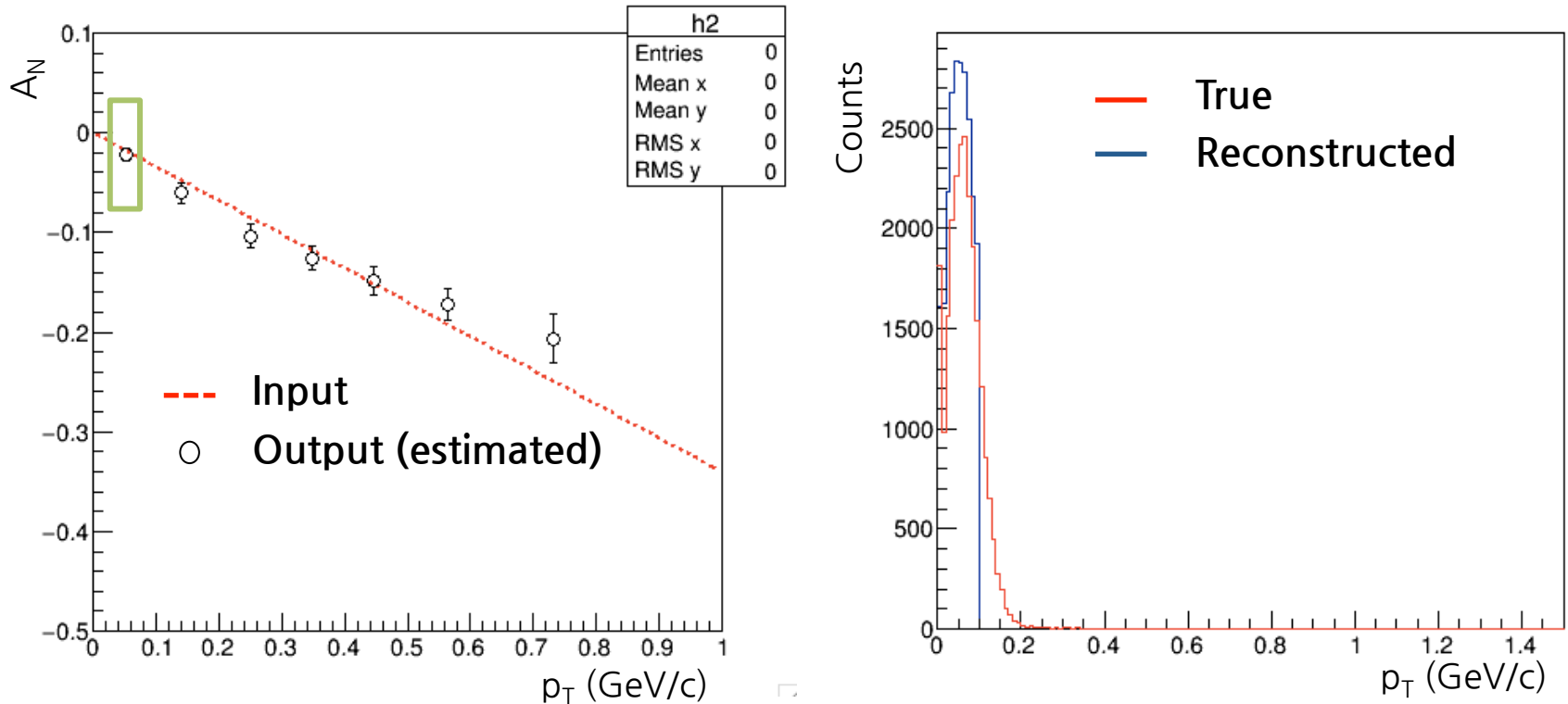
- In some lower  $p_T$  region, underestimation is possible but the  $A_N$  is not very different due to the smearing to both lower and higher directions.

# How precisely can we estimate the $A_N$ ?



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- In higher  $p_T$  region, there is always overestimation and it will give underestimated different  $A_N$ .

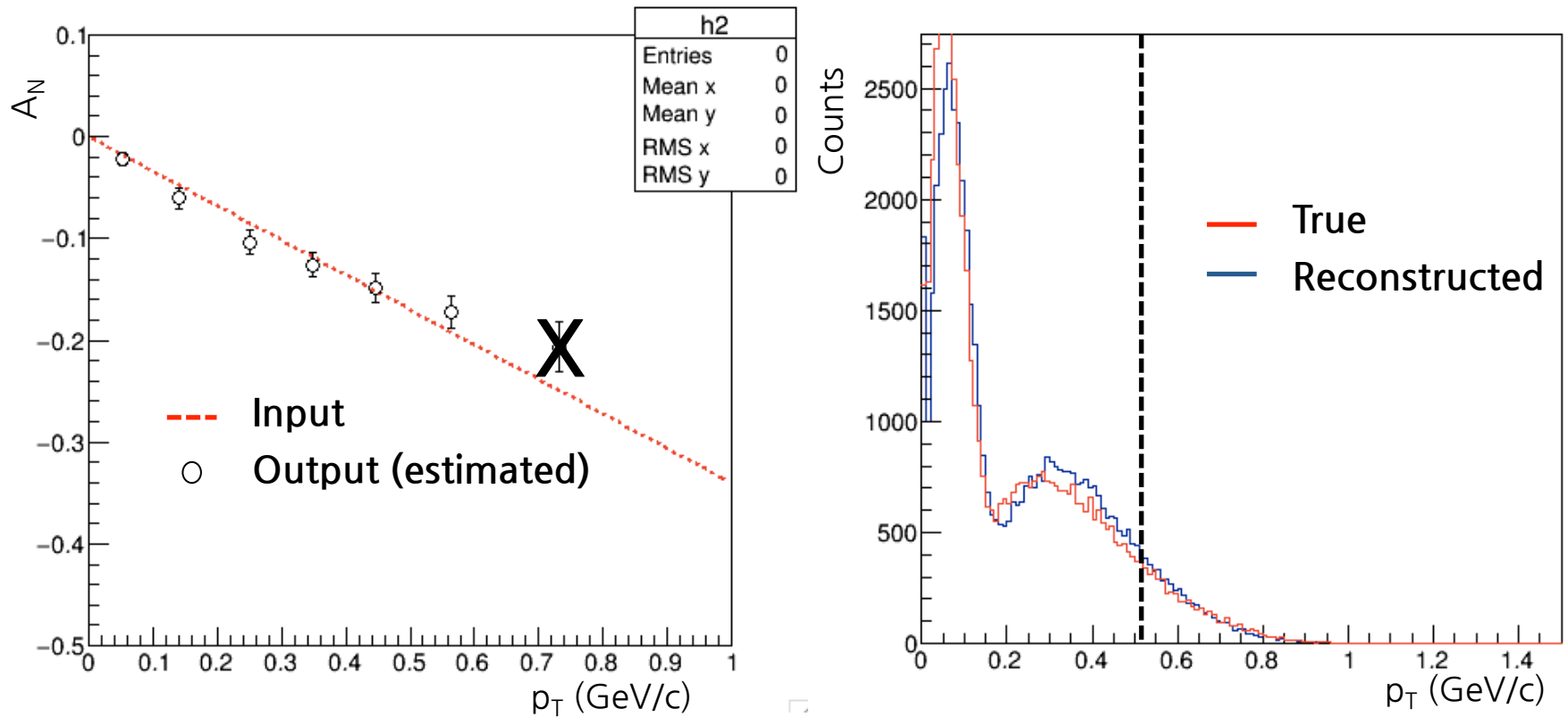
# How precisely can we estimate the $A_N$ ?



- In some lower  $p_T$  region, underestimation is possible but the  $A_N$  is not very different due to the smearing to both lower and higher  $p_T$ .
- In higher  $p_T$  region, there is always overestimation and it will give underestimated different  $A_N$ .
- In the lowest  $p_T$  region, too much overestimation is prevented from detector geometry.



# Conclusion for RHICf stand alone



- It is expected that the asymmetry increases as a function of  $p_T$  if we refer to the previous studies and RHICf (quick) analysis.
- it may be OK for making the preliminary result with RHICf stand alone if we exclude the high  $p_T$  tails.