Type-I π^0 p_T bin-to-bin contamination and A_N smearing

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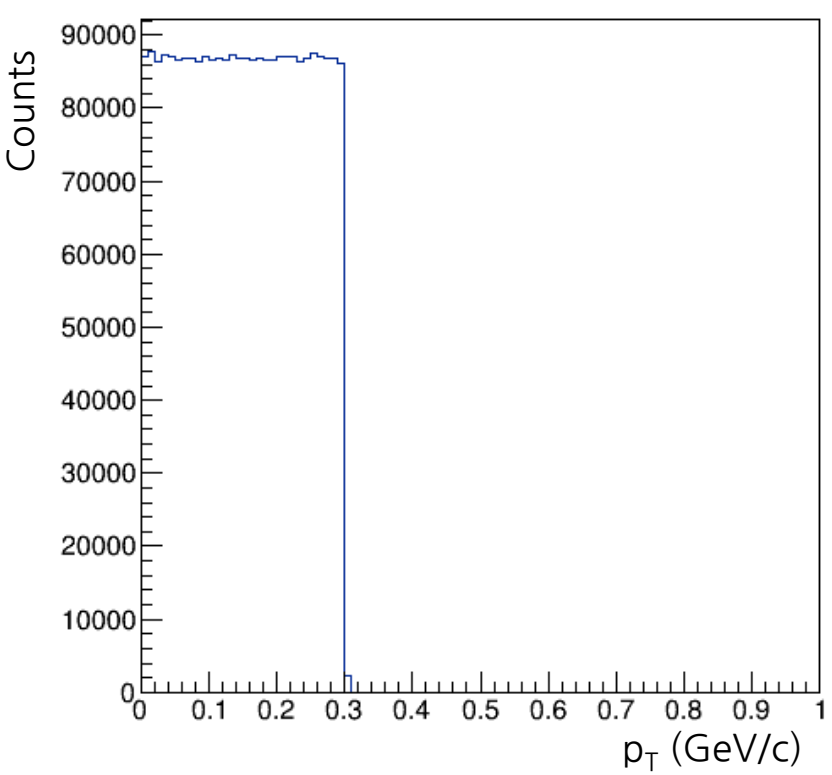
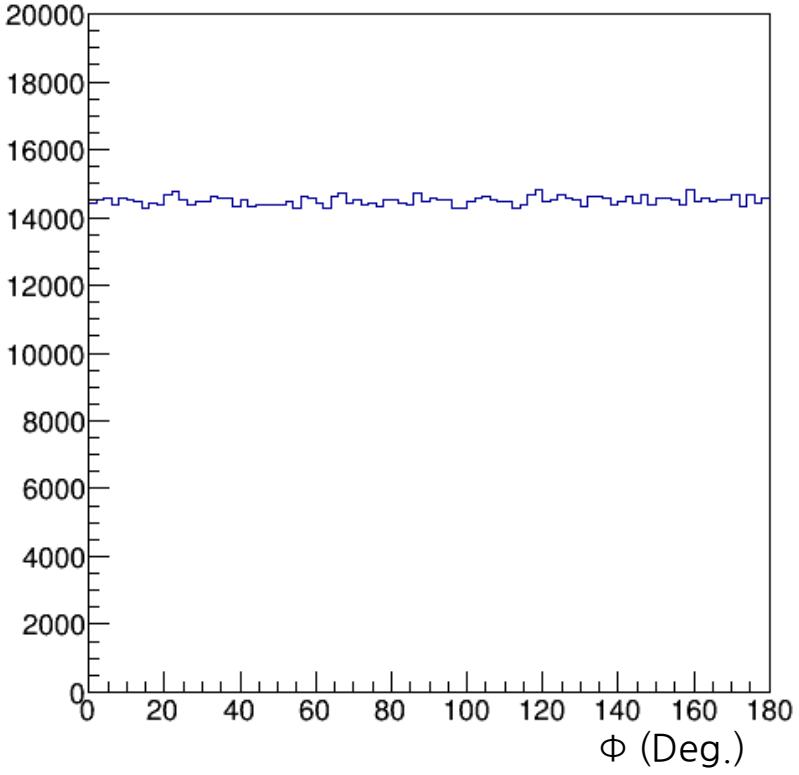
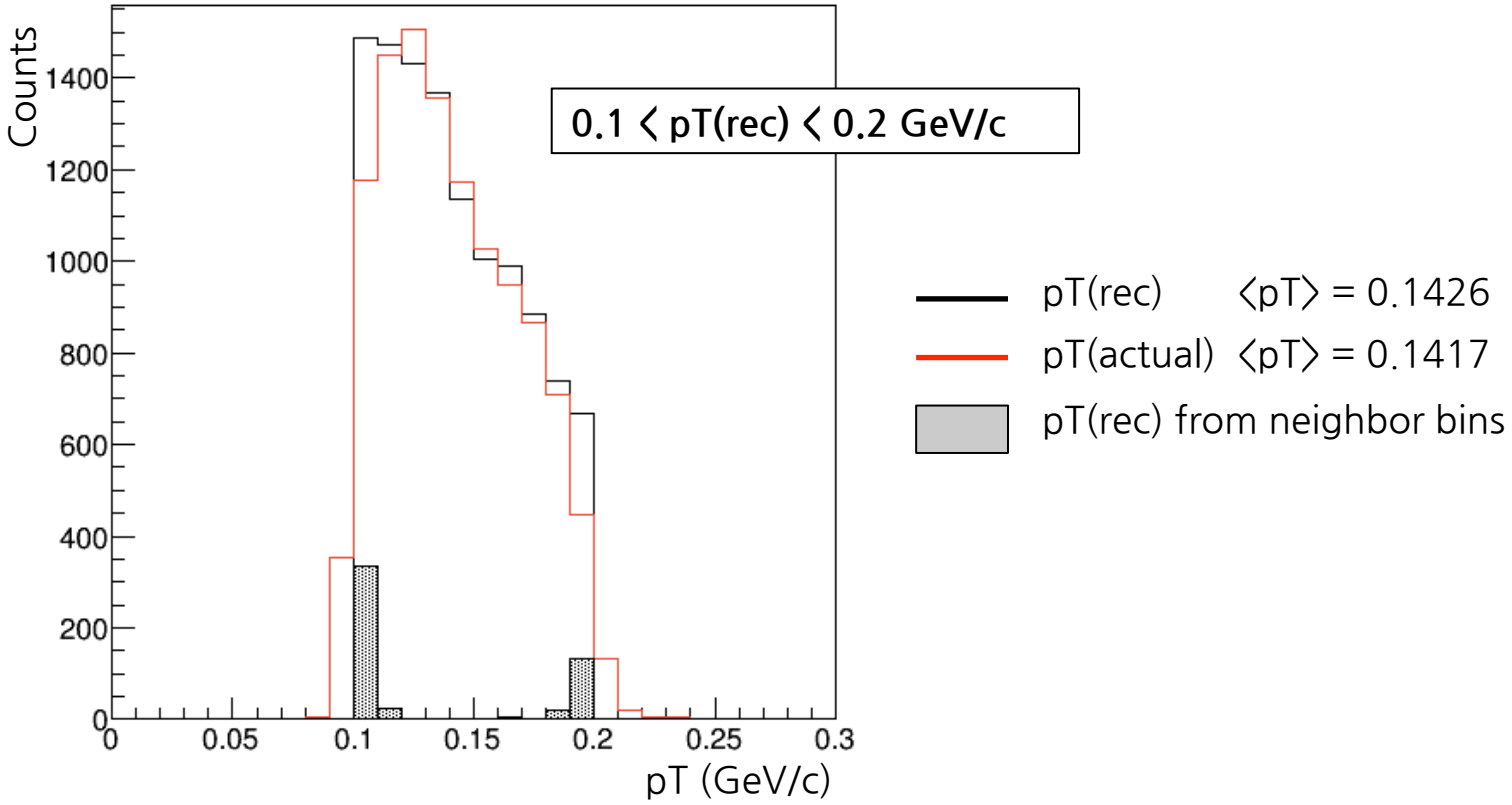
Type-I π^0 Monte Carlo sample ($E \approx 0.6x_F$)





- Type-I π^0 with E = 160 GeV over the p_T range of $0.1 < p_T < 0.3$ GeV/c was generated to study the bin-to-bin p_T contamination and A_N smearing by detector response.

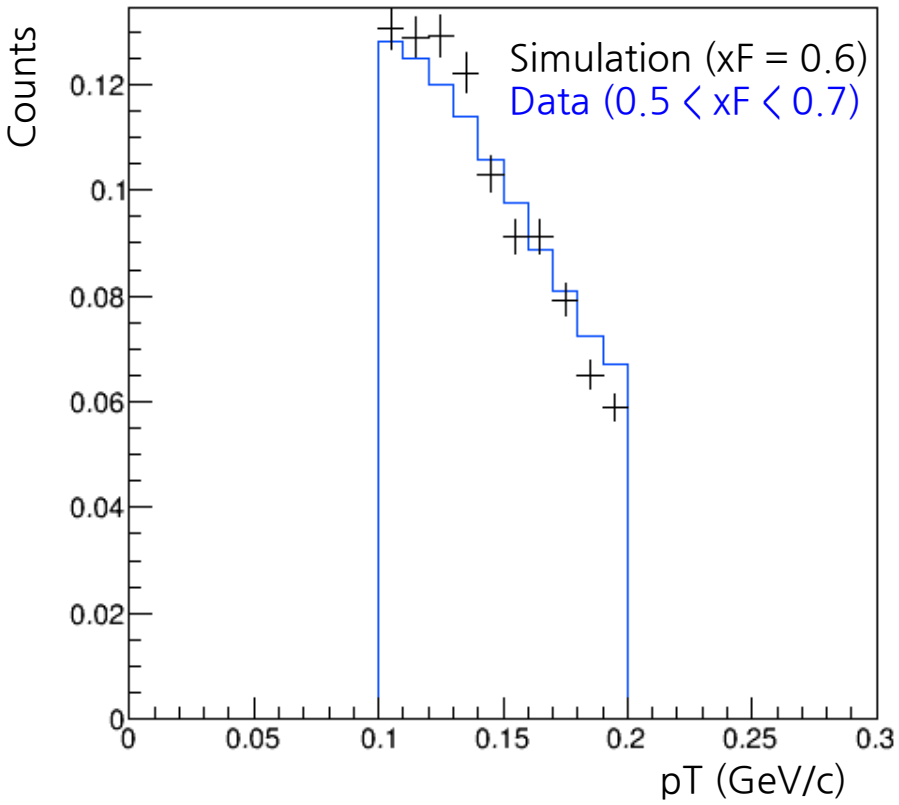
Actual p_T vs Reconstructed p_T



When $0.1 < p_T(\text{rec}) < 0.2$ GeV/c is chosen,

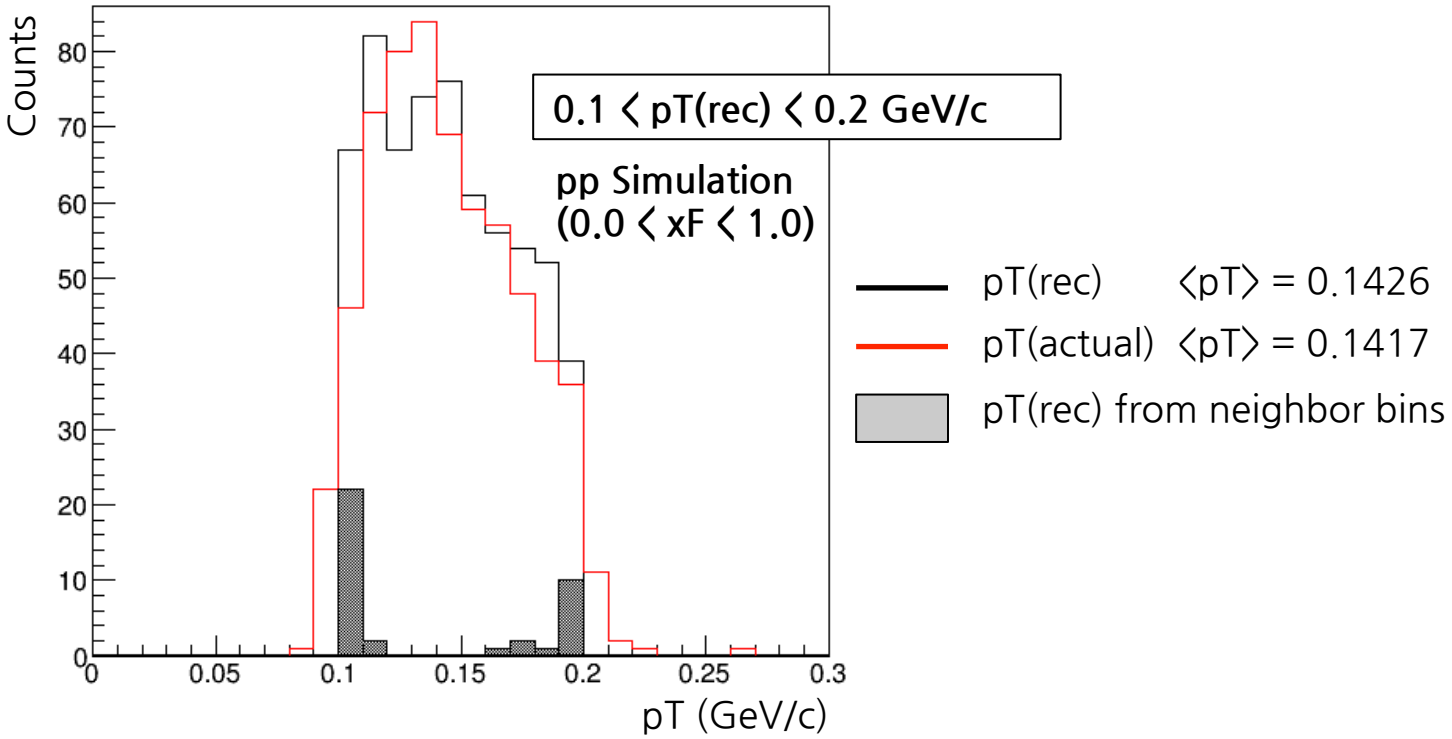
- $\langle p_T(\text{rec}) \rangle$ and $\langle p_T(\text{actual}) \rangle$ are almost same.
- ~ 4% of the entries come from neighbor bins.
- Ratio of π^0 whose actual p_T should be included in other bins is ~ 4%.

Monte Carlo p_T vs Data p_T



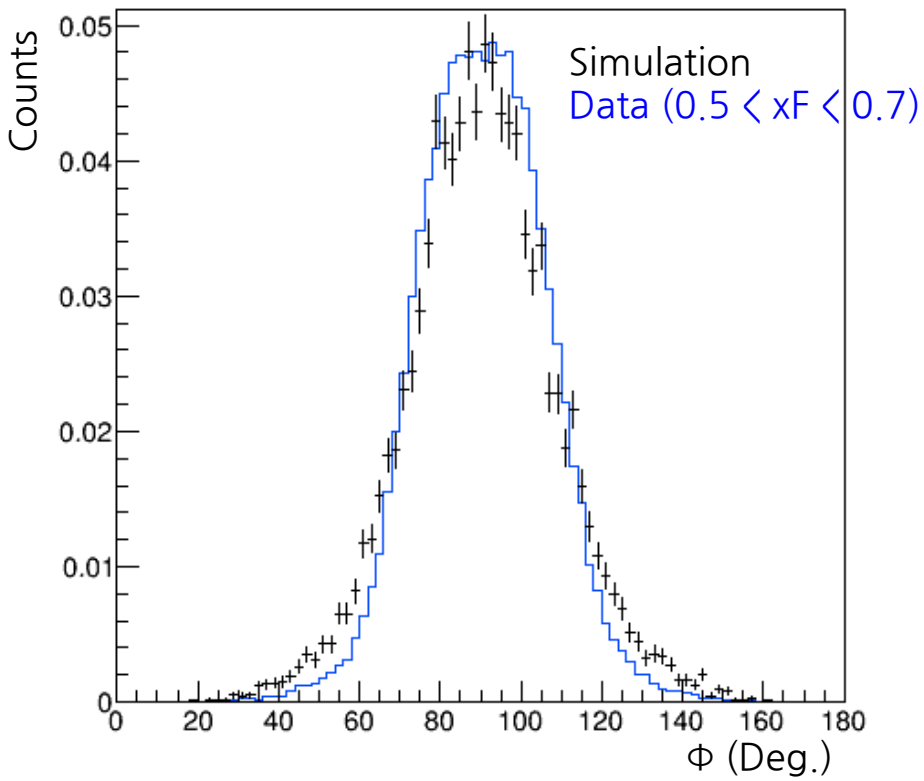
- p_T(rec) distribution of Monte Carlo and data is comparable due to same detector geometry.
- Similar contamination ratio with previous page is also expected to data.

Actual p_T vs Reconstructed p_T (pp Col. Sim.)



- In p+p collision simulation, we can same tendency as well.

Actual A_N vs Corrected A_N



$$A_N = \frac{1}{PD_\phi}\left(\frac{N^\uparrow - RN^\downarrow}{N^\uparrow + RN^\downarrow}\right),$$

where

$$D_\phi = \sum_i \left(\frac{N_i}{N}\right) \sin\phi_i,$$

Input A_N = 0.15
DΦ = 0.948

Reconstructed A_N before correction
= 0.144 +- 0.006
After correction
= 0.152 +- 0.006.

- Φ distribution is also comparable due to same detector geometry.
- AN smearing by detector resolution looks negligible.