



中国科学技术大学

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ALICE

Check of the track-collision association in MC in pp collisions

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MC and cuts

Prompt Jpsi:

LHC24d4a: [anchored to pass6 data](#)

526641, 526964, 527041, 527057

Non-prompt Jpsi:

LHC24d4b: [anchored to pass6 data](#)

526641, 526964, 527041, 527057

jira: <https://its.cern.ch/jira/browse/O2-4849>

Event selection:

$|V_{txZ}| < 10 \text{ cm}$

➤ Track selection:

➤ $p_T > 1 \text{ GeV}/c$

➤ $|\eta| < 0.9$

➤ $TPCncls > 90$

➤ $TPCchi2 < 4$

➤ $ITSncls > 2$

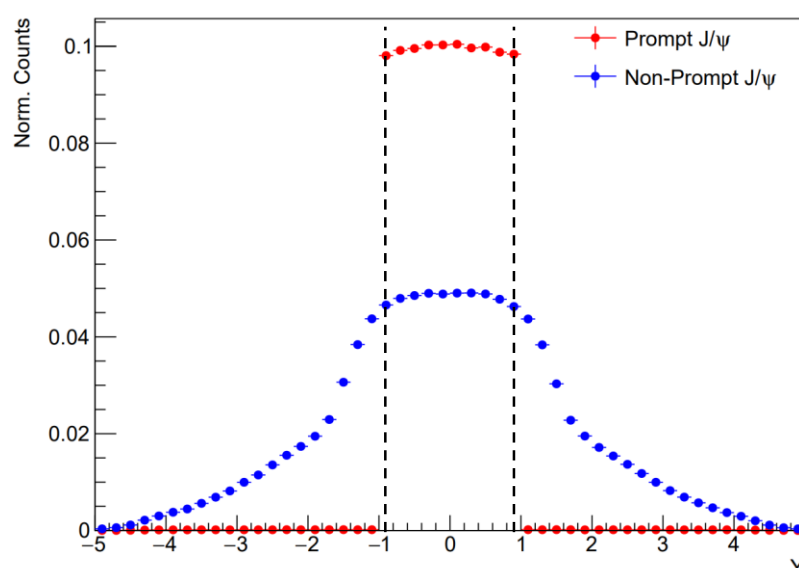
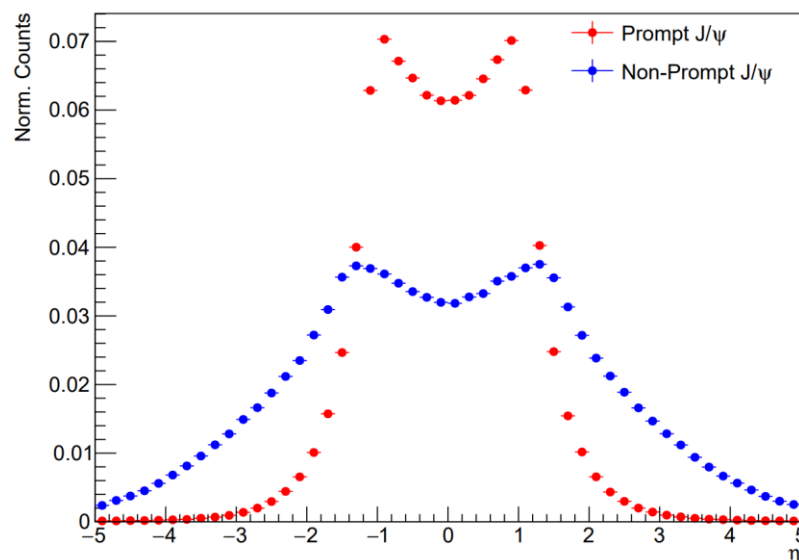
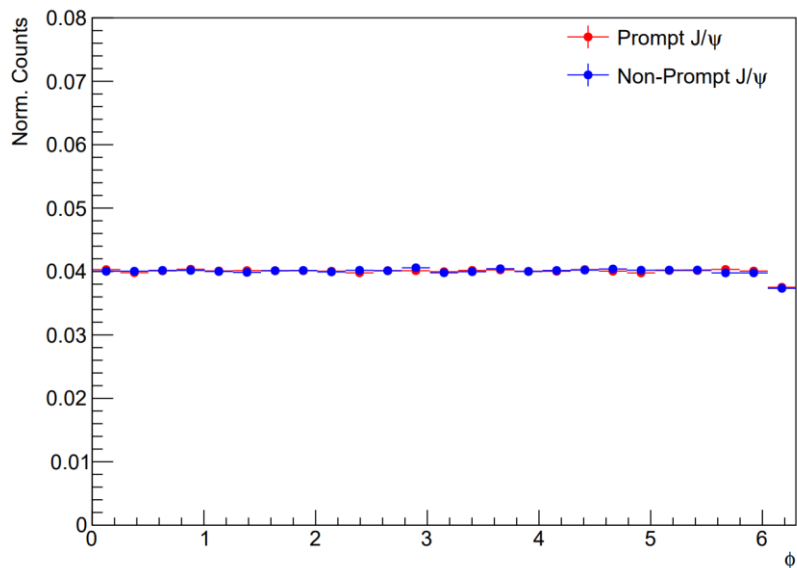
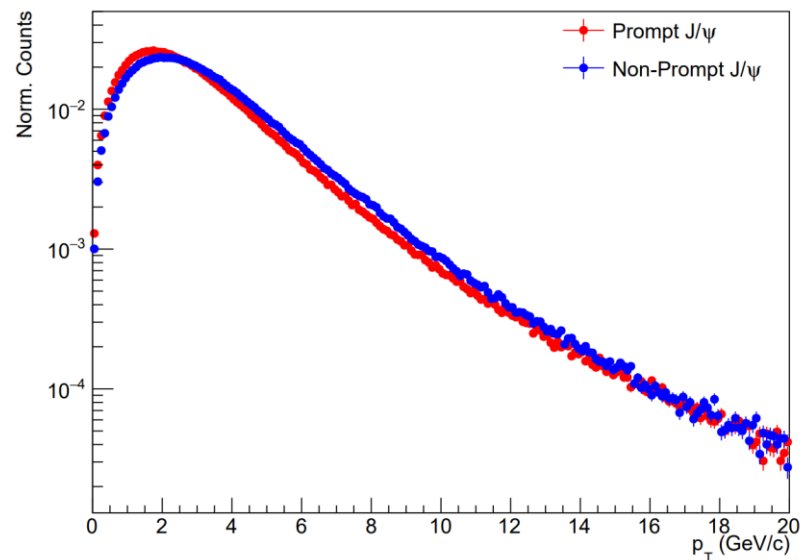
➤ At least one hit on the first 2 layers

➤ $-2 < TPCn\sigma_e < 3$

➤ $TPCn\sigma_p > 3$

➤ $TPCn\sigma_\pi > 3$

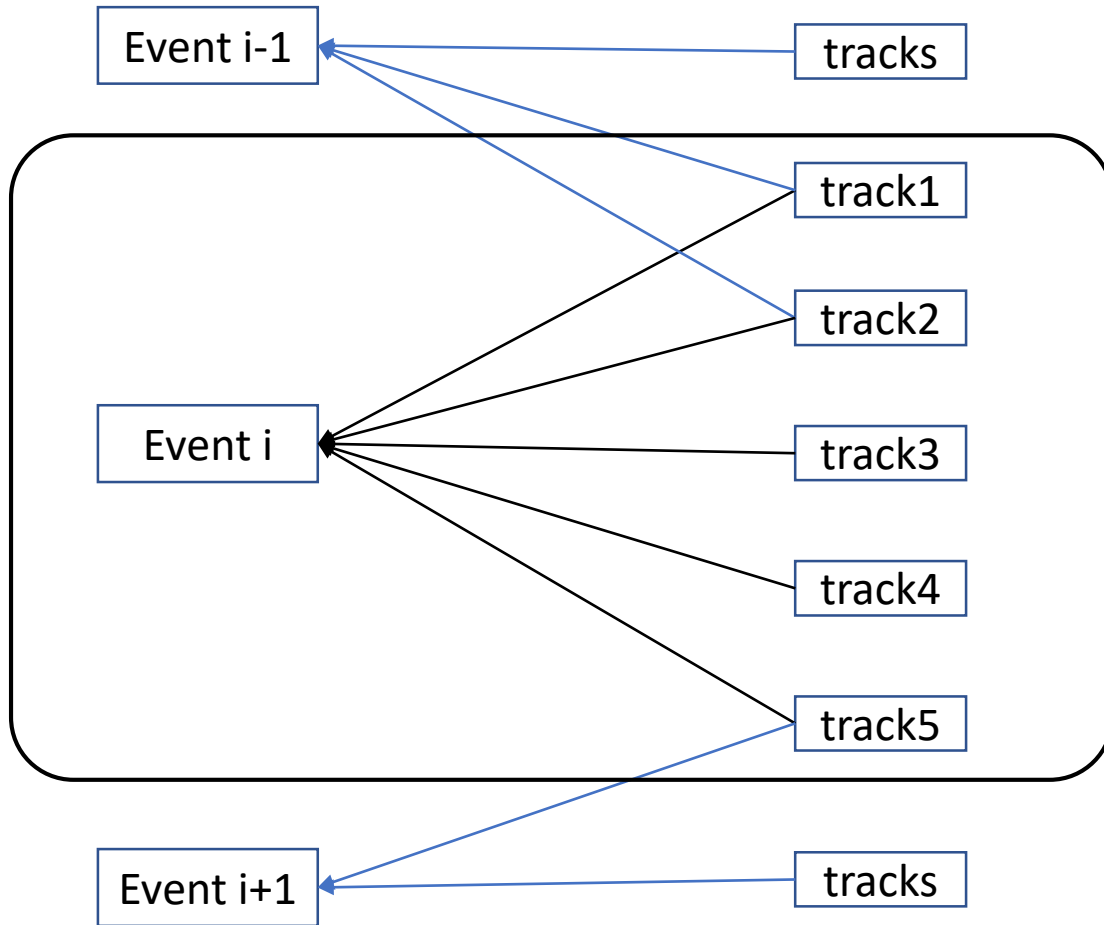
MC generated J/ψ



➤ MC J/ψ with $|y| < 0.9$ are selected

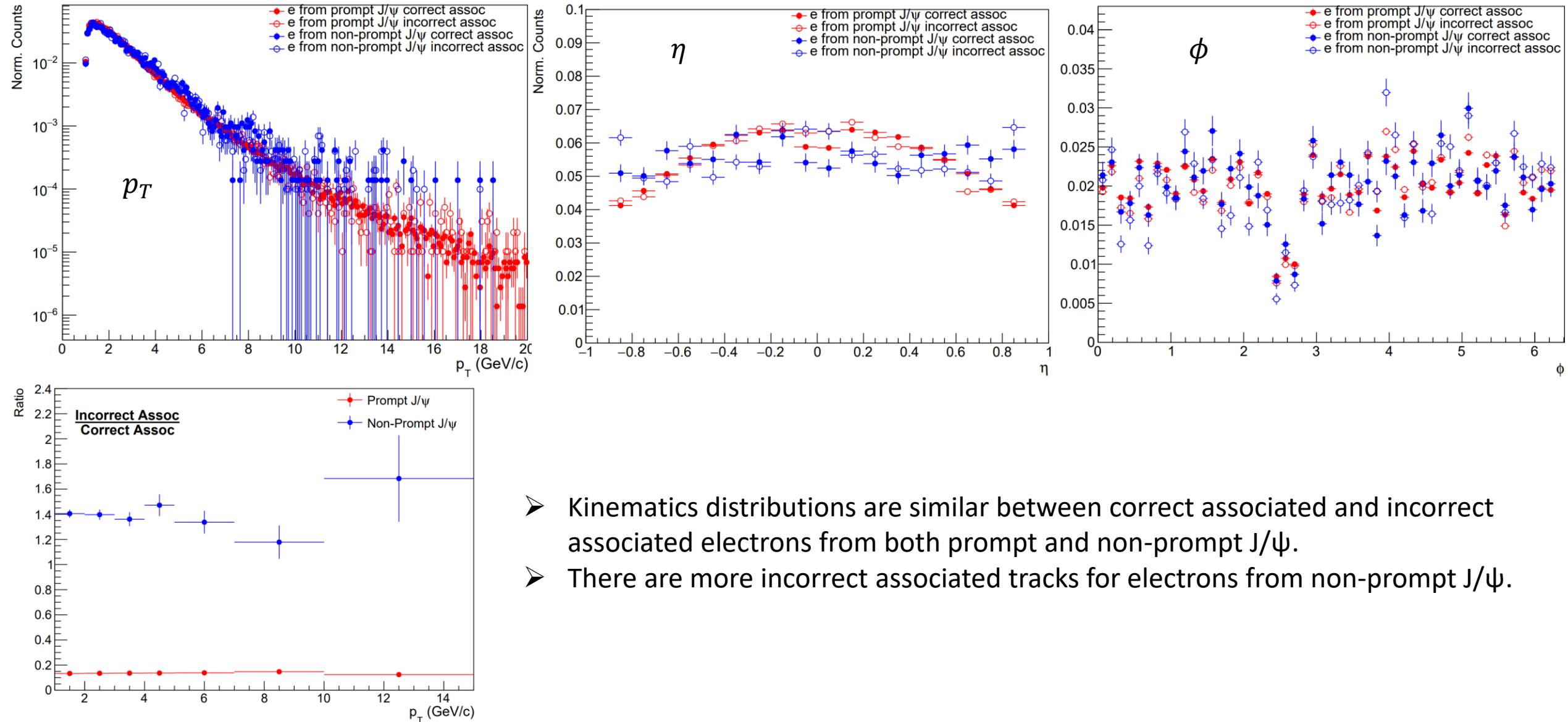
Track-collision association

Associations ($N\sigma < 4$ time compatibility)



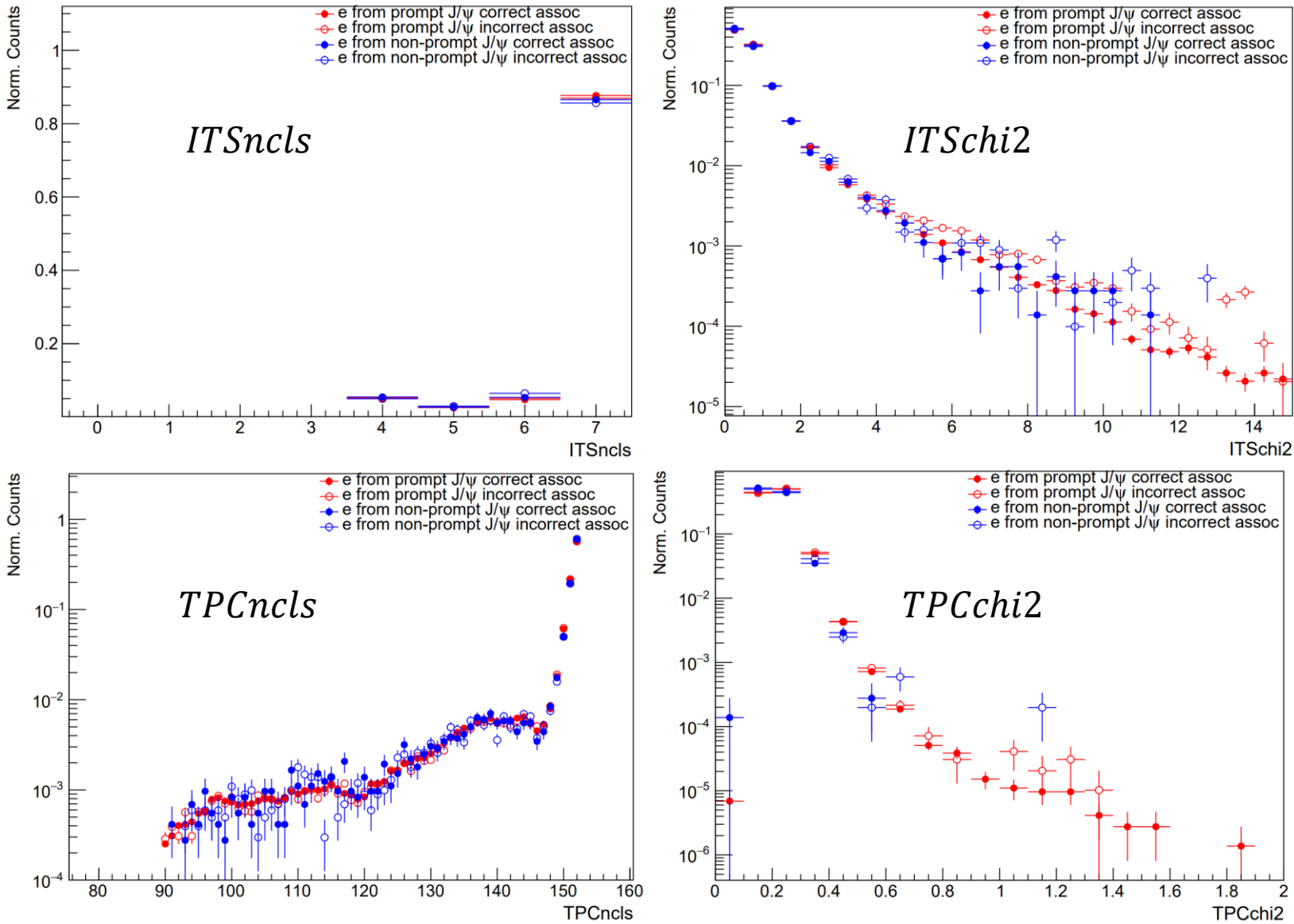
- Loop and pair all the tracks that associated to the same event.
- Remove pairs that both two legs are associated to more than one events.
(ambiguous pairs)

Associated tracks



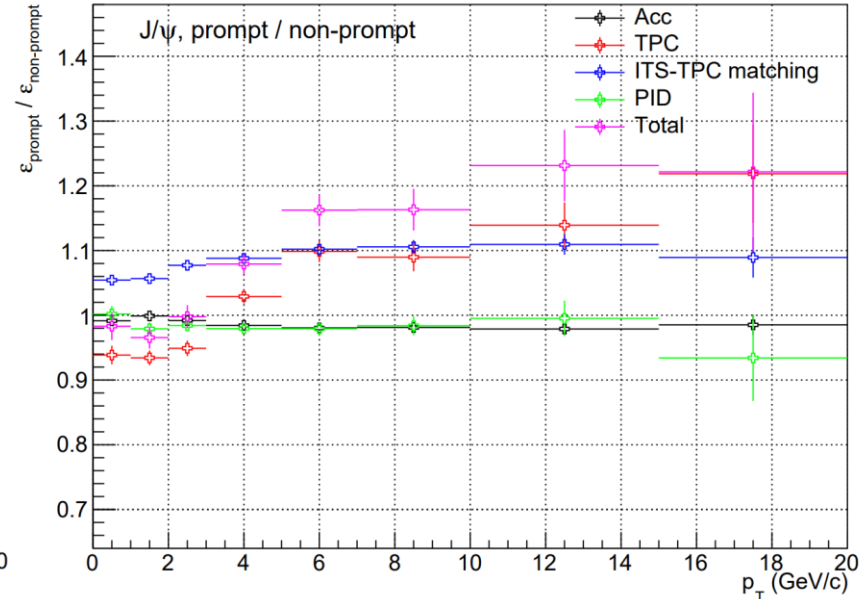
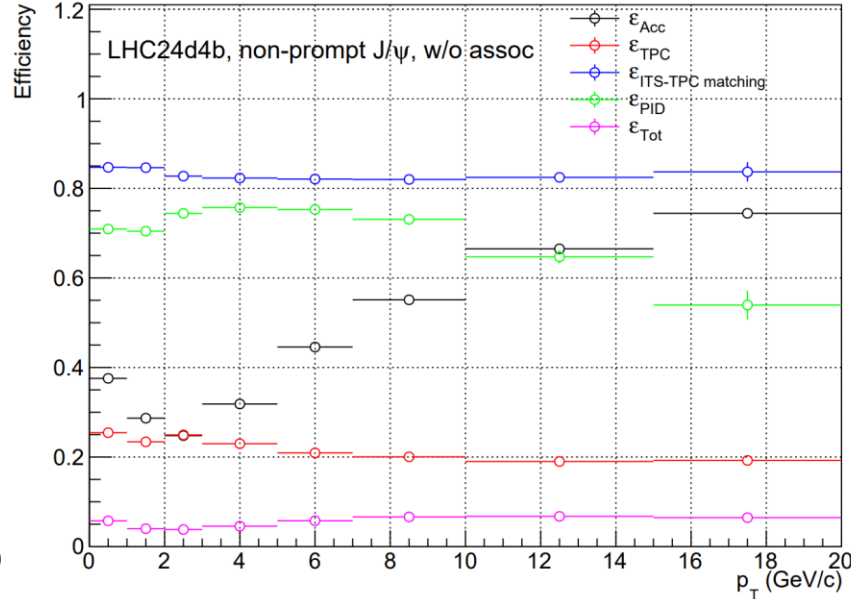
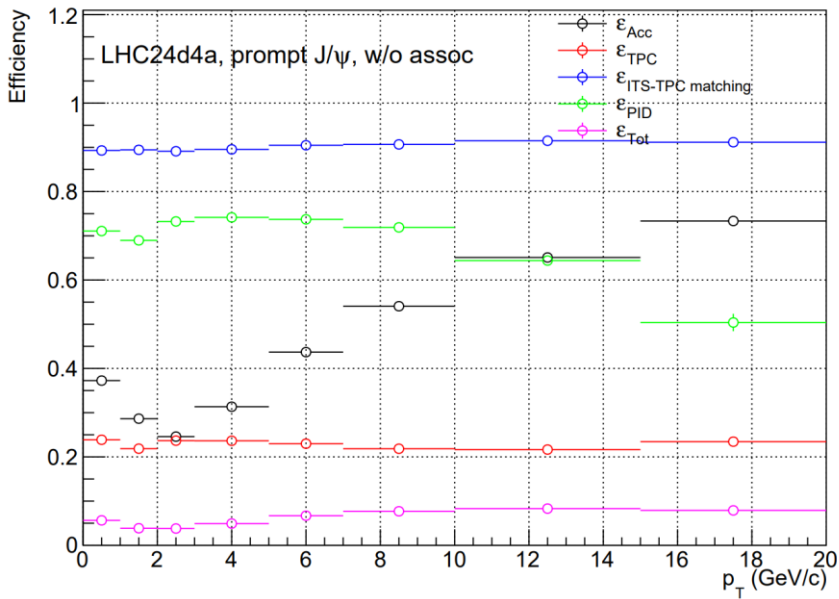
- Kinematics distributions are similar between correct associated and incorrect associated electrons from both prompt and non-prompt J/ ψ .
- There are more incorrect associated tracks for electrons from non-prompt J/ ψ .

Tracking performance



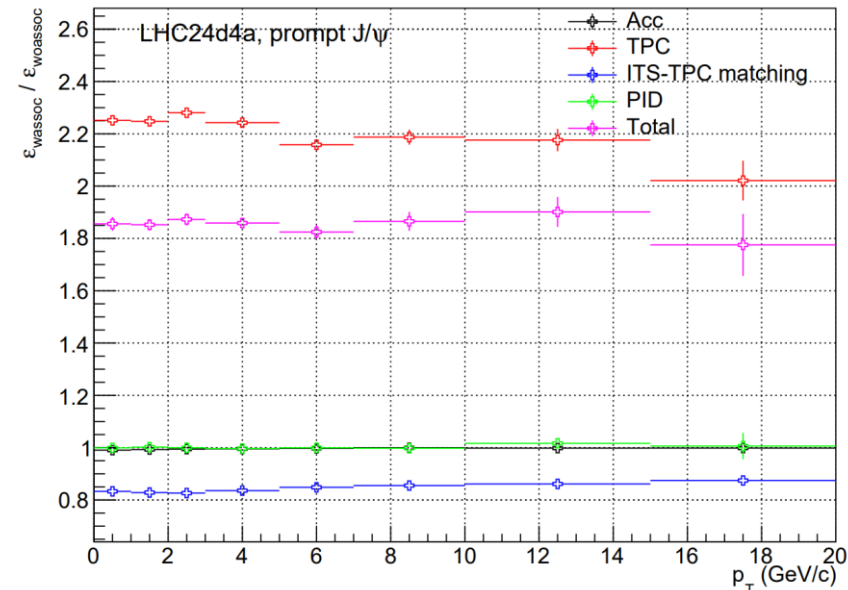
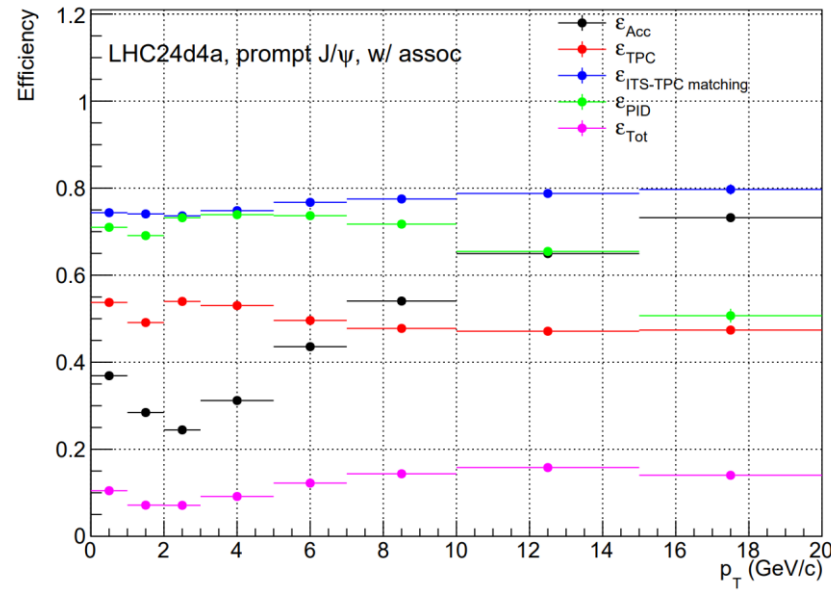
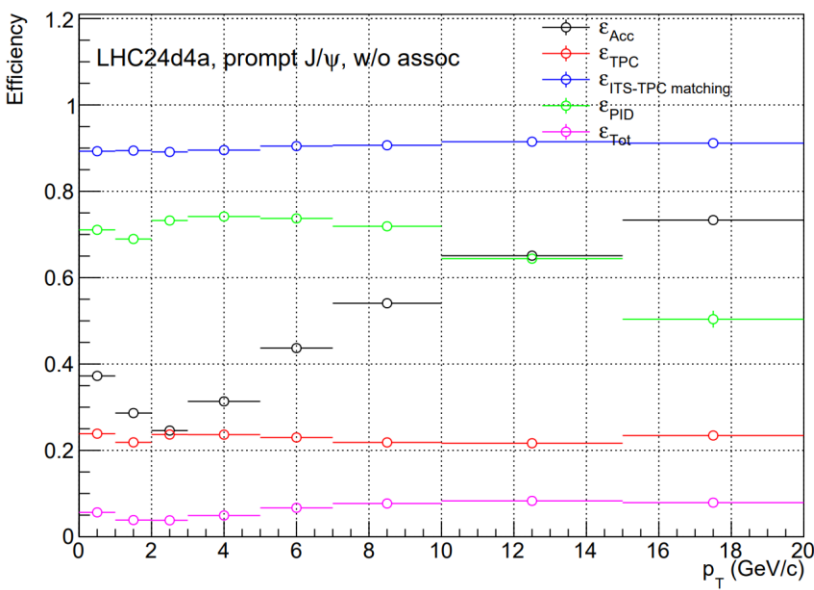
➤ ITS and TPC tracking performance are similar between correct and incorrect associated electrons.

Efficiency



- The TPC tracking efficiency is less than 30%.
- The difference of efficiency between prompt and non-prompt J/psi is $\sim 20\%$ in high p_T and mostly contributed by TPC tracking and ITS-TPC matching efficiency.

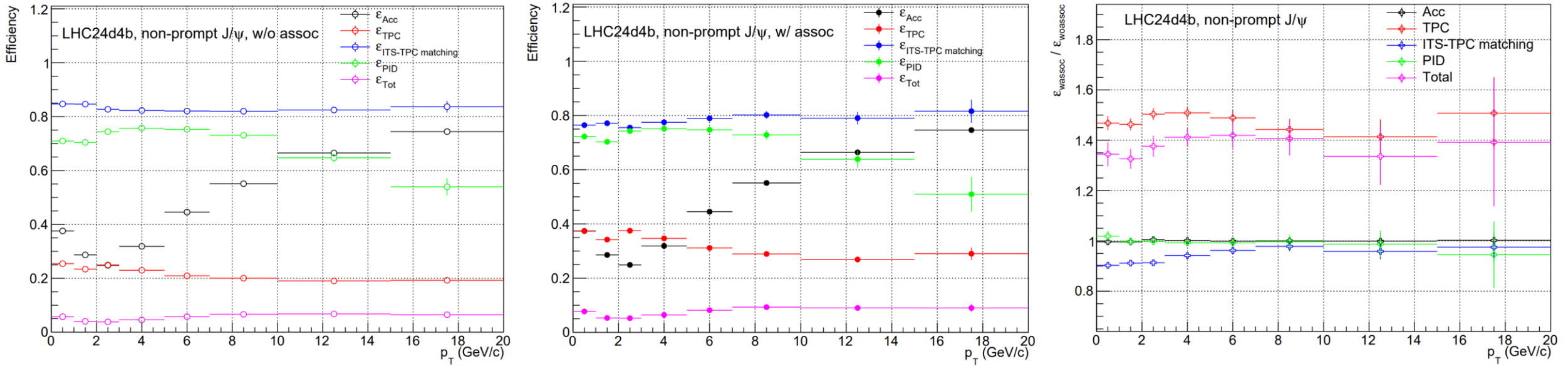
Efficiency with association



For prompt Jpsi:

- After using track-collision association, the tracking and total efficiency are nearly double.
- The ITS-TPC matching efficiency decrease $\sim 20\%$.

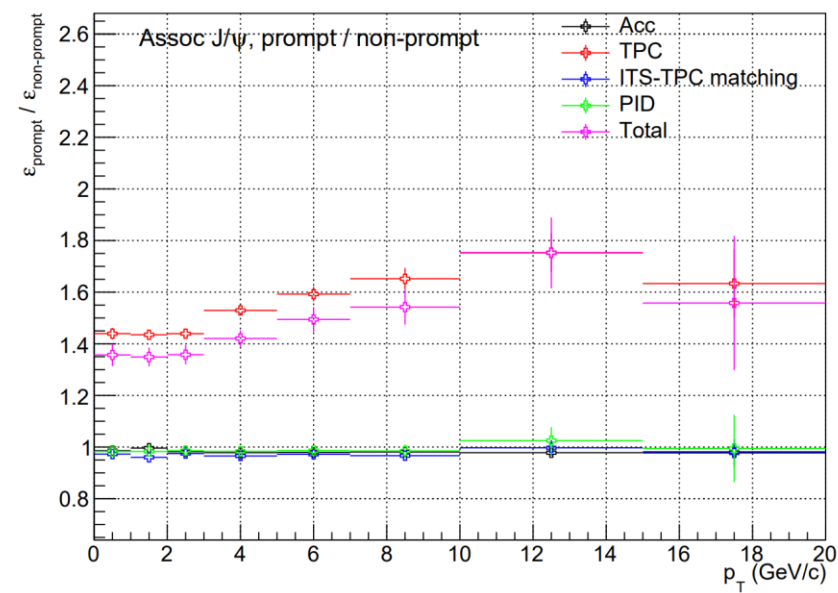
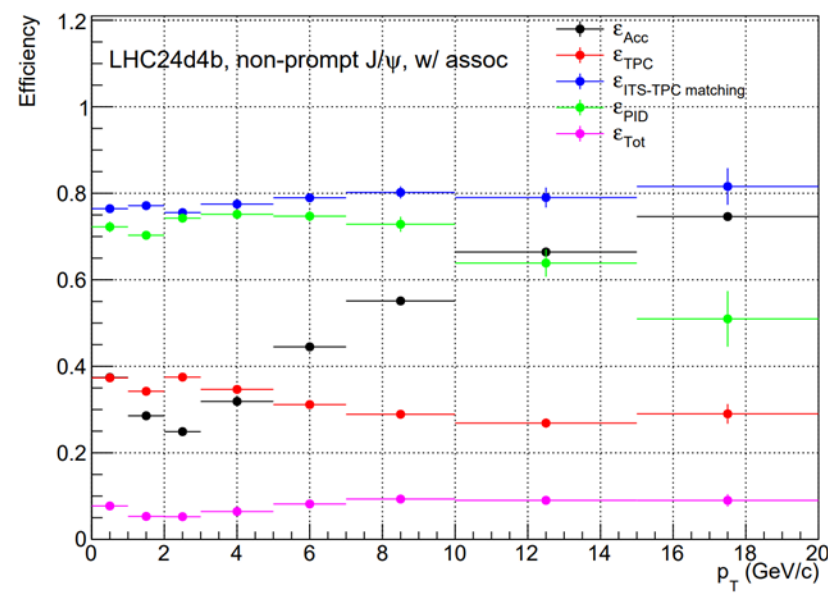
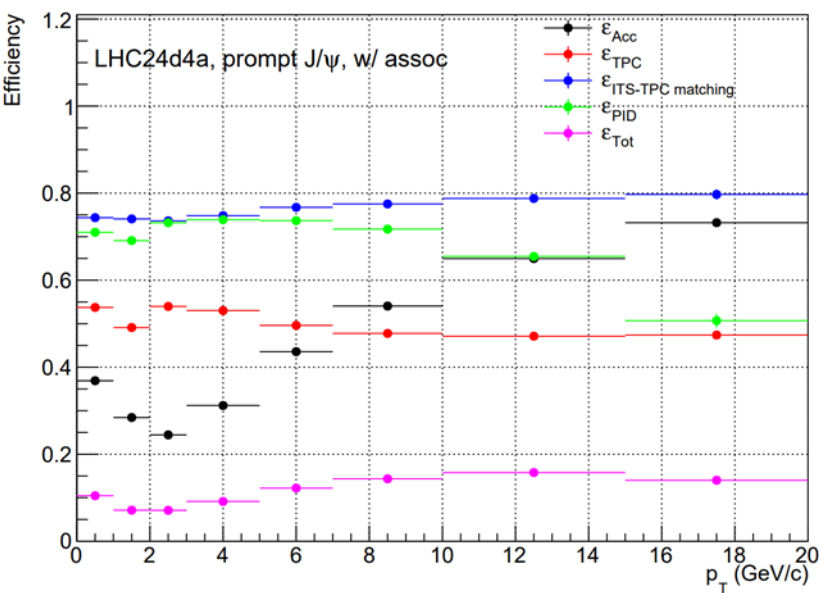
Efficiency with association



For non-prompt Jpsi:

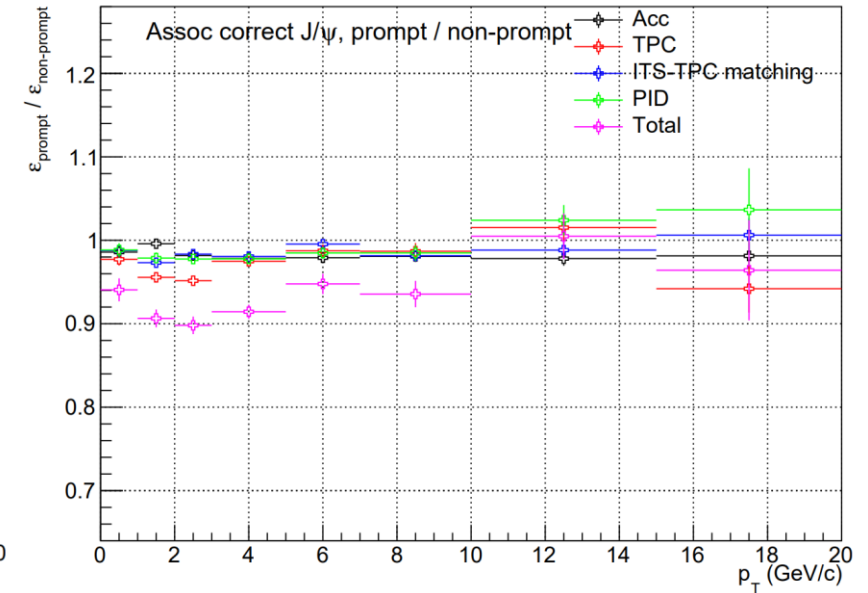
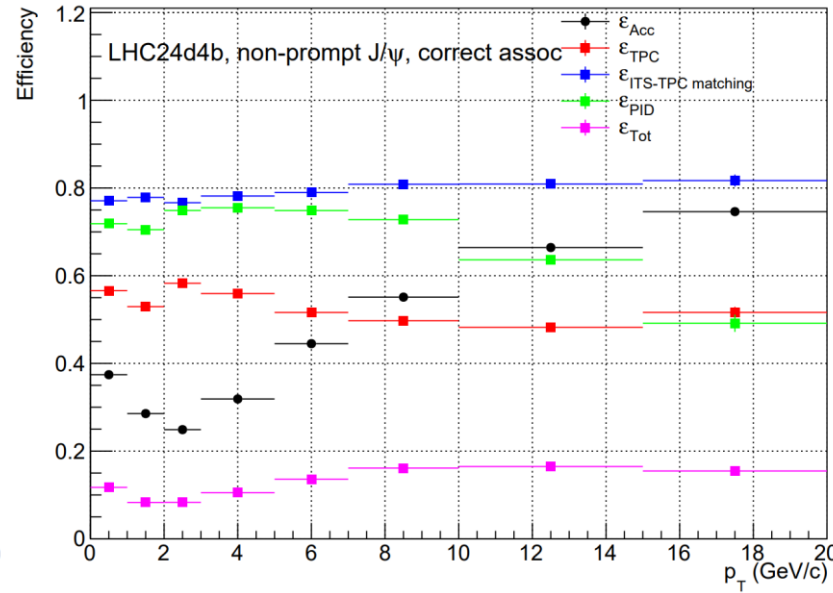
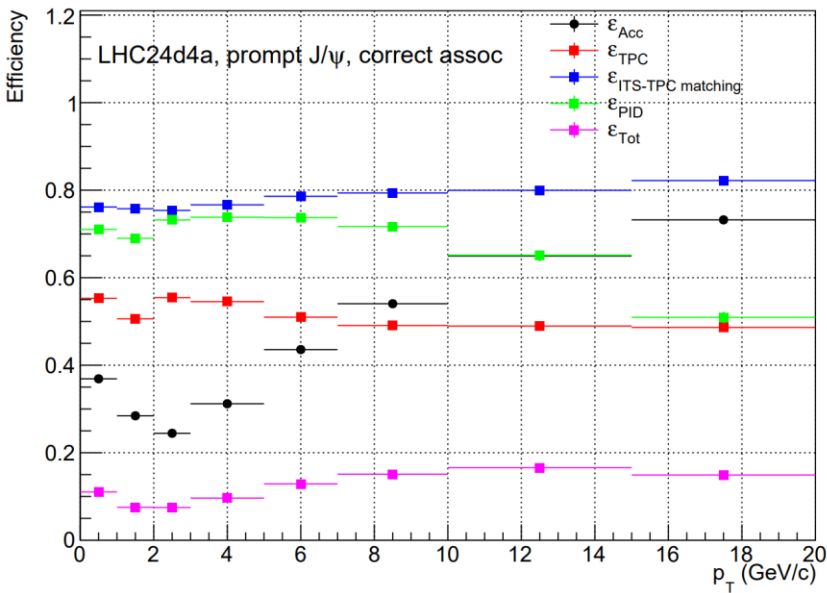
- After using track-collision association, the tracking and total efficiency increase $\sim 40\%$.
- The ITS-TPC matching efficiency decreased less than 10%.

Efficiency of prompt and non-prompt Jpsi



➤ The difference of efficiency between prompt and non-prompt Jpsi can reach 60% after association.

Correct association



J/ψ $\begin{cases} e^+ \text{ ambiguous} \\ e^- \text{ ambiguous} \end{cases}$

- If we select the correct association from all the pairs, the efficiency of non-prompt Jpsi will be the same with prompt J/ψ.
- Some reconstructed non-prompt J/ψ are marked as ambiguous pairs and lost.

Summary

- The efficiency of prompt and non-prompt J/ψ are studied with and without track-collision re-association in high IR MC.
 - The re-association can recover some J/ψ signal. The efficiency of prompt J/ψ is nearly double and increase $\sim 40\%$ for non-prompt J/ψ .
 - The efficiency of prompt and non-prompt J/ψ are $\sim 20\%$ different in high p_T , and increase to 60% after re-association.
 - Some non-prompt J/ψ signals will be lost as ambiguous pairs.