NanoAODs production packages comparison for $B^0 \rightarrow K^{*0} \mu^+\mu^-$ decay channel

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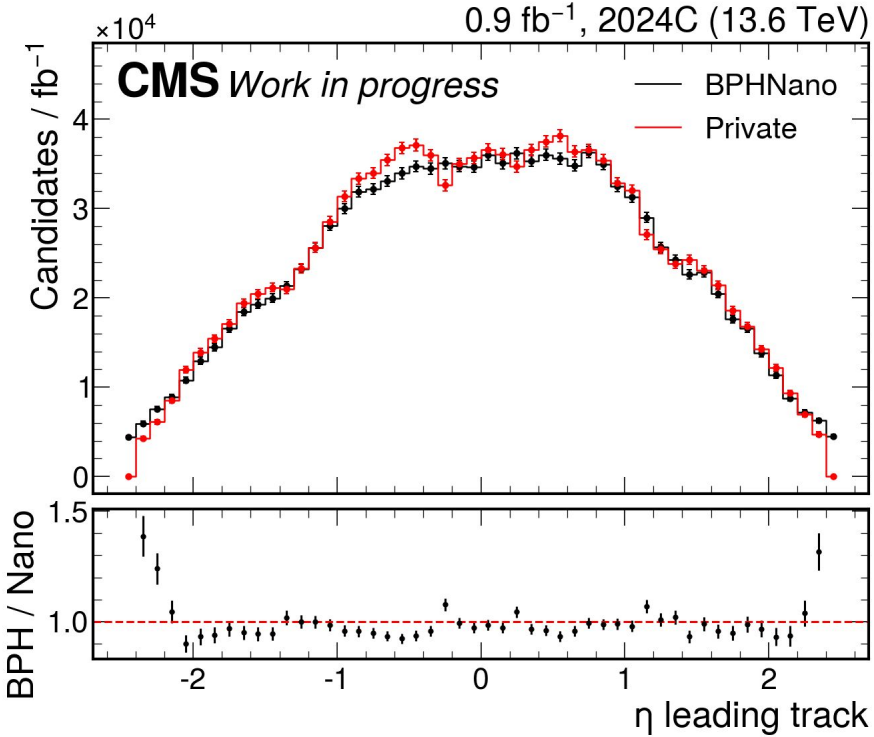
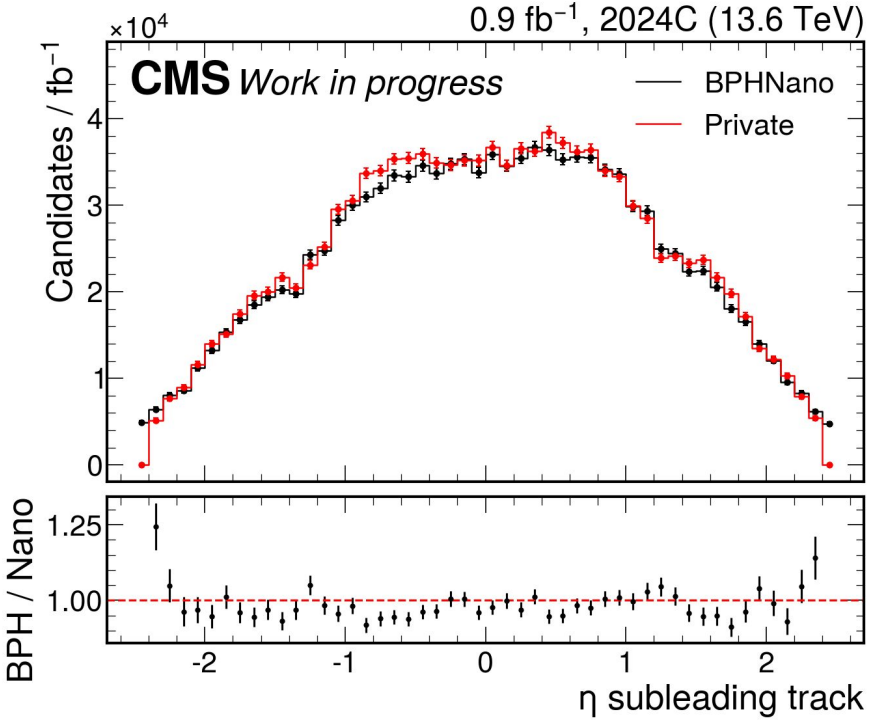
13/07/2026

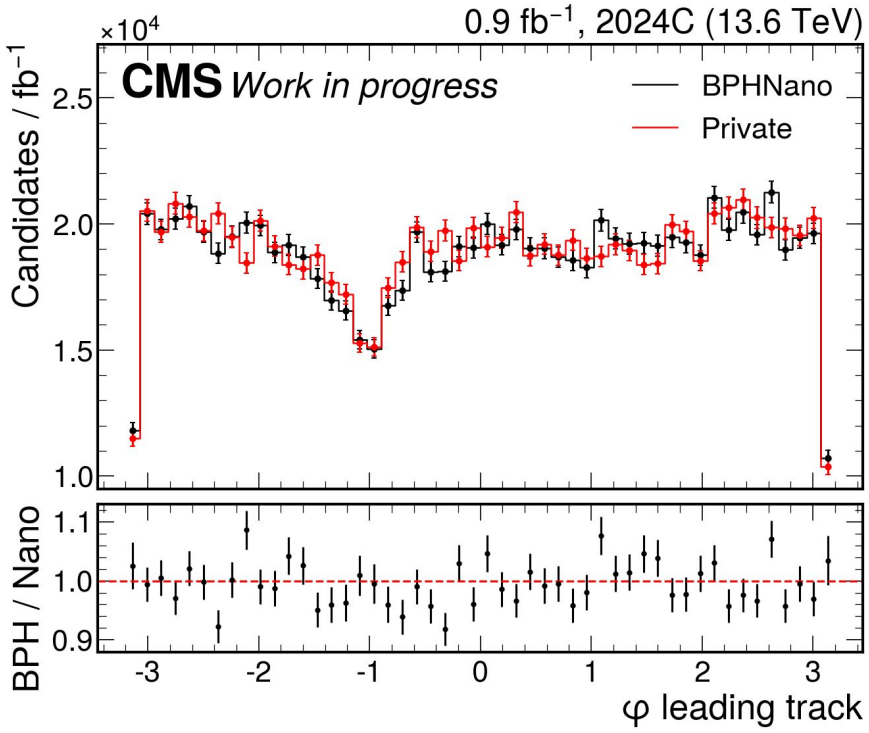
Corrected plots

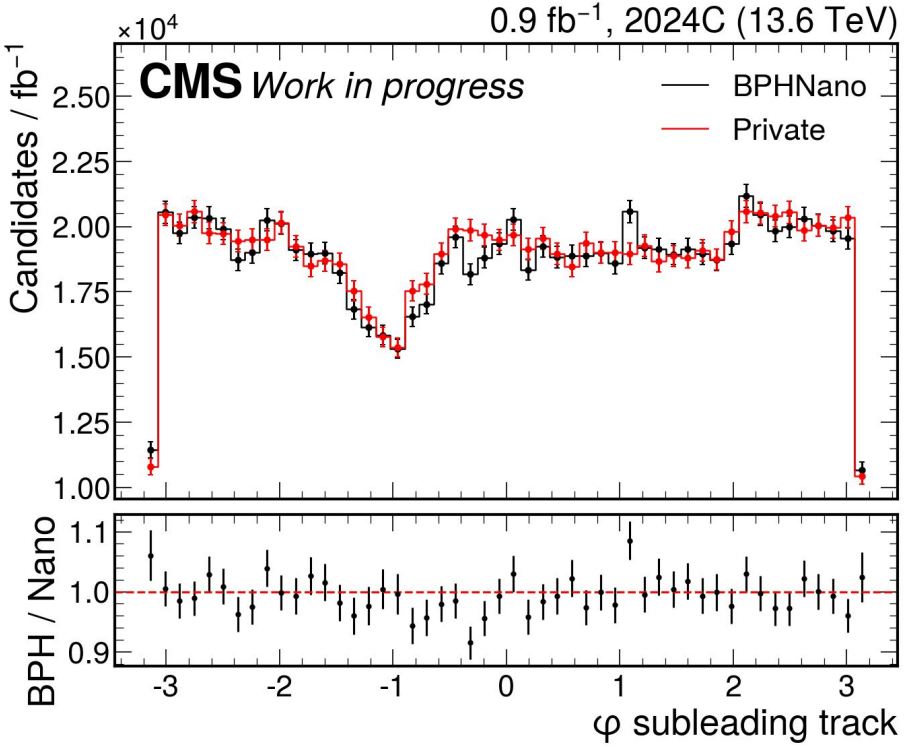
Plots of track pT after correcting the misordering in the code



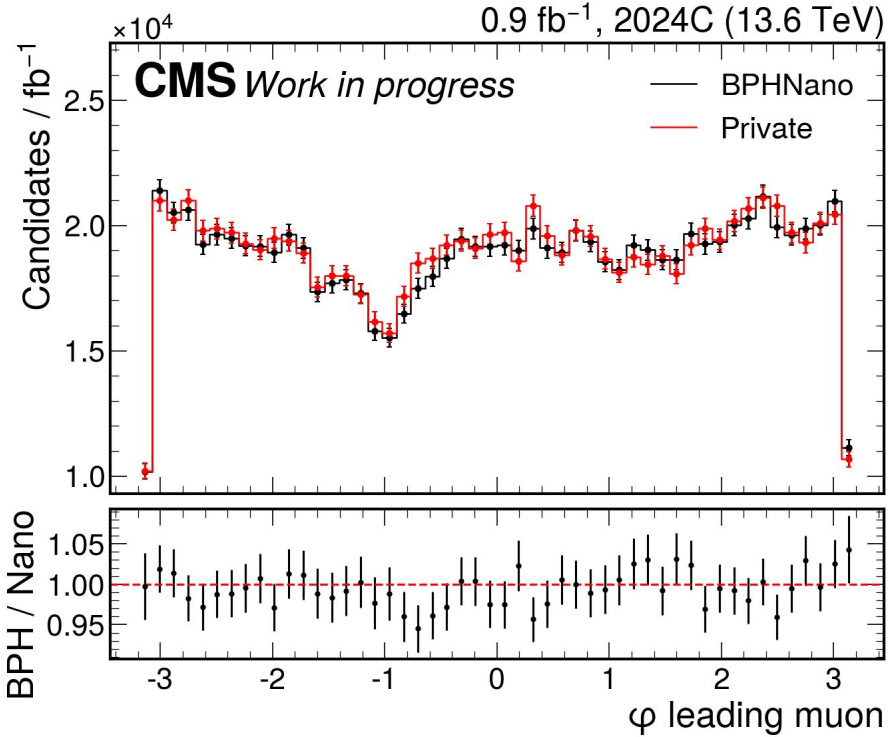


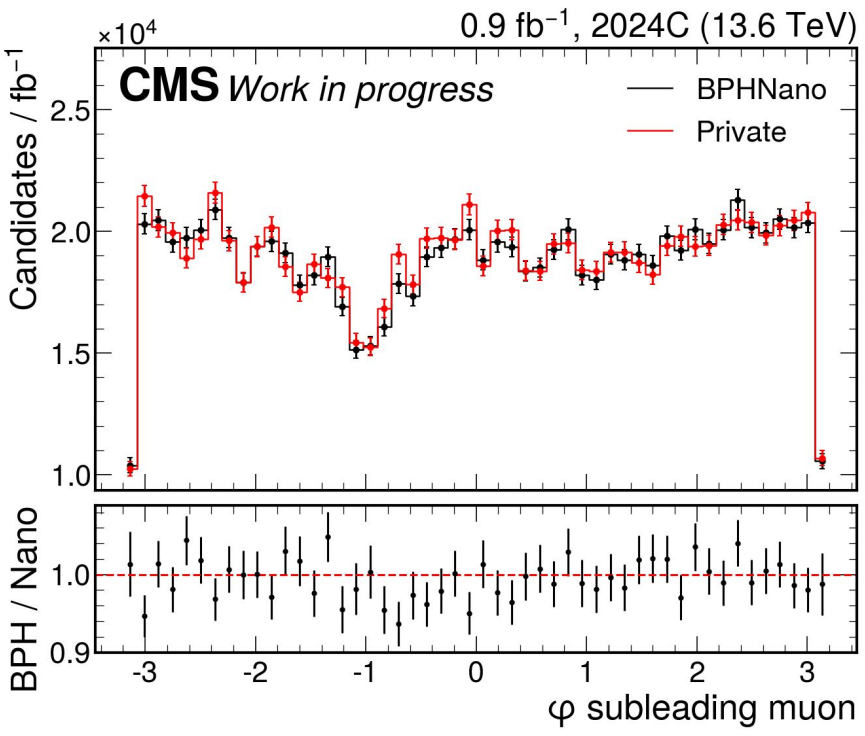
Corrected plots



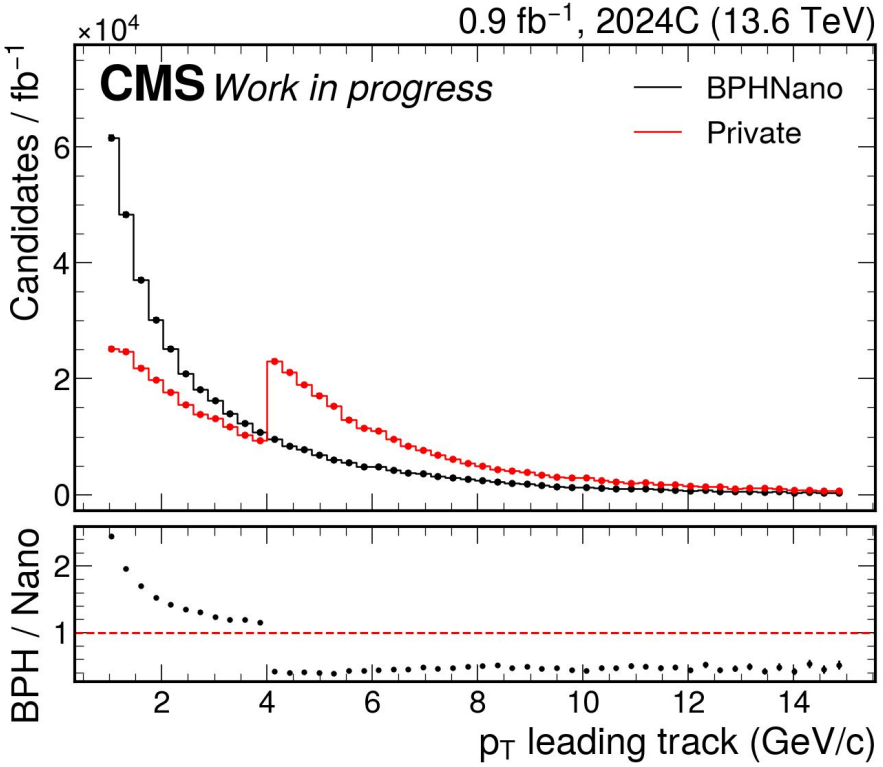


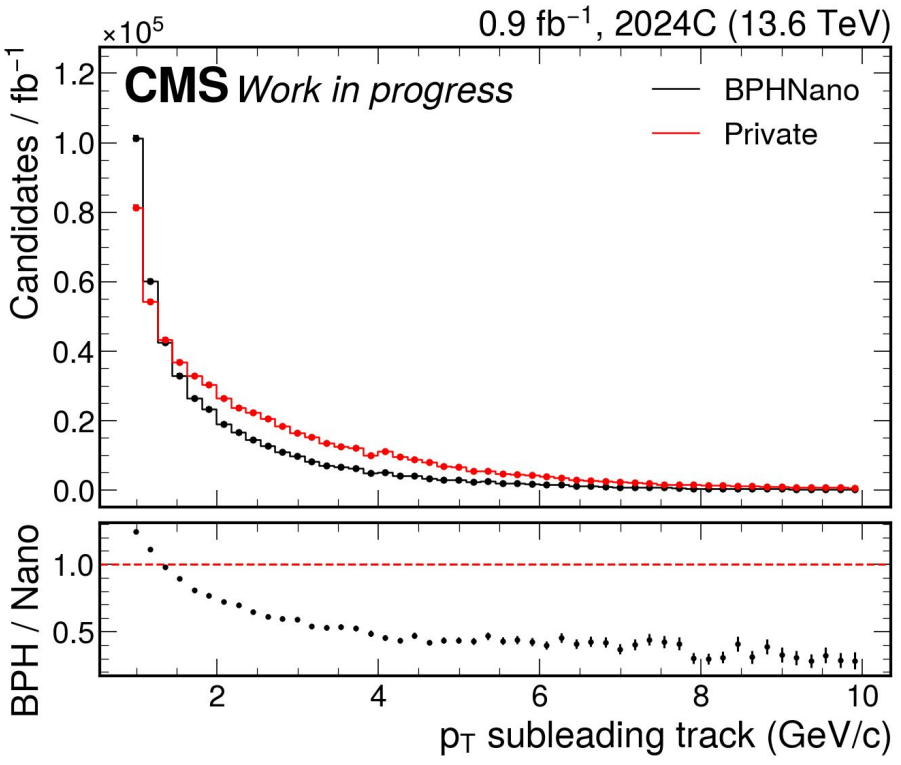
Corrected plots





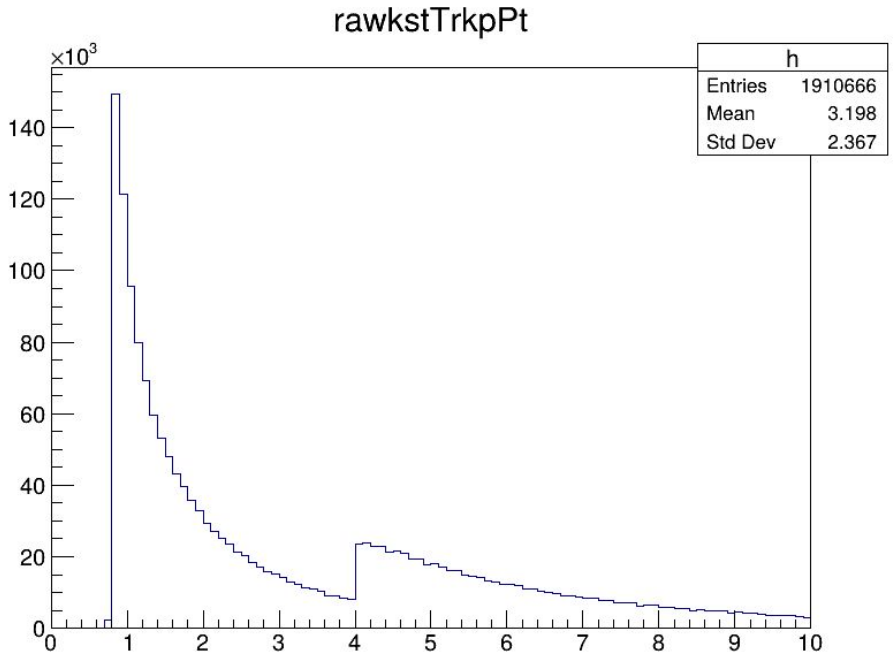
Corrected plots

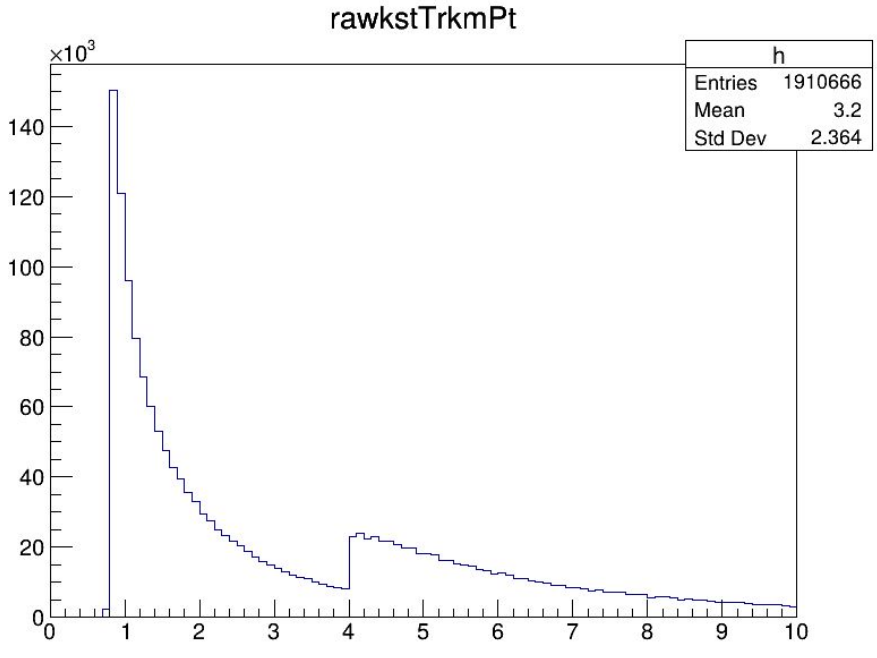




Investigation on tracks p_T

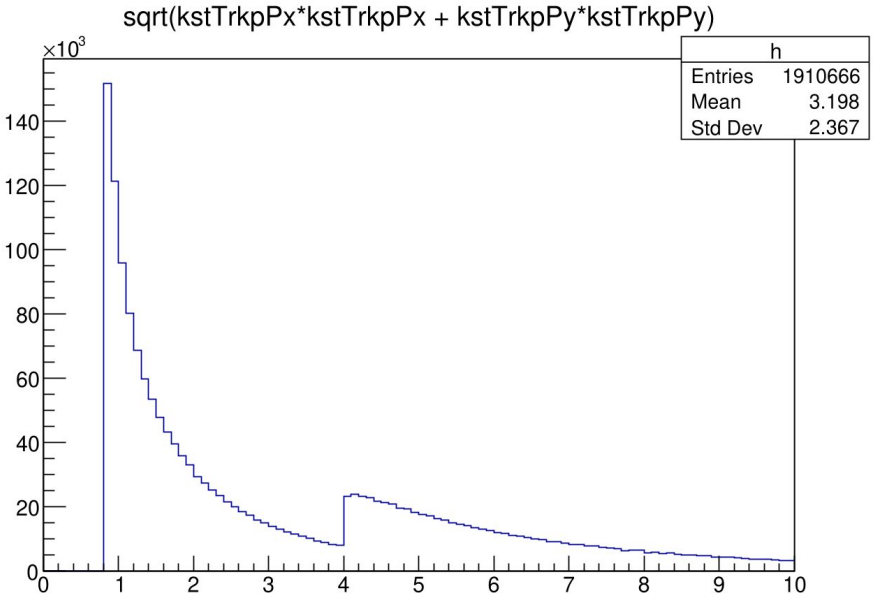
Inspection of the raw ROOT file directly in the terminal shows that the feature is intrinsic to the variable itself.

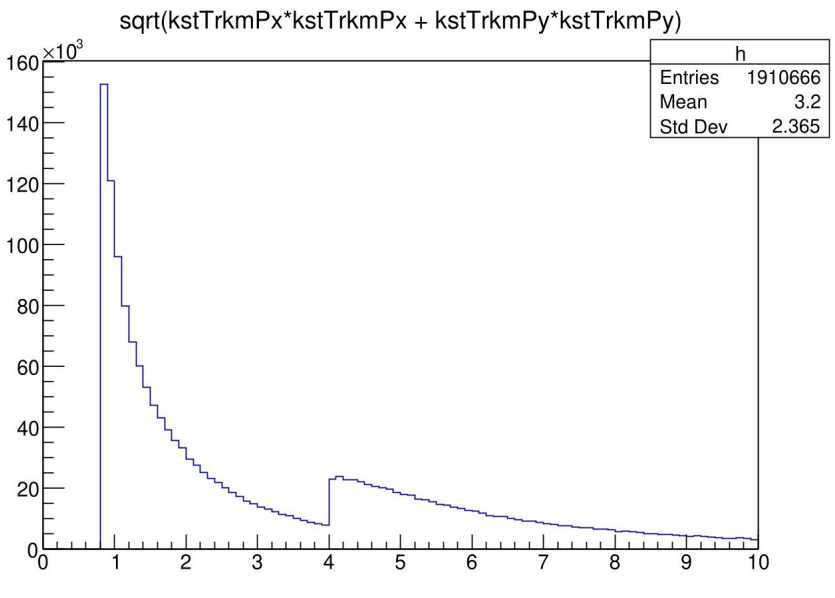




Investigation on tracks p_T

Tried to use post fit p_T variable, which also shows the same behavior.



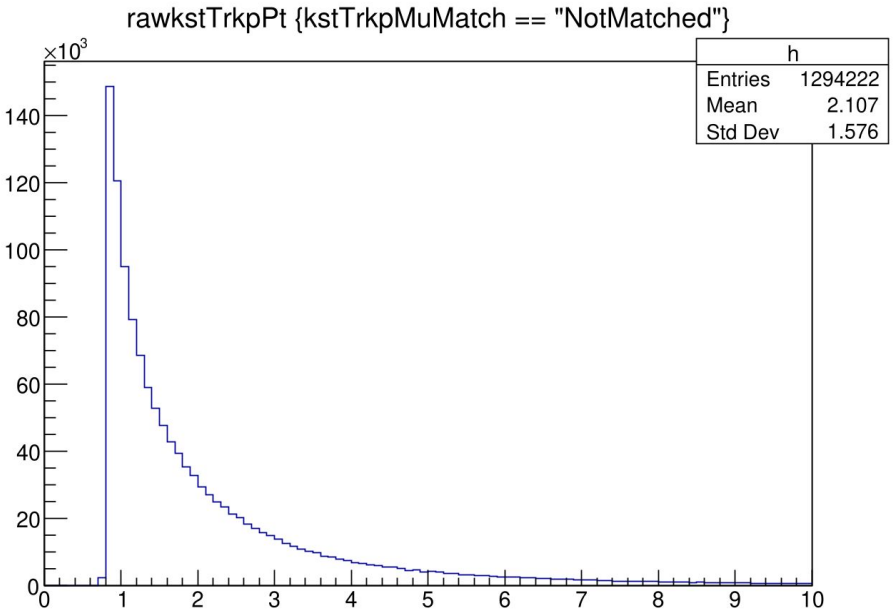


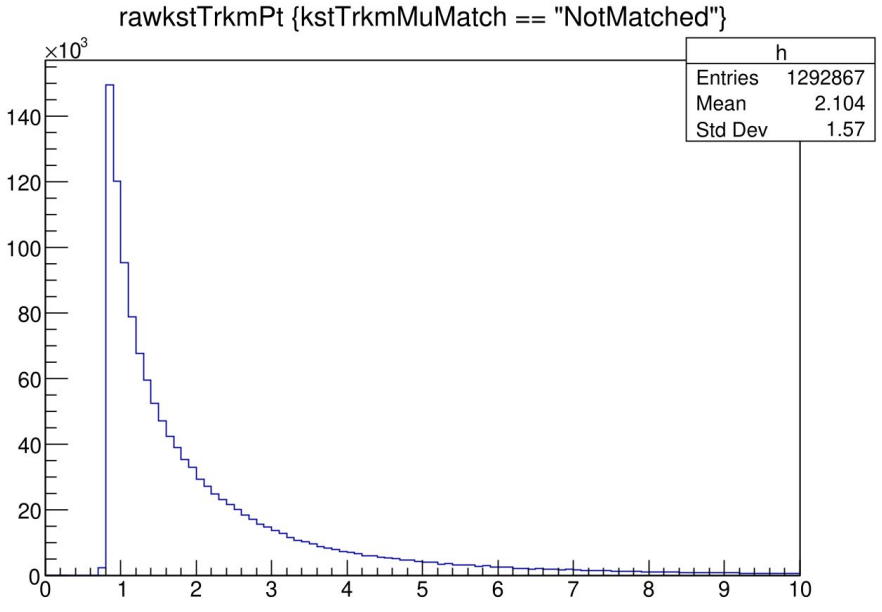
Peaks are localized at 0.8 GeV (hadronic cut) and 4 GeV (muon cut), which suggests tracks include both hadrons and muons.

Investigation on tracks p_T

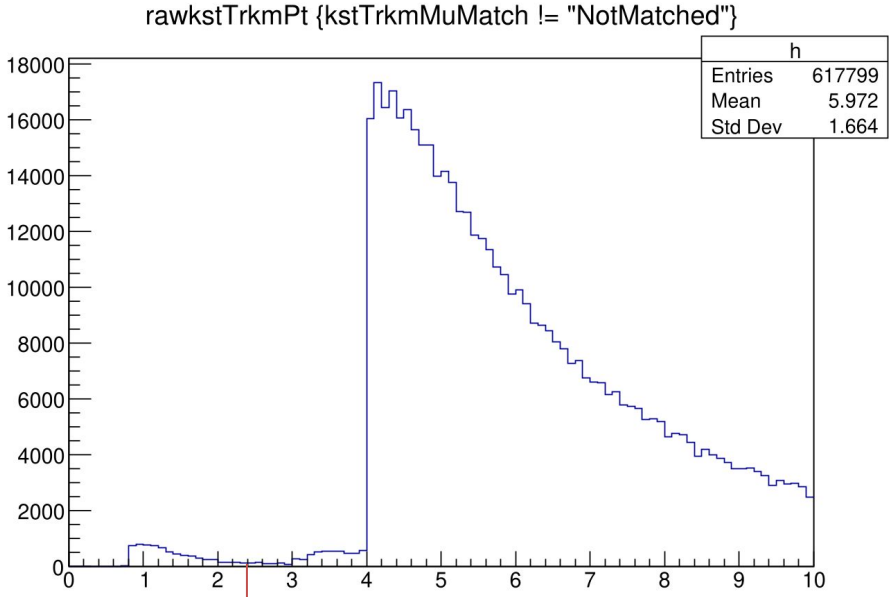
Solution: Use the string branches that indicate whether a hadronic track is matched to a reconstructed muon:

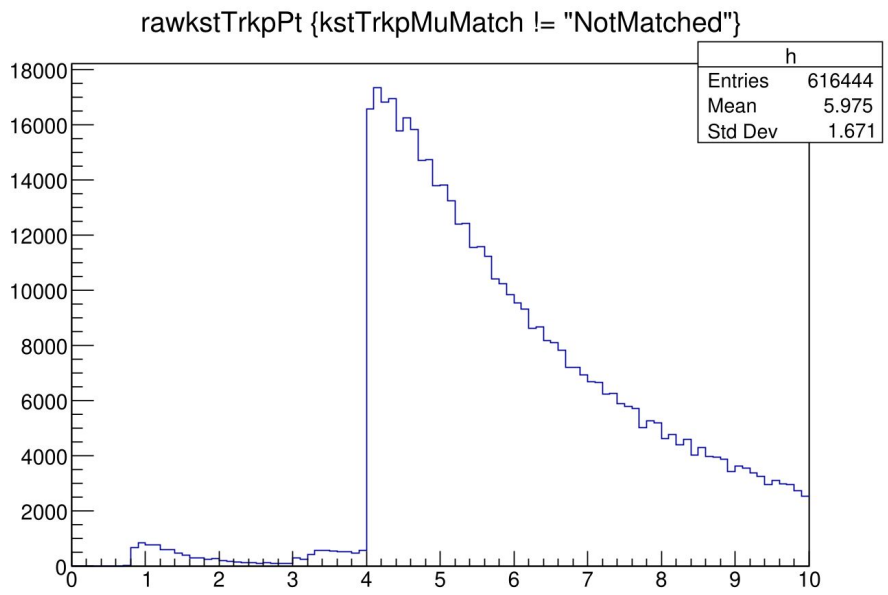
- “NotMatched”: Track is a clean hadron
- Otherwise: Track is a muon and should be discarded





Investigation on tracks p_T





Probable contamination from muons: This collection uses the innerTrack (data **only from Tracker**), while the 4 GeV cut is applied to globalTrack (data from **Tracker + Muon Chamber**)

Thank you