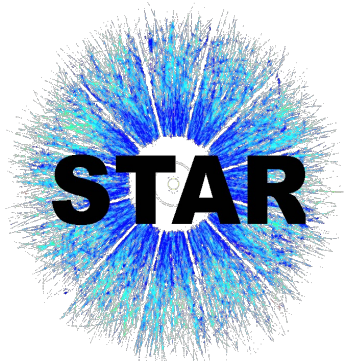




Centrality definition concerning most central collisions in high-multiplicity triggered O+O at $\sqrt{s_{NN}} = 200$ GeV

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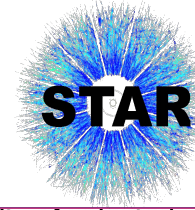
29/7/2025

Previous presentation

https://drupal.star.bnl.gov/STAR/system/files/HM_OO_Omega.pdf

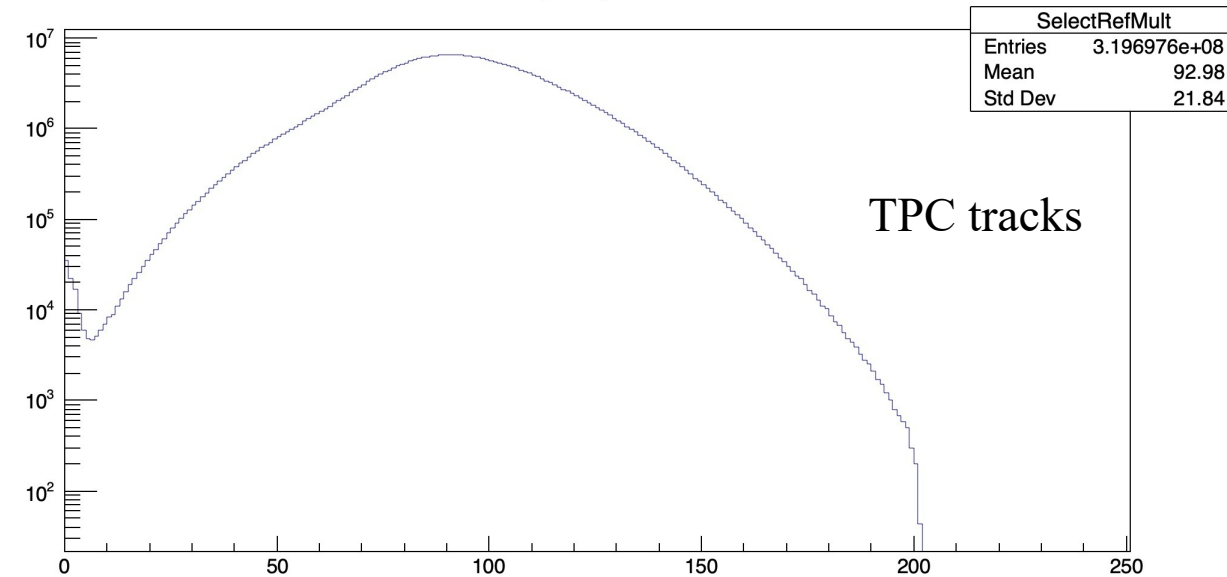
https://drupal.star.bnl.gov/STAR/system/files/Omega_phi_OOhm_0.pdf

Dataset and event selection

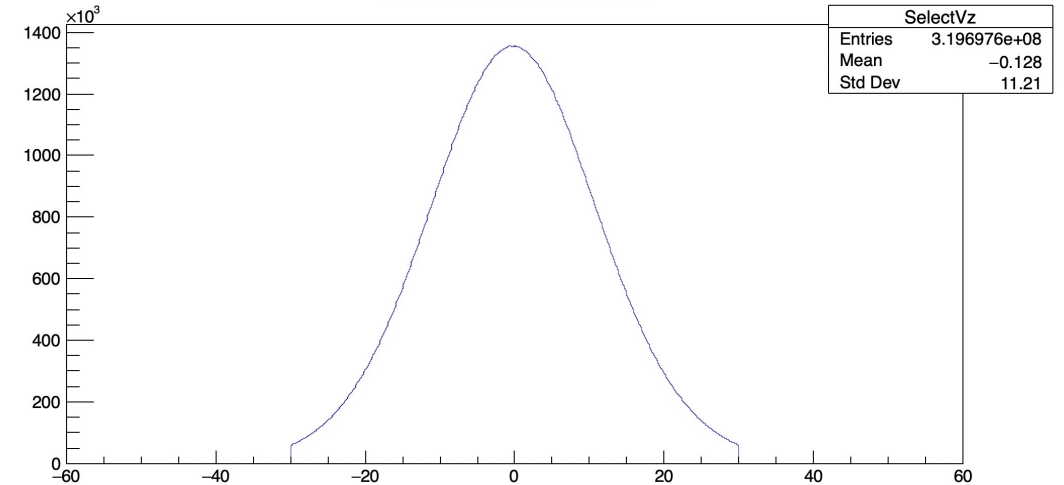


- Run21 OO 200GeV
 - production_ps_OO_200GeV_2021
- Triggers: 860111(HM_EPD),
860103(HM_TOF)
- Production: P23ic
- Events: ~320M (RFF)
- $|V_z| < 30\text{cm}$, $|V_r| < 2.0\text{cm}$
- Bad runs removed
- Pileup events removed (Zhengxi's work)
- https://drupal.star.bnl.gov/STAR/system/files/oo_cent_summary_v3.pdf

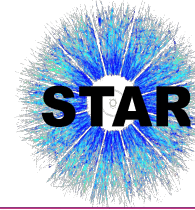
Reference Multiplicity of selected events



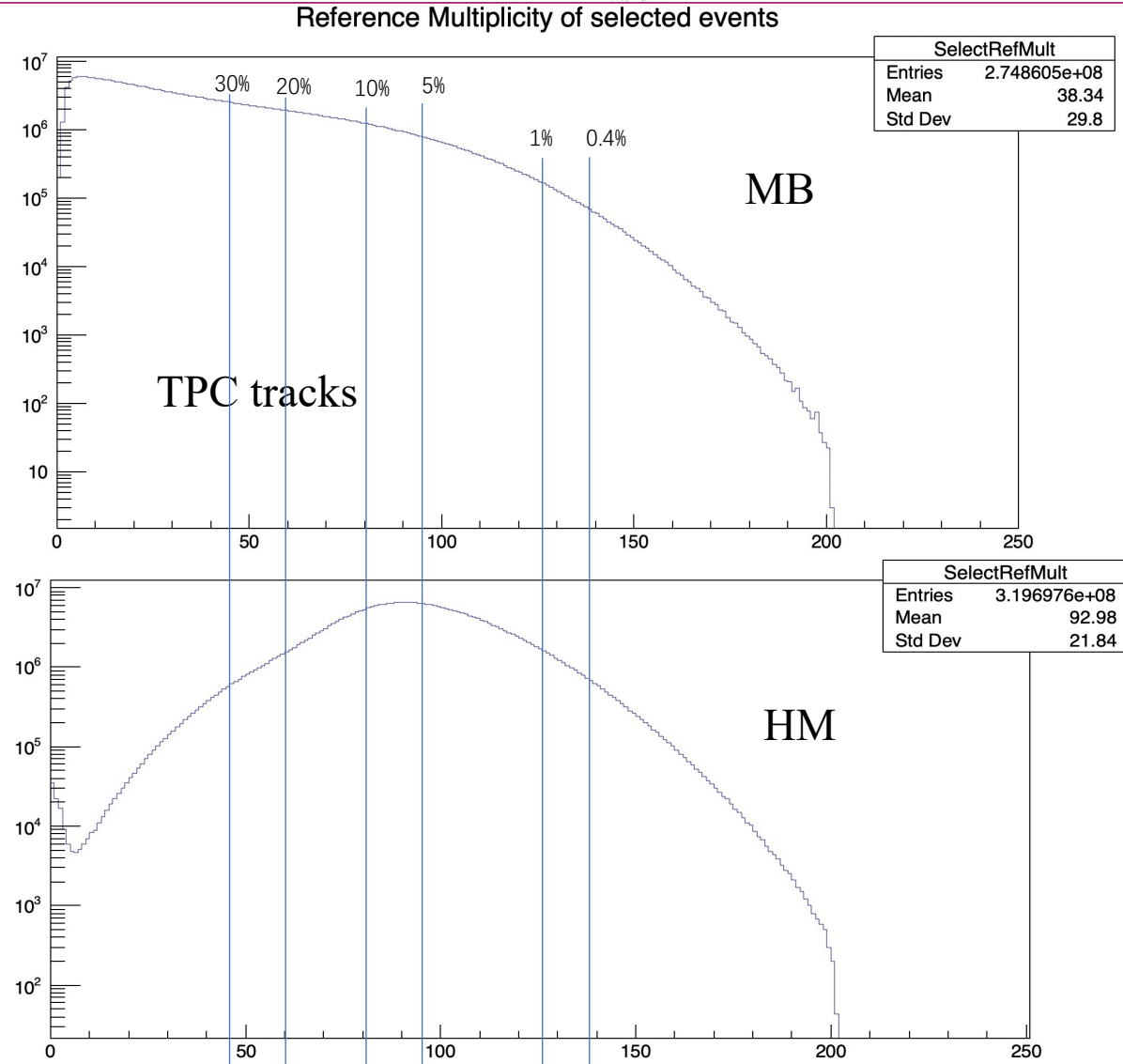
Vertex Z of selected events



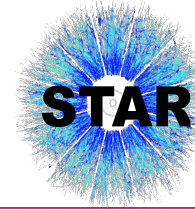
Centrality selection



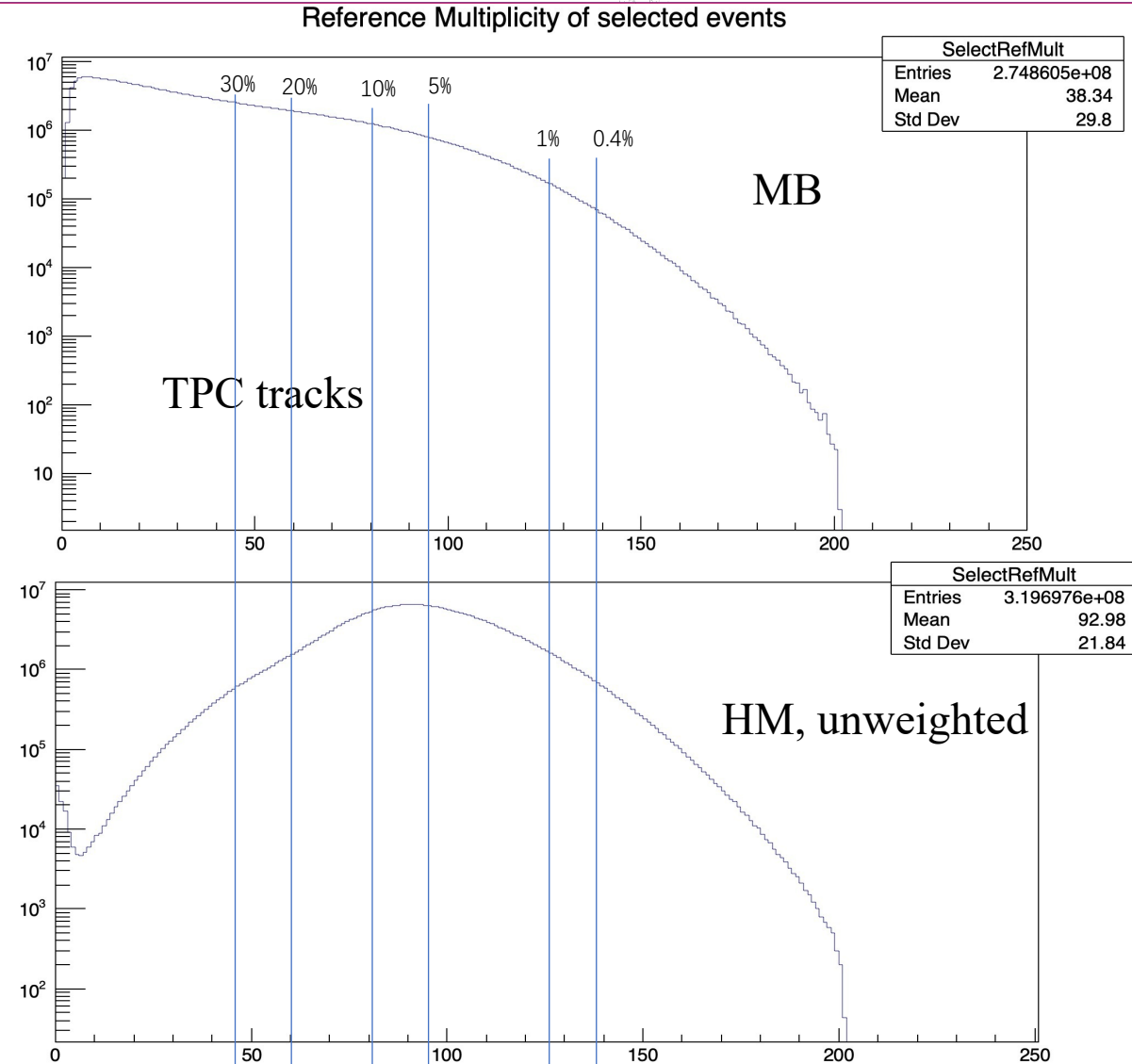
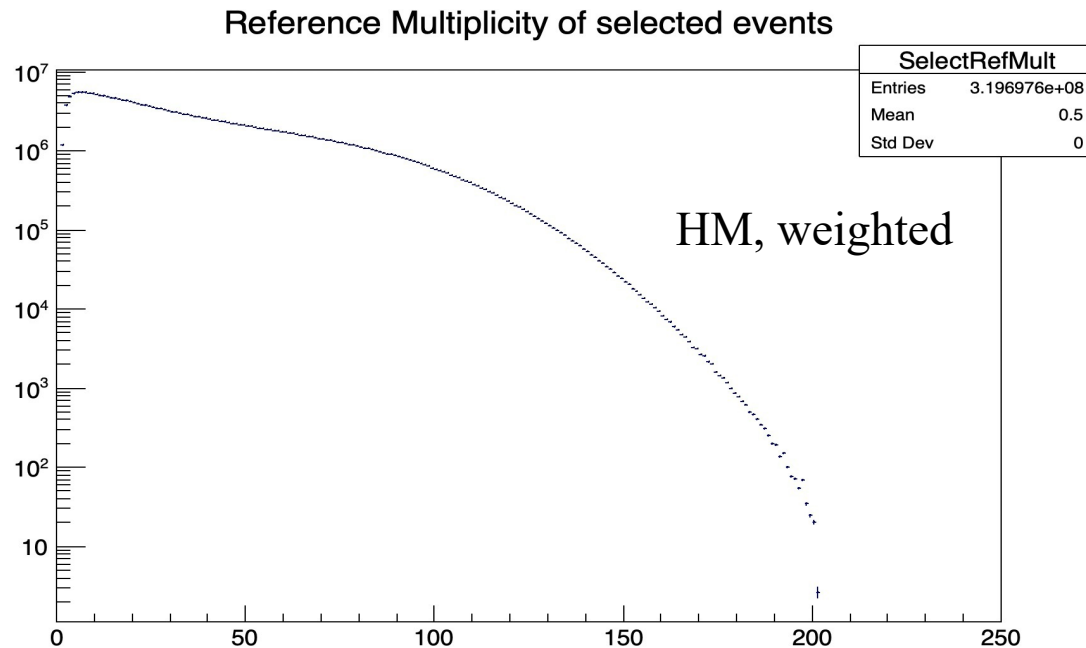
- Centrality selection by number of TPC tracks
 - Track quality cuts: according to Zhengxi's work
 - $|\eta| < 1.5$, $0.2 < p_T < 2$ GeV
 - $n_{\text{HitsFit}} > 15$
 - $gDCA < 3.0$ cm
 - $n_{\text{HitsFitRatio}} > 0.52$
 - 5%, 10%, 20%, 30% cut values: Glauber fit by Zhengxi's work:
 - https://drupal.star.bnl.gov/STAR/system/files/oo_cent_summary_v3.pdf
- 0.4%, 1% cut values determined from Min. bias TPC tracks distribution (RFF) by counting bin contents and calculate the ratio of the **selected events over total number of 0-5% events**
- Cut values: 95(5%, **standard cut**), 127(1%, **our count**), 138(0.4%, **our count**)
- Cuts applied to High Multiplicity triggered events



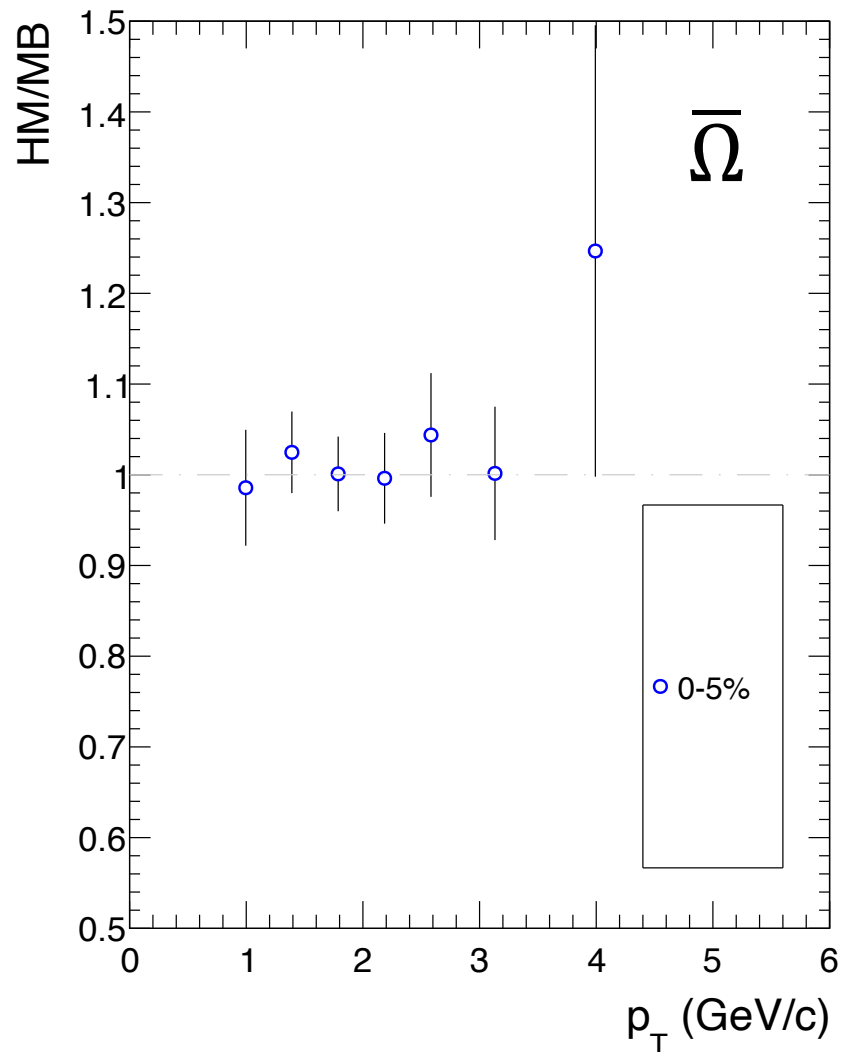
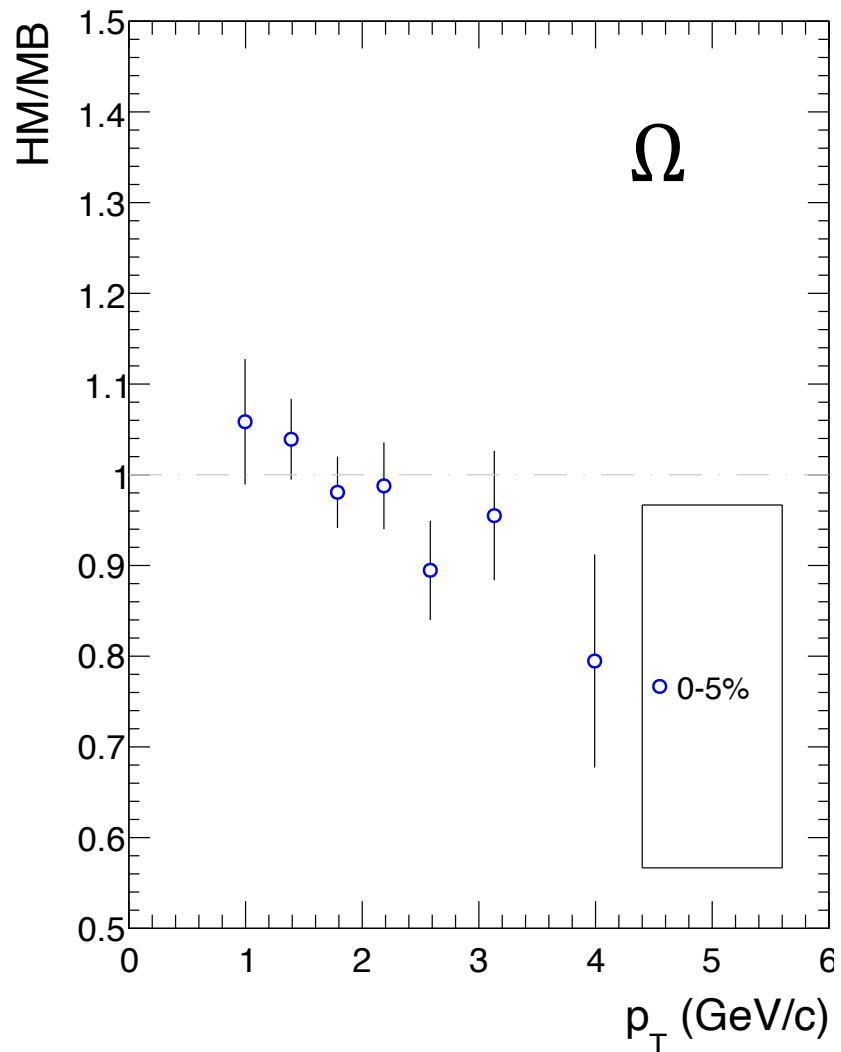
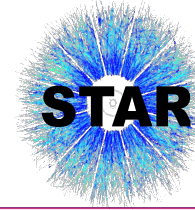
Centrality selection



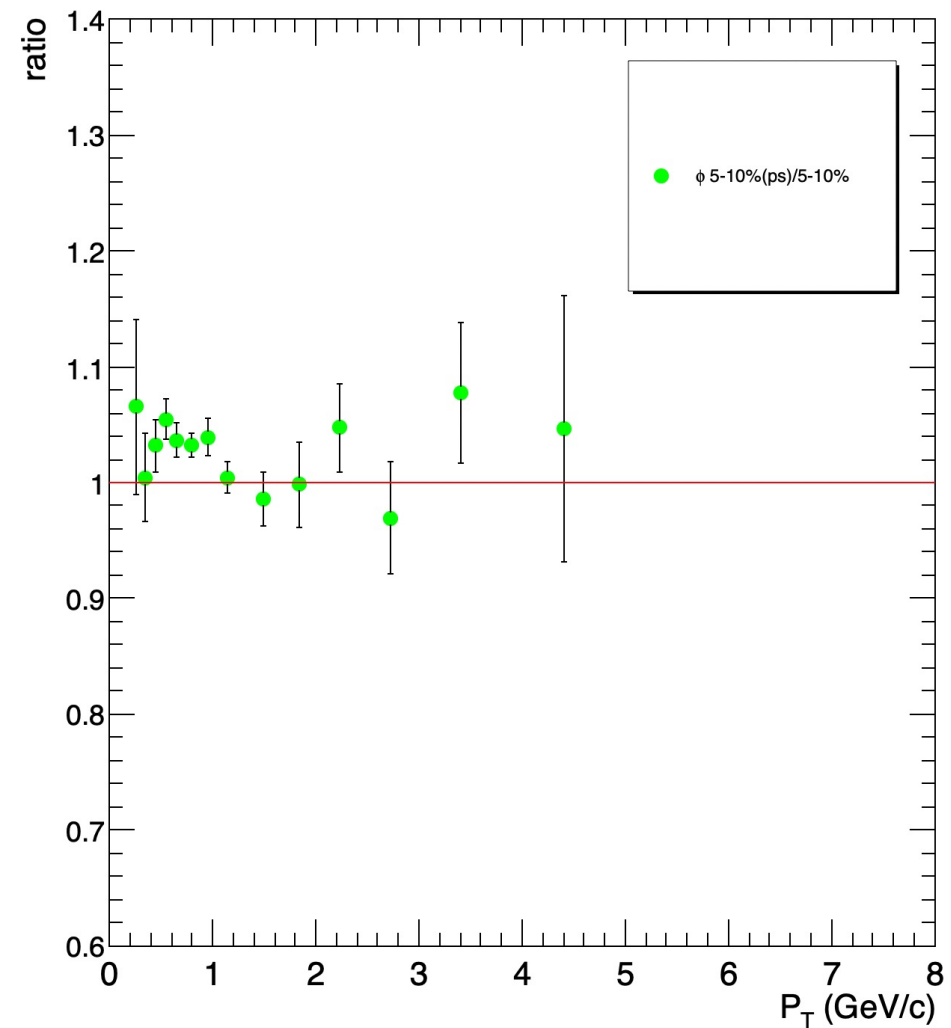
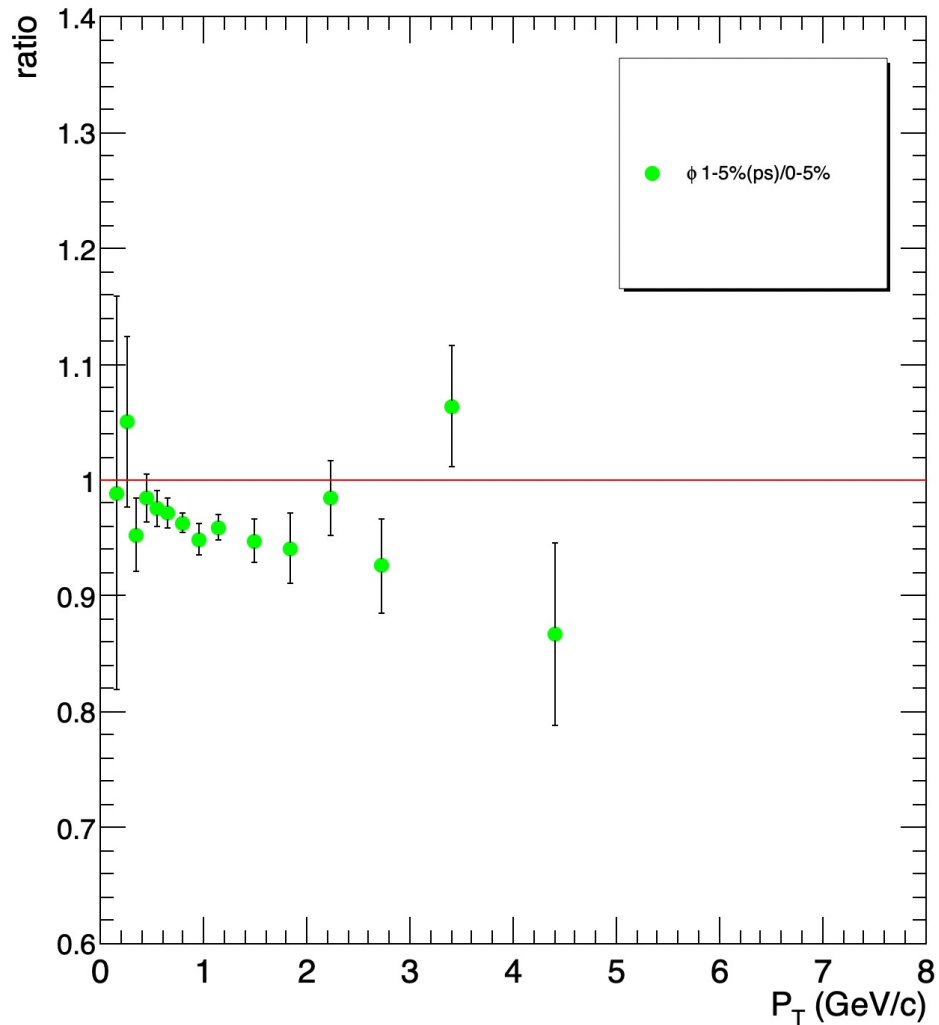
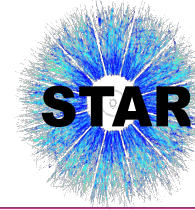
- HM distribution different from MB distribution due to trigger bias, especially in sub-central area.
- Correction done by calculating the ratio of MB/HM distribution and treat it as a weight when filling histograms.



Comparison with MB

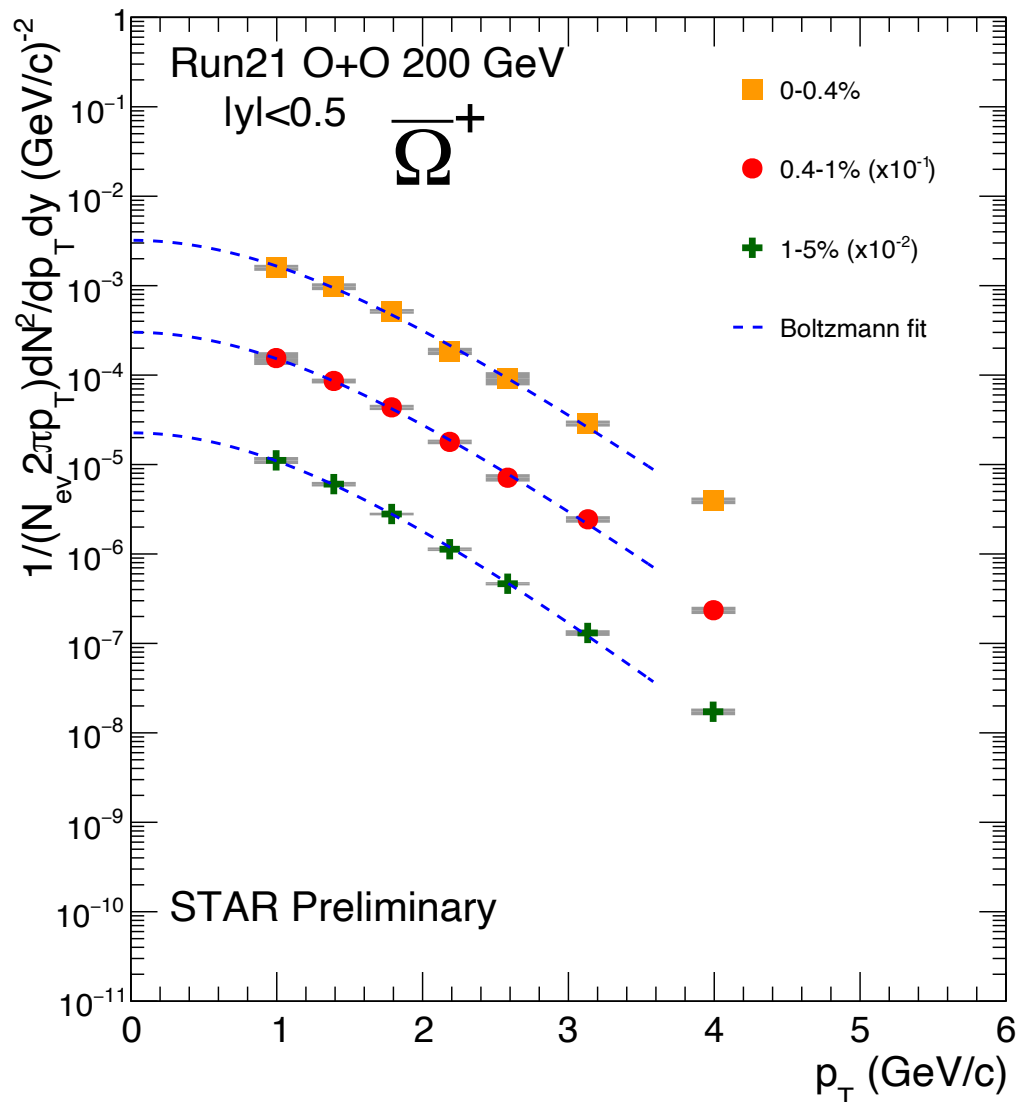
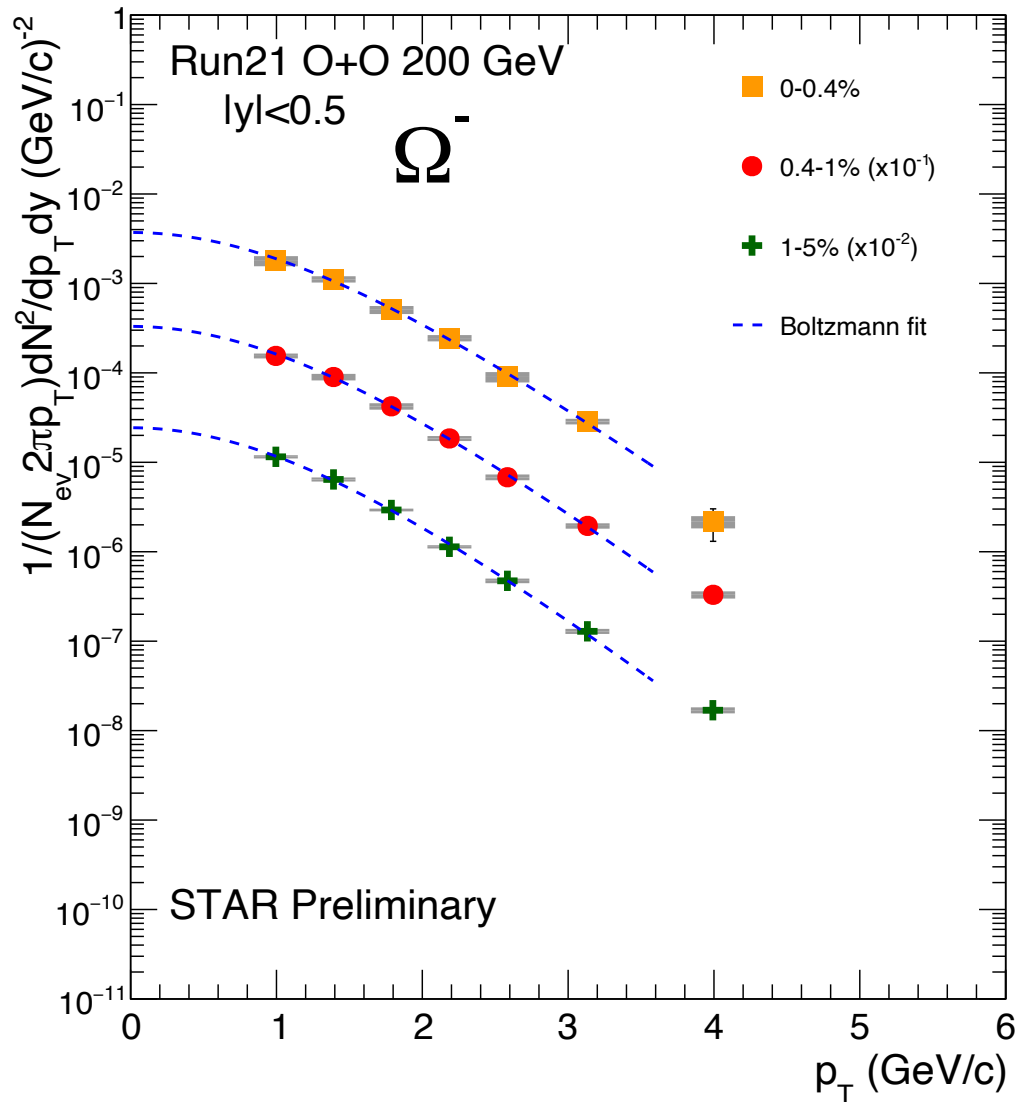
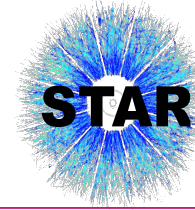


Comparison with MB



Corrected spectra

Measurement for 3 centrality bins
Maximum $p_T \sim 4$ GeV/c



Corrected spectra

Measurement for 3 centrality bins
Maximum $p_T \sim 4$ GeV/c

