BTOF Calibration for Run19 dataset with new TPC alignment

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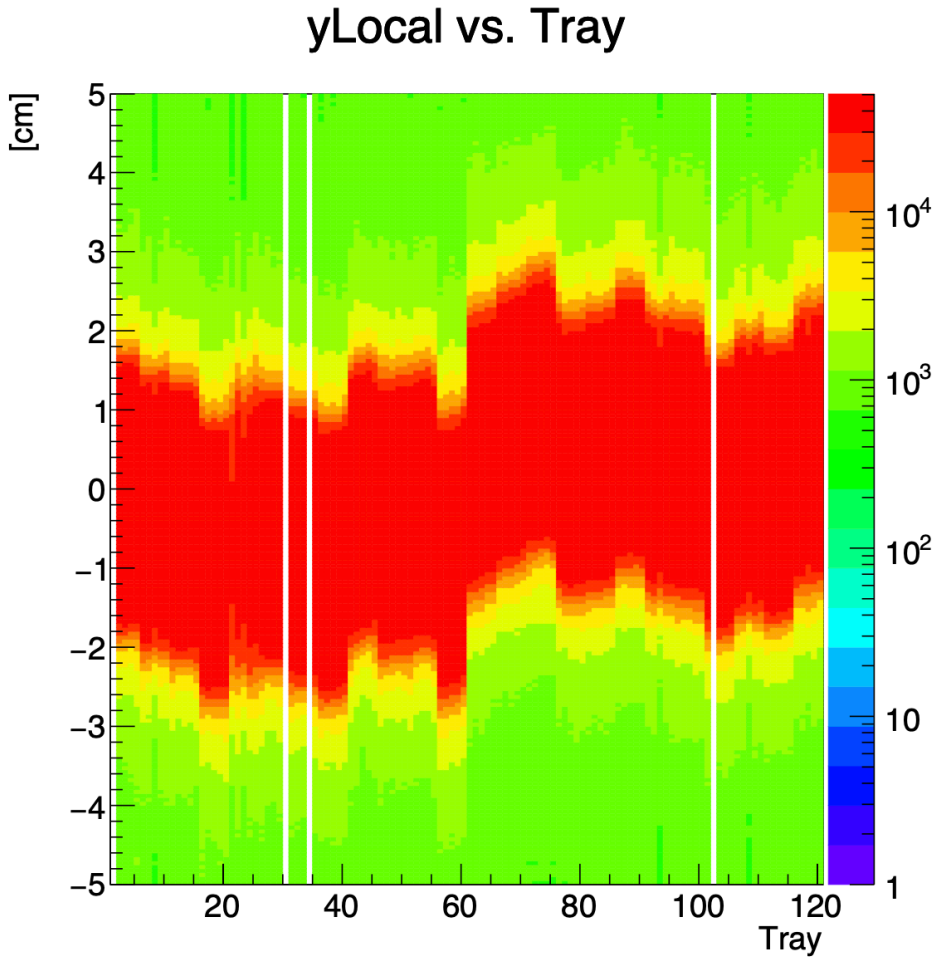
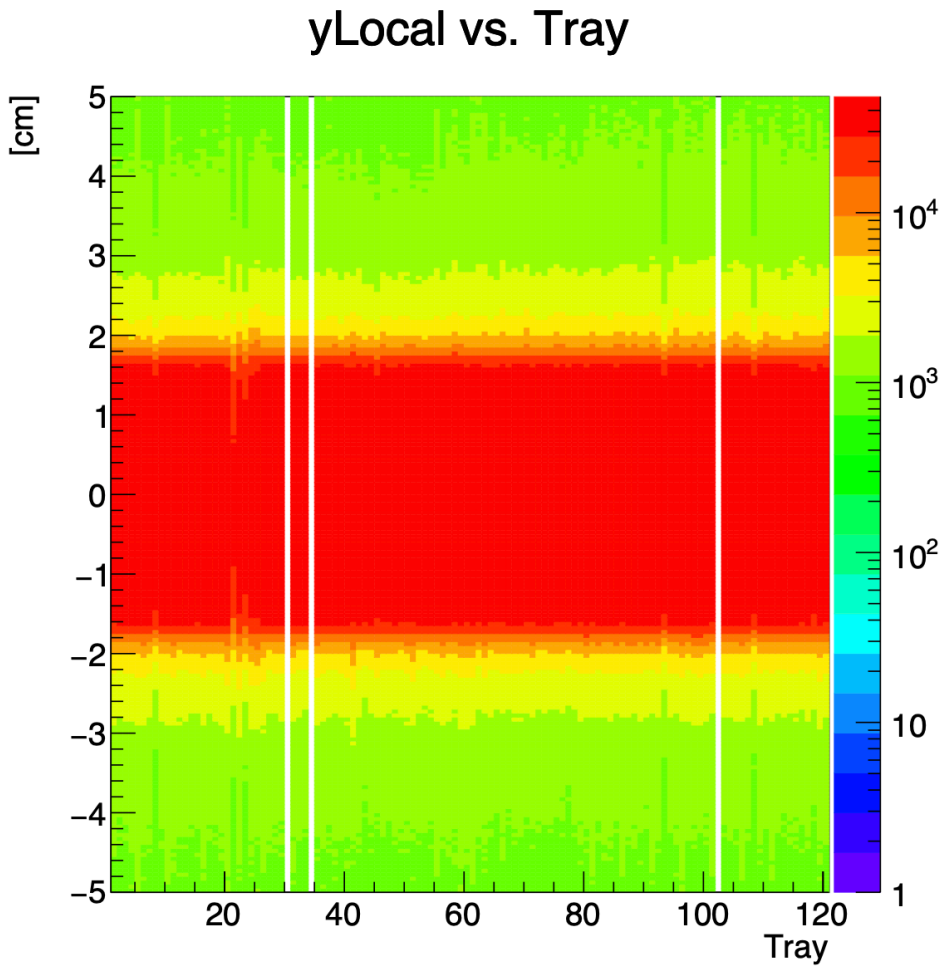
12/13/2024

BTOF geometry alignment

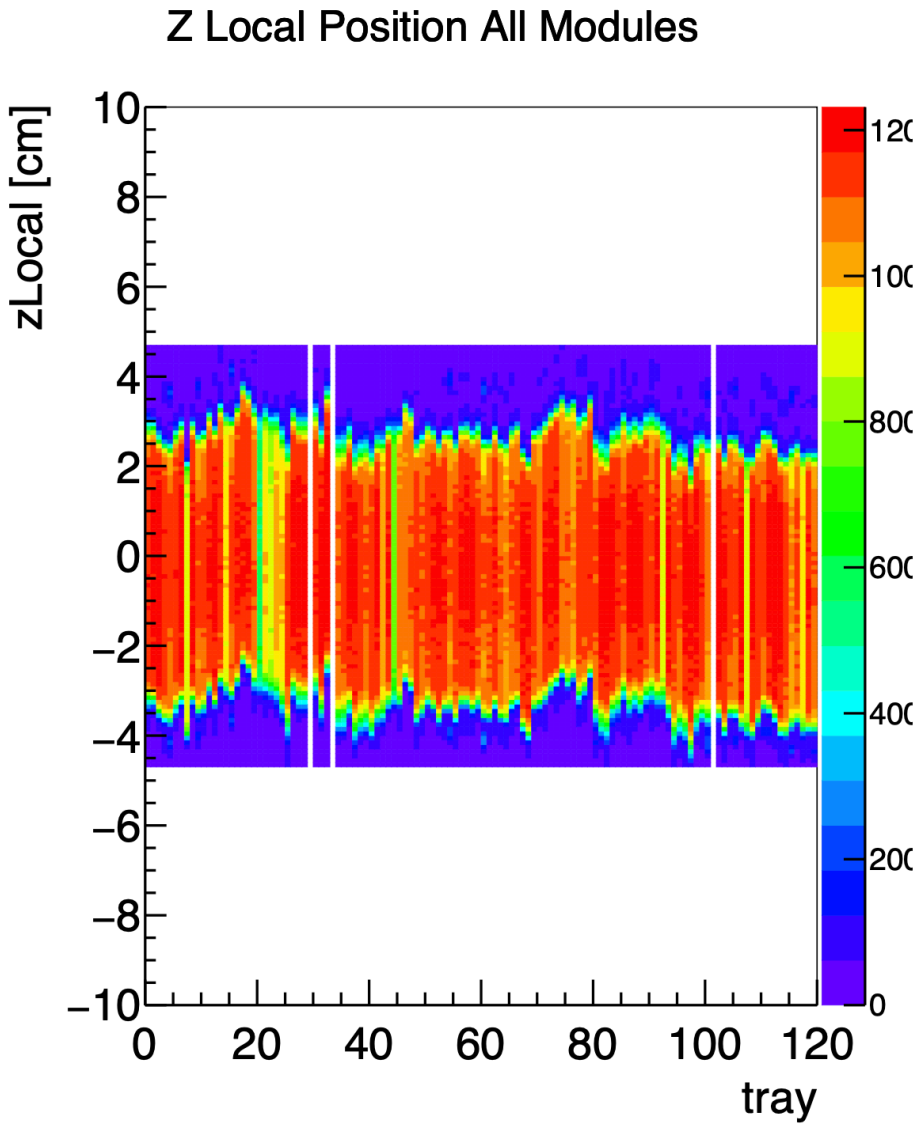
- Geometry alignment of BTOF need to be calibrated since the data is new TPC aligned. It is well aligned after calibration now.



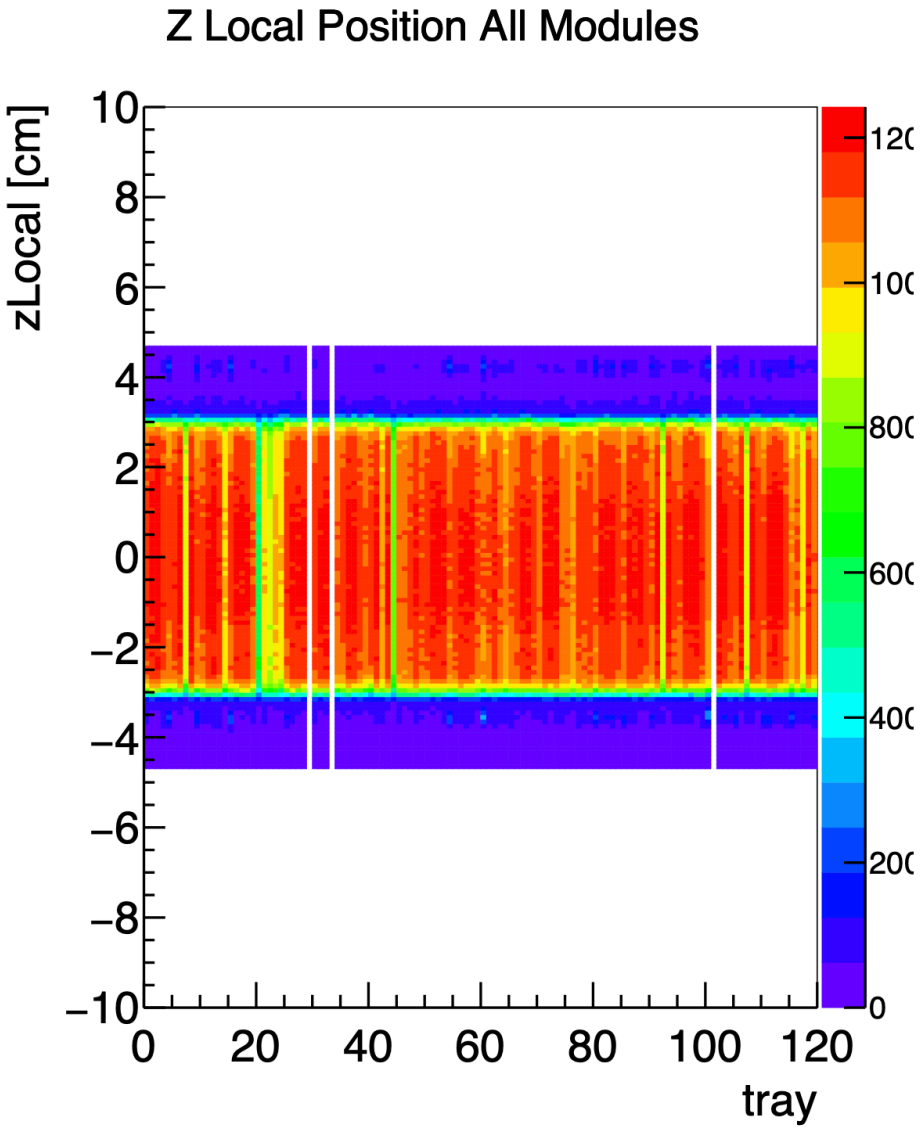
Raw data with new alignment



Data with calibration



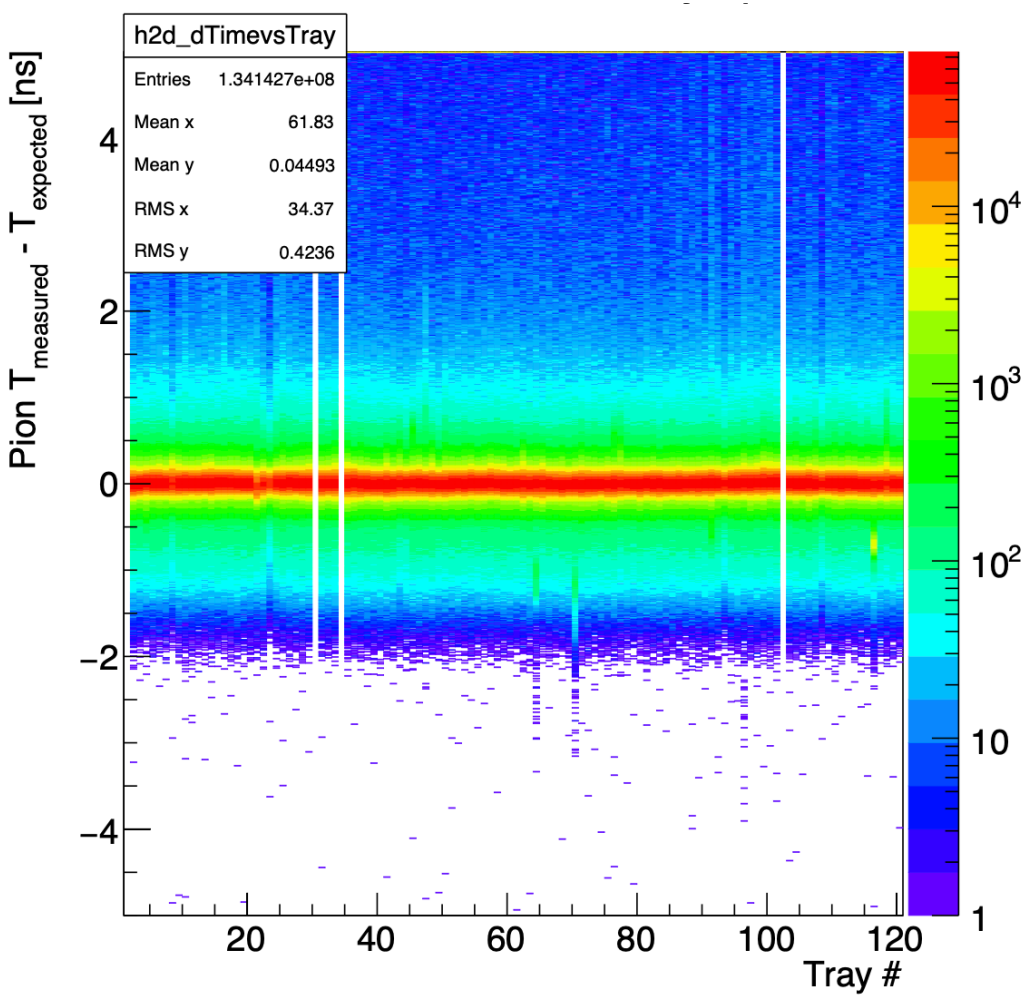
Raw data with new alignment



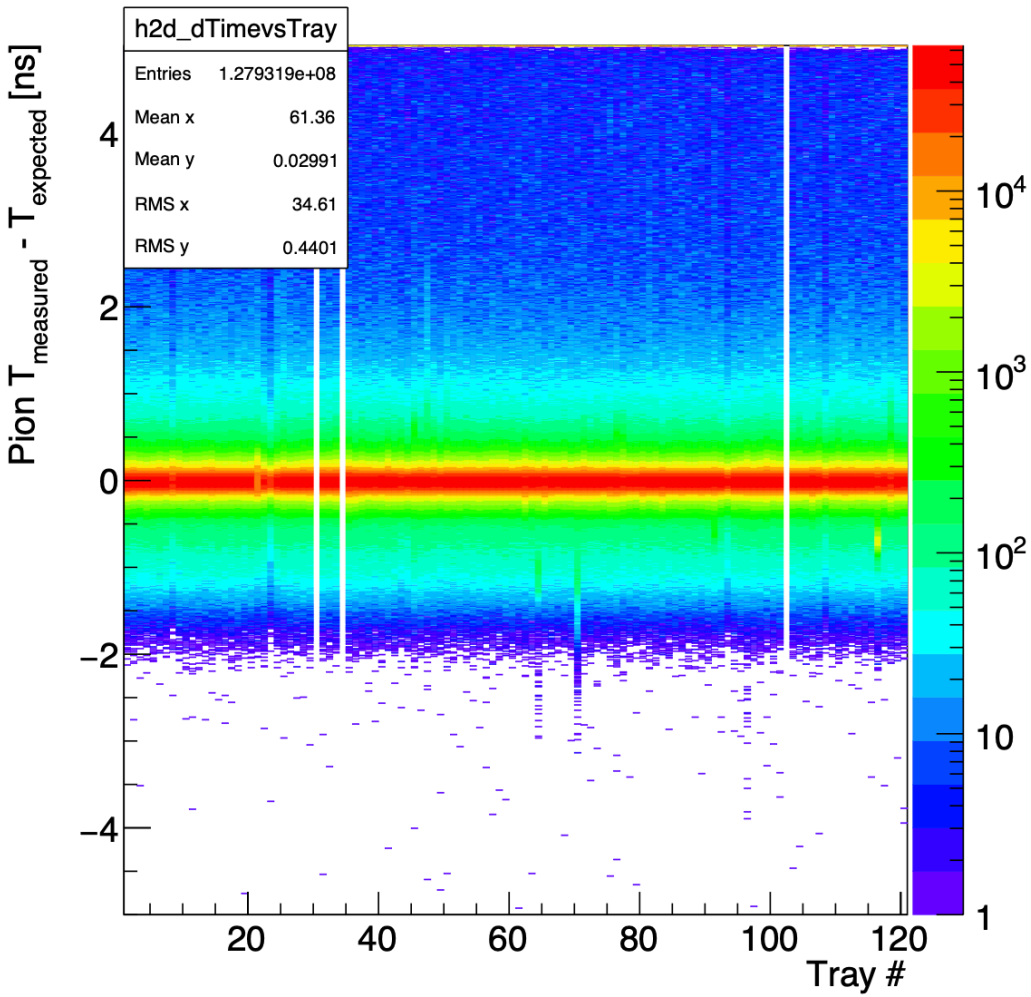
Data with calibration

BTOF T0 Calibration

- BTOF T0 has good behaviour. Now we include the tray 1.



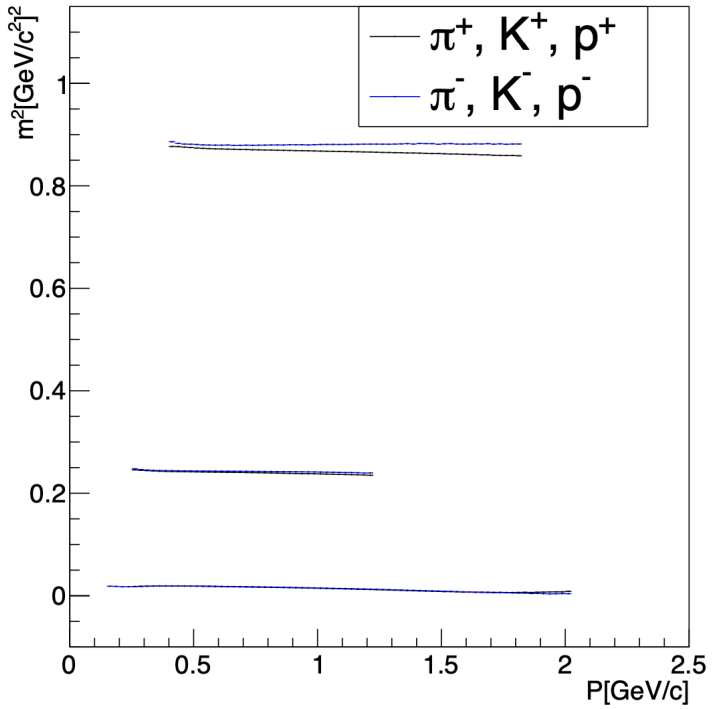
Raw data with new alignment

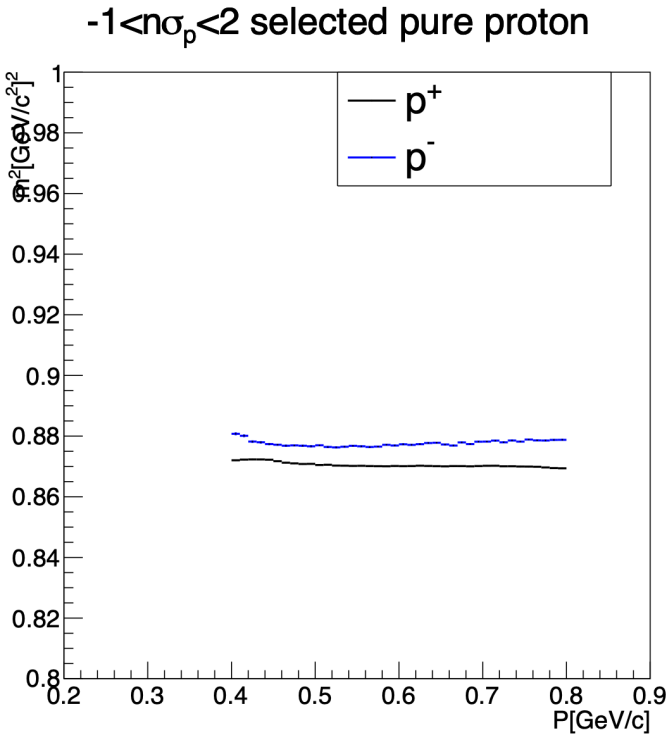


Data with calibration

Charged particle mass splitting

- We observed the charged particle mass splitting similar as previous Run21 OO 200GeV dataset.
- The mass difference between positive and negative particles increases when the momentum goes larger.
- The splitting is much larger when eta has a positive value. And it is very small when eta is negative.





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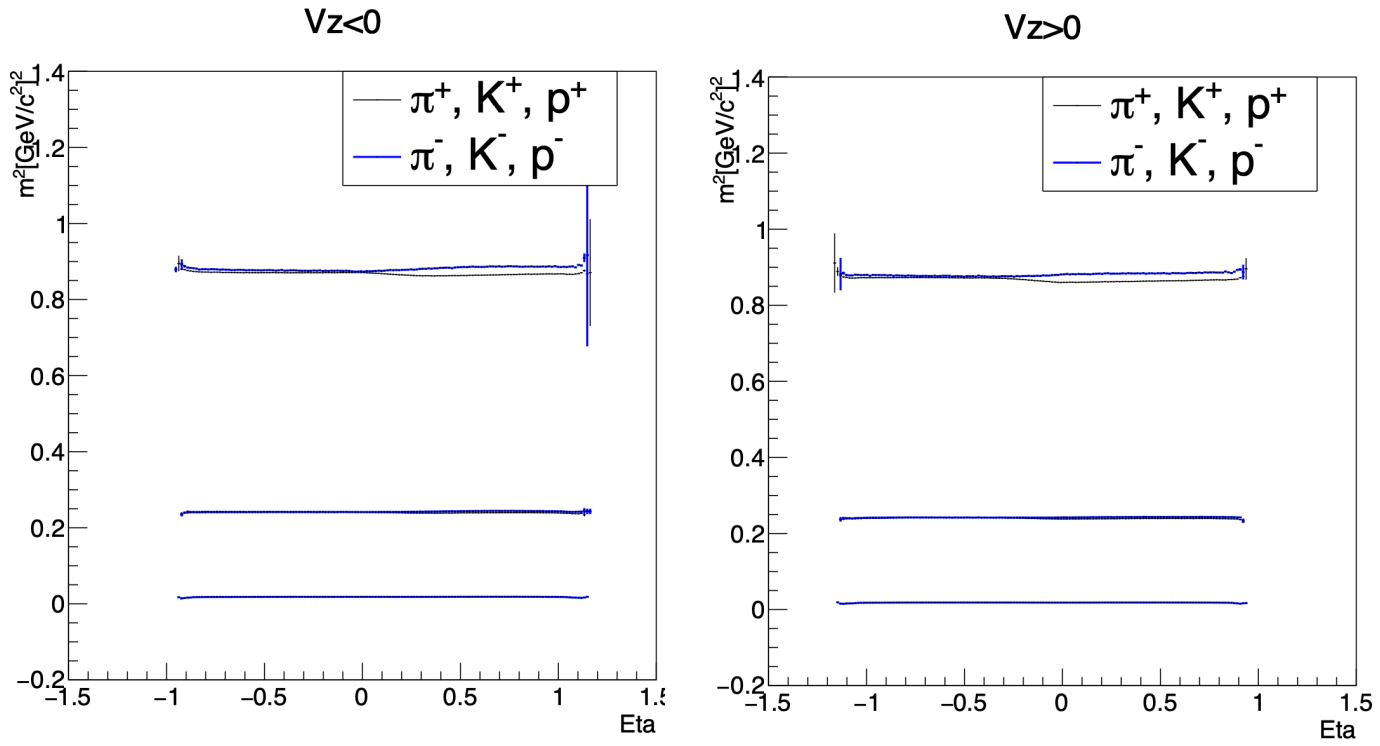
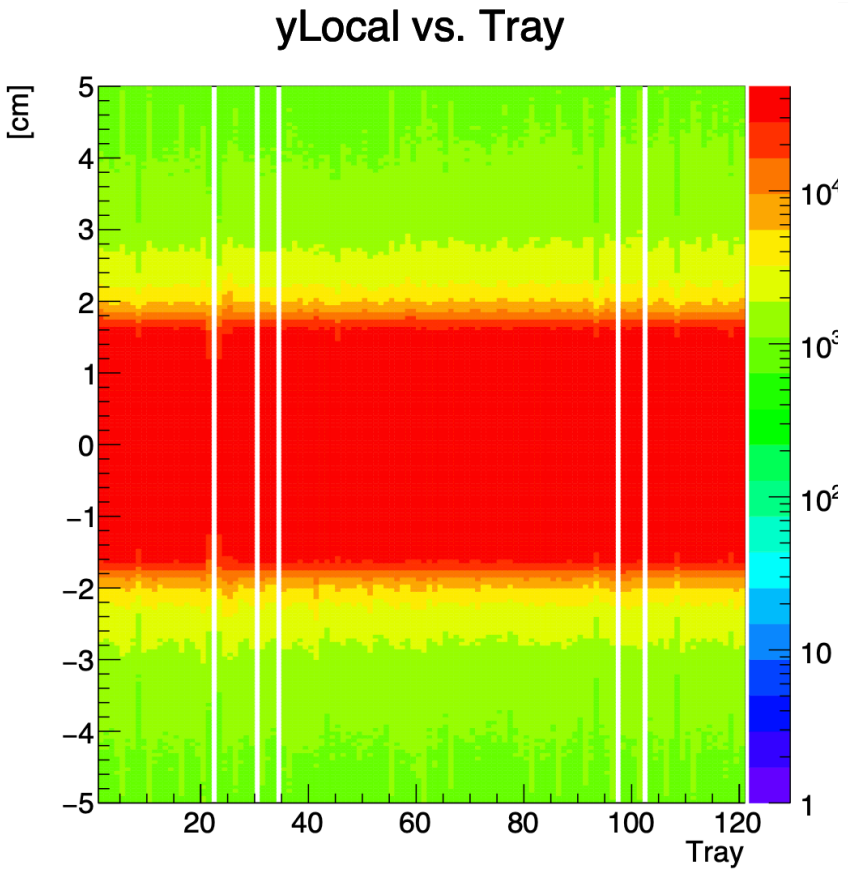
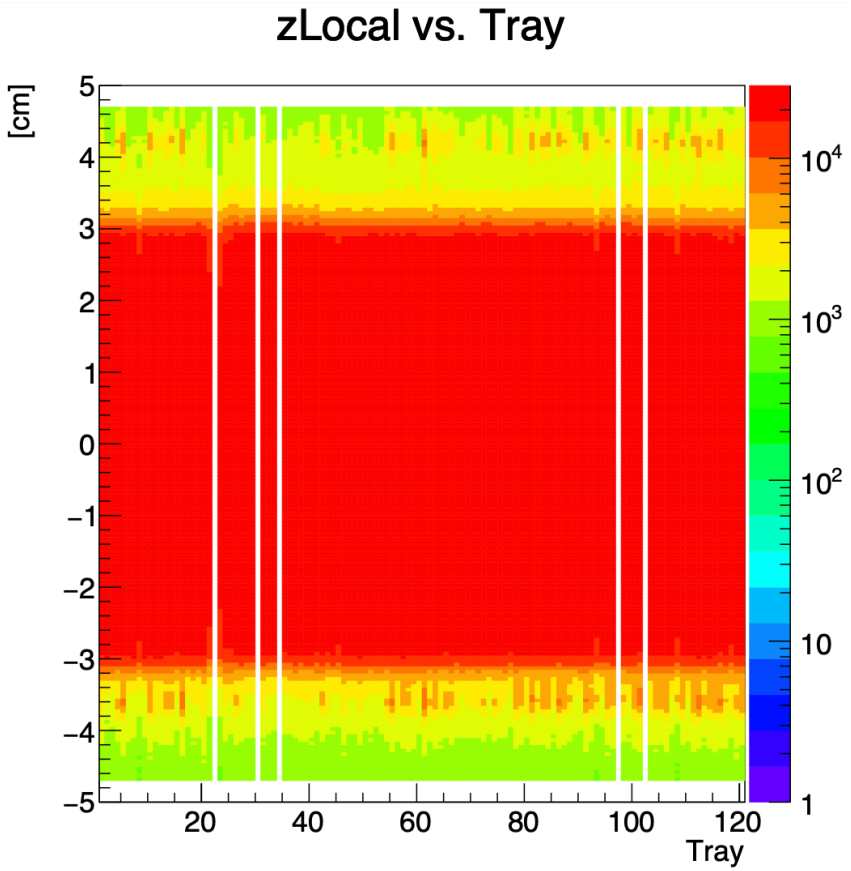
It has no Vz or ZDC Rate dependence

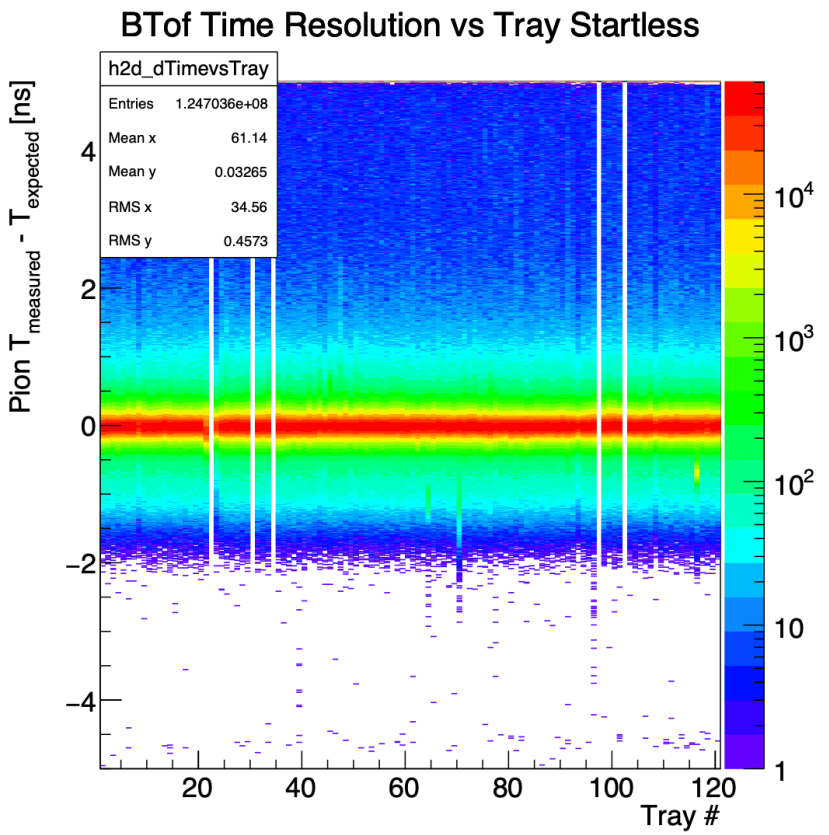


Run19 14GeV BTOF Calibration

- Run19 14 GeV BTOF T0 and geometry behaviour are already good now.

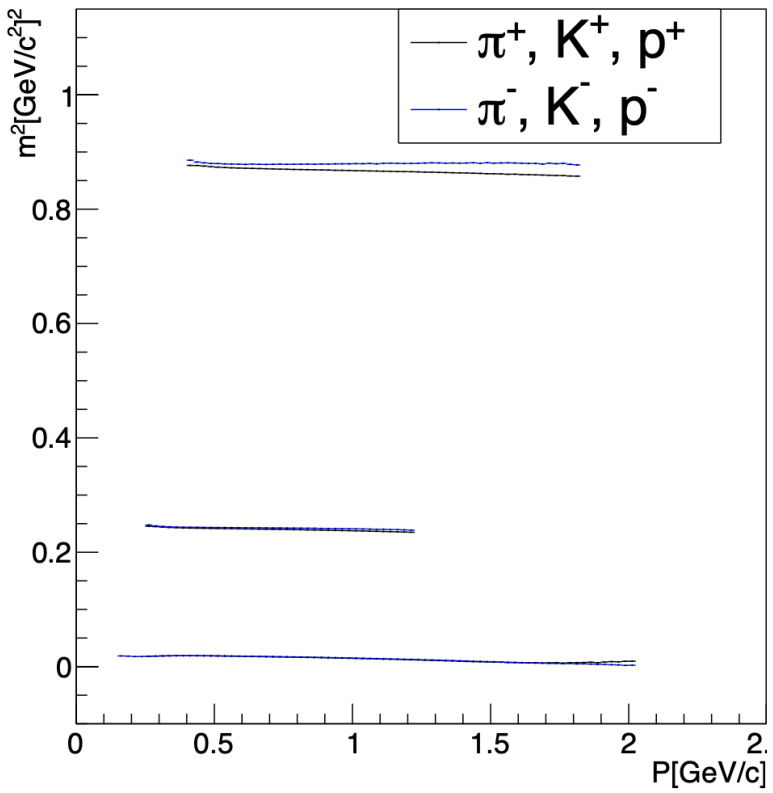


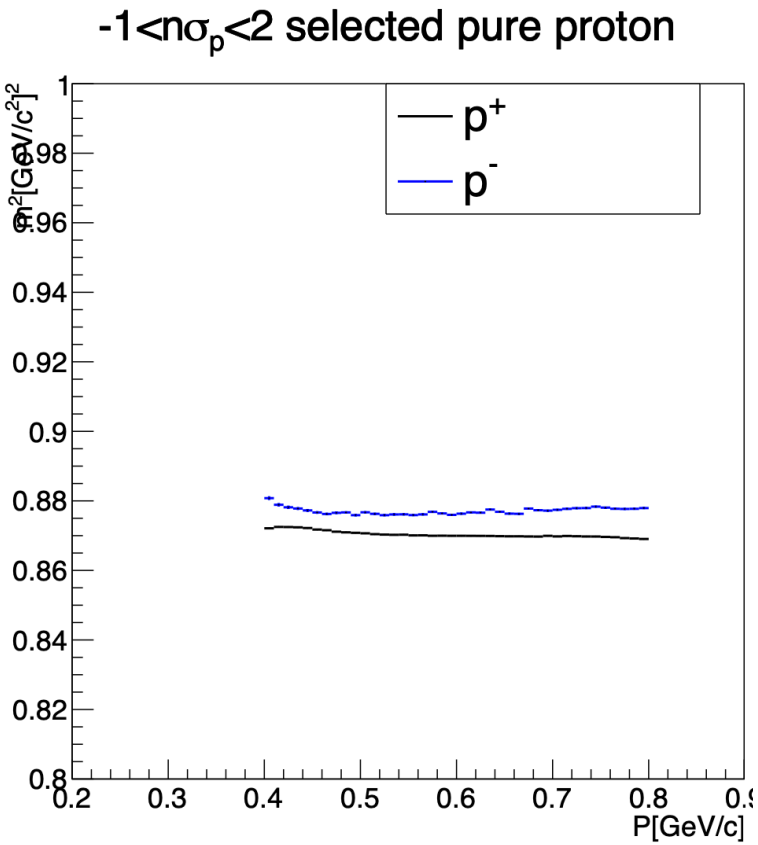


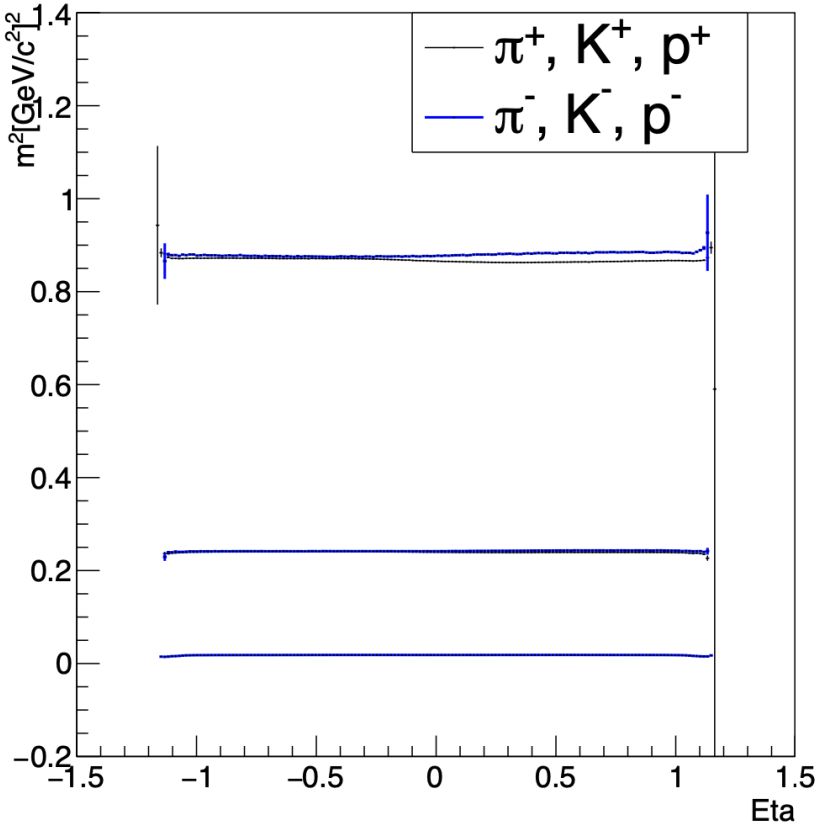


Run19 14GeV mass splitting

- Same charged particle mass splitting is observed at 14GeV similar as 19GeV.

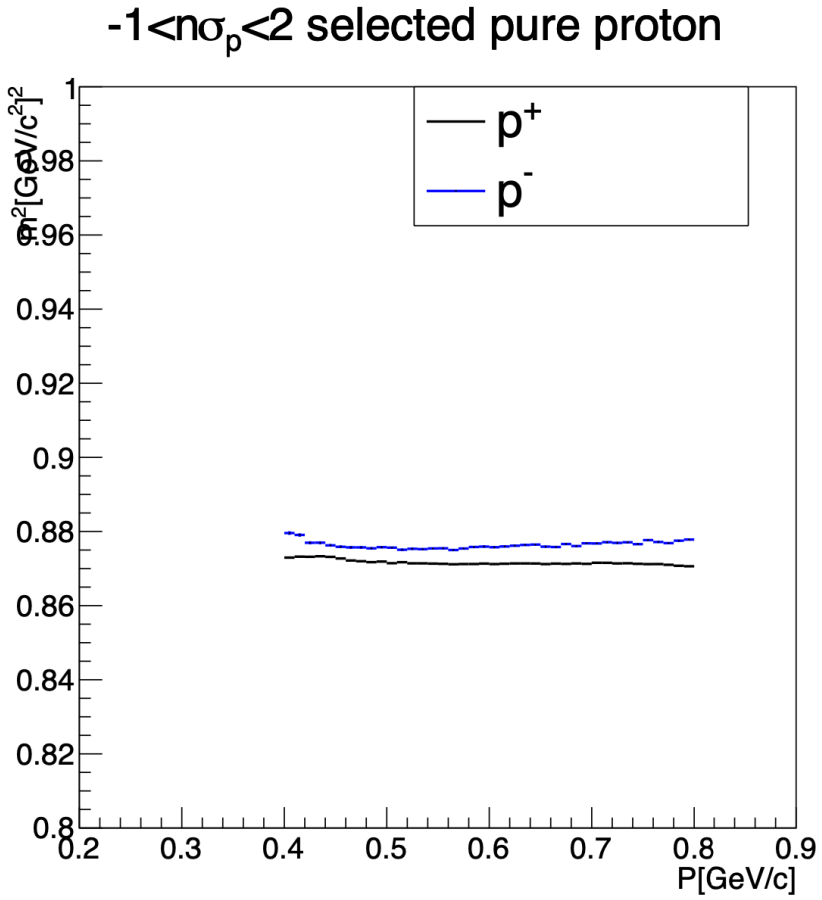




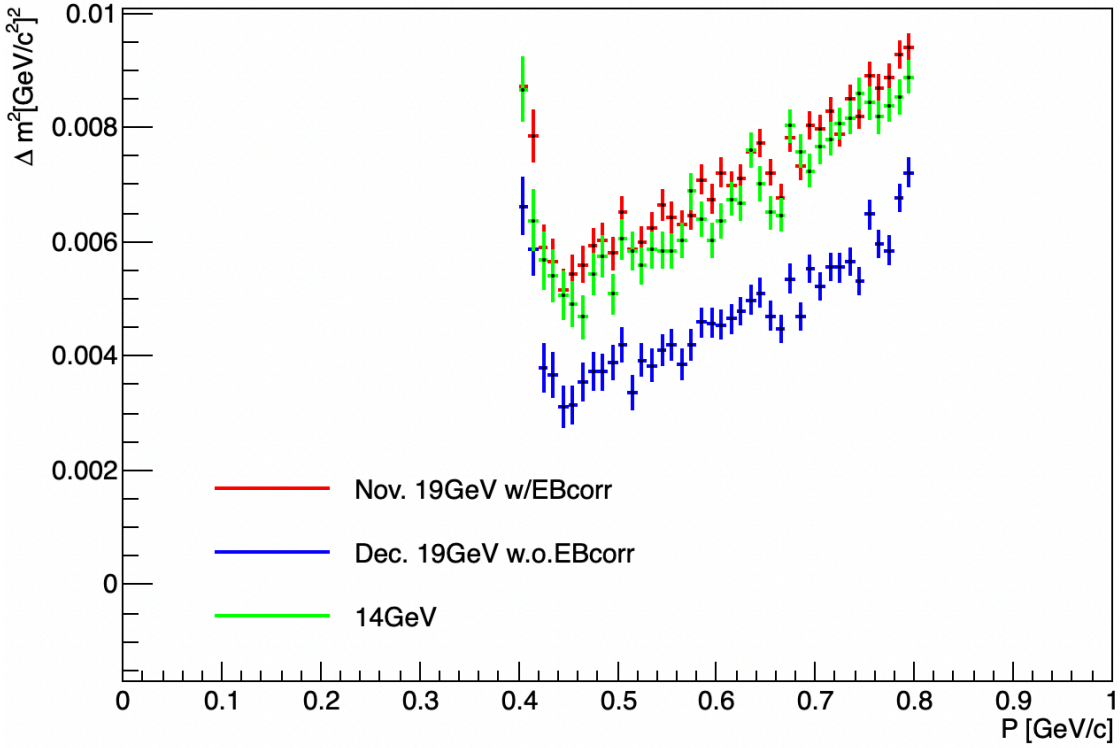


New 19GeV sample without EB correction

- Charged particle mass splitting still exists. The mass splitting is smaller compared to the previous 19.6GeV sample with EB correction.
- And the mass splitting of 14GeV is slightly below 19GeV with EB correction, which is in the middle of two 19GeV sample.



Mass splitting $\Delta m_p^2 = m_{p^-}^2 - m_{p^+}^2$



Summary

- New BTOF Calibration for Run19 AuAu 19.6/14.6GeV data. BTOF T0 and geometry behaviour are already good now.

- Charged particle mass splitting is observed again similar as Run21 OO 200GeV at two 19.6GeV (w./w.o. EB correction) and 14.6GeV data sample.
- The mass splitting at 19GeV without EB correction (produced in Dec.) is smaller than 19GeV dataset with EB correction (produced in Nov.).
- The mass splitting of 14GeV is slightly below 19GeV with EB correction.