



Calibrations Status and Remaining Issues

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STAR COLLABORATION MEETING
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Outline

- Approach and scheduling for data readiness in Run 10
- News from the front...
 - EMCs
 - TPC
 - Cosmic Rays
 - TOF
 - FTPC
 - PMD
 - BeamLine
- Run 11
- Summary

Approach to Run 10

- Staged calibrations:
 - Preliminary (within 20 days of starting each dataset)
 - Beamlines, approximate pedestals, status, gains
 - TPC calibrated to $\Delta(p_T)/p_T @ p_T=5 \text{ GeV}/c \leq 20\%$
 - Some calibs from previous year
 - Intermediate (near the end of data-taking)
 - Final (months afterwards)
 - Details explored for full calibrations
- FastOffline used these calibs as they became available
- Expectations of calibration deliverables spelled out[†], (e.g. FoMs: resolutions, biases), and analyses decided on needs and priorities...

[†] <http://drupal.star.bnl.gov/STAR/event/2010/05/12/software-and-computing-phone-meeting/calibration-readiness-run-10-achieved-resolution-and-incoming-improvements>

Calibration Driven Productions

- HLT stream
 - Preliminary calibrations (i.e. Run 9 values + any updates from during the Run) sufficient [delivered in ~20 days]
- BES (all streams; ordered by 7, 11, 39 GeV)
 - Intermediate calibrations (i.e. updated for Run 10, but not waiting full TPC alignment) requested [delivered early summer]
- Full Energy (all streams; FF then RFF)
 - Waited for full calibrations [FF delivered mid fall, RFF pending]
- 62 GeV at lower priority
- Schedule generally maintained to within a couple weeks

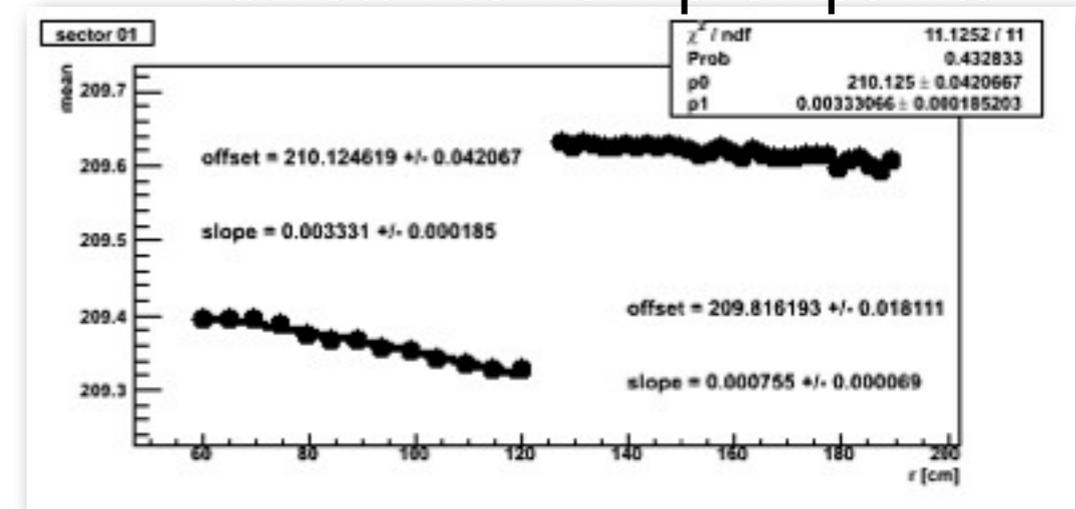
EMCs: a quieter year

- Reminder: EMC calibs applied in analyses
 - BEMC tower peds & status used by production for “matched tracks” [done]
- All towers: Run 9 gains updated in May (not using VV triggers) [done]
 - Feedback to TPC: E/p @ high p_T showing some possible east/west and +/- systematics in p calculation (TPC calibs; somewhat expected)
 - No changes to HVs for Run 10, and difficult to calibrate in AuAu (occupancy) [re-use Run 9 gains]
 - Feedback from users on validity of this is appreciated
- BSMD peds & status not ready for Run 10 [in progress]
- BSMD gains not finalized for Run 9 [in progress]
- Endcap pre- and post-shower calibrated with towers for Run 9 [done]
- Barrel pre-shower: work remains open [stalled]

TPC: the challenges continue

- Problematic recording of anode voltages in DBs
 - PWGs needed Anode & RDO DBs for QA of “good runs” (+RDOs)
 - Also important for dE/dx !
 - {ShiftLog + OnlinePlots + Intuition} to fix the DB (weeks of work)
 - Prevention in Run II is still an un-closed topic
- Attempt to do padrow-by-padrow & global T0s using prompt hits
 - Systematics not understood (held up Twist calibration), reverted to old methods (residuals in z & east-west prim vtx. matching)
 - **Still an unknown $\sim 1.5\text{mm}$ effect at CM in RFF**

Padrow T0s from prompt hits

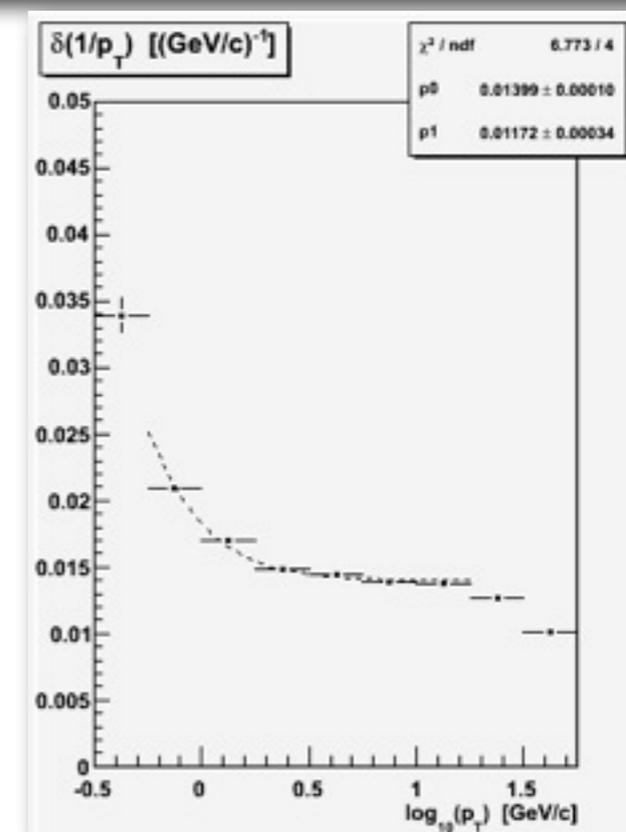
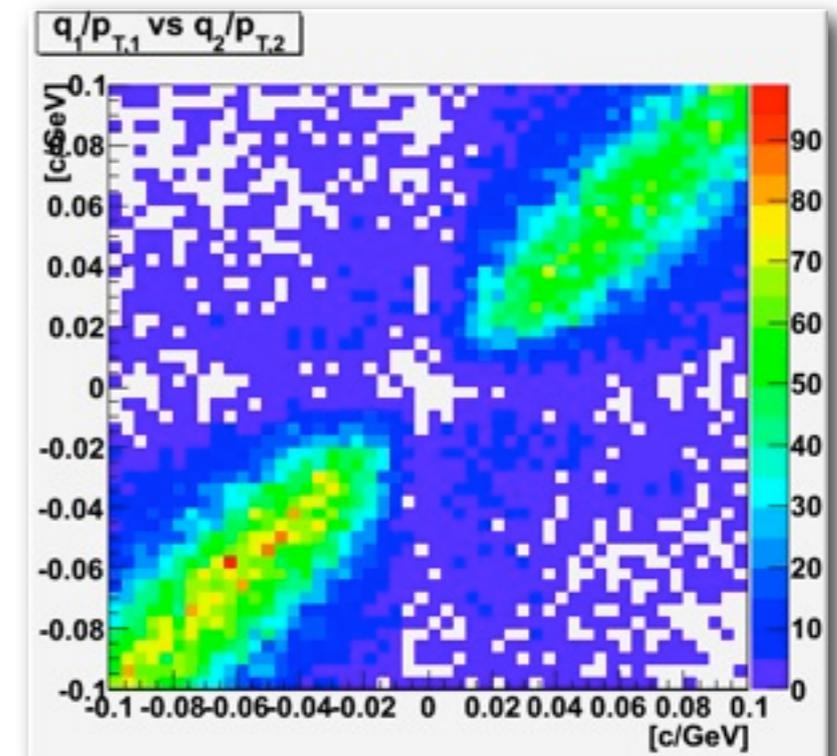


TPC: the challenges continue

- Alignment
 - Goals: explore FF vs. RFF differences towards understanding historical h^-/h^+ issue
 - Possible “Shifted Gating Grid” distortion
 - Seems to have helped Run 9 pp500 SC+GL calib
 - Not fully investigated for Run 10, but avoided for alignment (excluded problem areas)
 - Sector 20 did not respond to alignment: **disabled!**
 - Could be (yet another) distortion seen at edges of where anode voltages are off (...or other unknowns...)
 - Investigations still ongoing, **no “victory” to declare yet!**
...but production could not wait
- **Hit errors: we know they’re wrong** (changed chip params, but lost our calibration tool!)

Cosmic Ray Triggers

- TOF-TOF[-MTD] coincidence
- Tool for performance measurements (e.g. p_T resolution)
- Clear +/- separation above 60 GeV/c
- Some effects not fully understood (e.g. improved curvature resolution @ high p_T)
- Much more to leverage here!
... more TPC p_T systematics (e.g. vs. luminosity, B field, crossing CM),
dE/dx systematics, TOF & MTD resolutions)

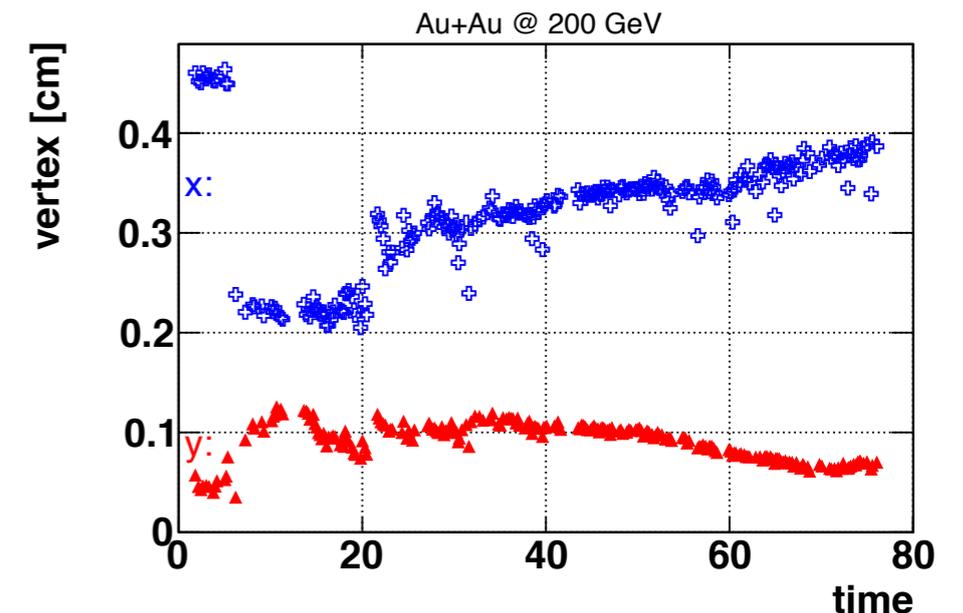


TOF: a year of firsts

- Full barrel (yay!) and first HI Run
- Dependent on, and very useful for TPC calibration work!
- Multiple calibration passes
 - Preliminary and intermediate TPC calibrations allowed for early TOF calibrations
 - High stats in AuAu200 allowed for cell-based (23k!) final calibrations (previously grouped by boards)
- BES led to inefficient VPD (7 & 11 GeV)
 - New “start-less” algorithm (use BTOF to estimate start)
- Afterburner can re-apply calibs (e.g. newer calibs, choice of using start-less algorithm)
 - Caveat: newer calibs may have TPC-TOF alignment conflict (not yet quantified)

Forward: FTPC, PMD

- st_pmdftpc stream was useful for calibration productions
- FTPCs
 - No big surprises this year [done by early summer]
- PMD
 - BES (7, 11 GeV) provided too few stats; used 39 GeV calibs for those [done by early summer]
- BeamLine
 - For UPC in 200, 62, 39 [done for all but 62]
 - Saw some “steps” (not a new thing)
 - BES elected not to use it (beam width not folded into a BeamLine)



Run 11: looking ahead

- Time to make sure we have our workforce lined up
- Variety of operations:
pp500 (at Run 9 x2!), AuAu200, UUI93, AuAu18/27?/5.5?!, pp2pp
- Continue to provide quick preliminary calibrations
- Skills & codes developed during Run 9 will be important:
 - Studies using triggered sample of high momentum $e^{+/-}$ for calorimeter calibrations
 - Pile-up in the TPC was insurmountable for SpaceCharge & GridLeak calibrations: learned to use it
- I say it every year: go in expecting something new...

Summary

- Run 10 calibrations delivered closer to schedule than in recent years
 - Commitments to the work ahead of time paid off
 - Less turnover of workforce than before, but this is still a concern for delays
 - RESTATING FOR THE Nth TIME: Well-documented work and instructions for successors can help avoid delays, but we continue frequently to fall short on this
 - Additional new minds and ideas are helpful and welcome to *improve* calibrations!
 - Better-calibrated FastOffline than any since Runs 1 & 2
- h^-/h^+ issue is still not settled! (...and there are new complications)
- Run 11 calibration preparations must be ramping up now

- Backup slides...

2010 Calibration Efforts

TPC

Maxim Naglis: SC
Jie Zhao
Zubayer Ahammed
Liang Xue
Gene Van Buren
Yuri Fisyak

TOF

Frank Geurts: SC
Bingchu Haung
Xiaoping Zhang
Xin Dong
Rafael Derradi de Souza
Joey Butterworth
Bill Llope

FTPC

Janet Seyboth: SC
Prithwish Tribedy
Hui Wang

BEMC&EEMC

Oleksandr Grebenyuk: SC
Justin Stevens: SC
Alice Ohlson
Elena Brunae
Wenqin Xu

PMD

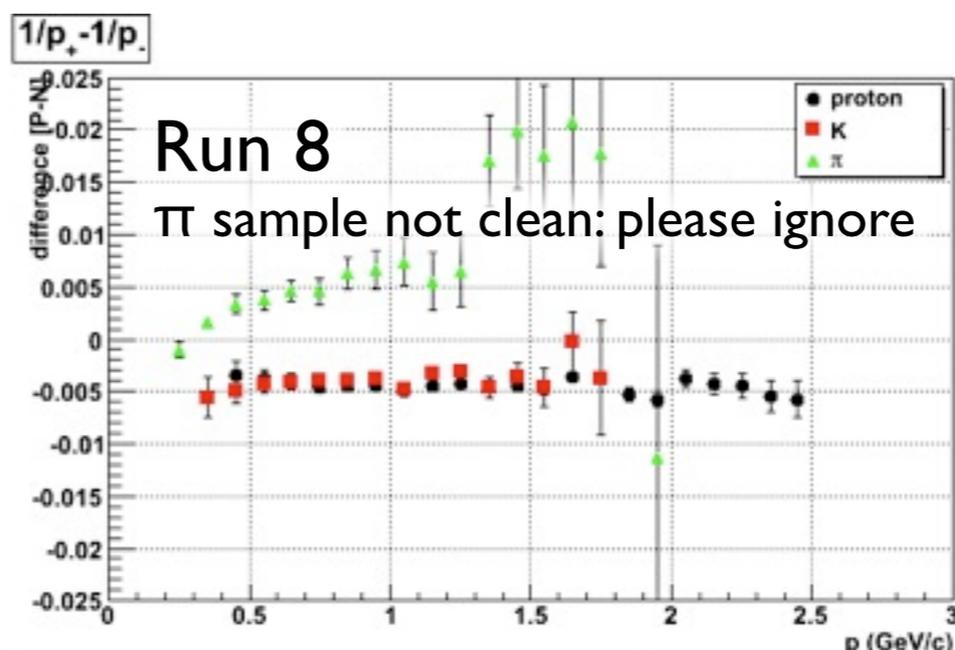
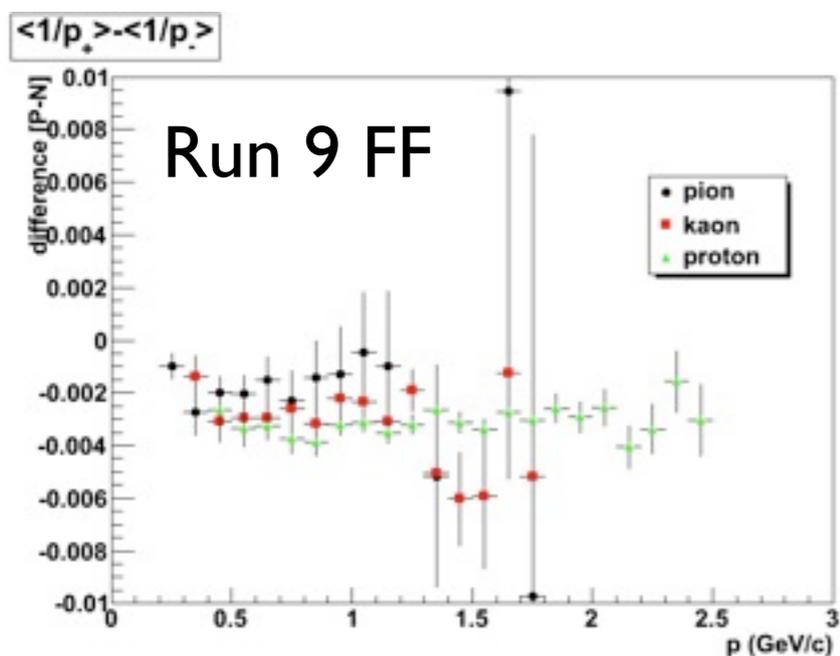
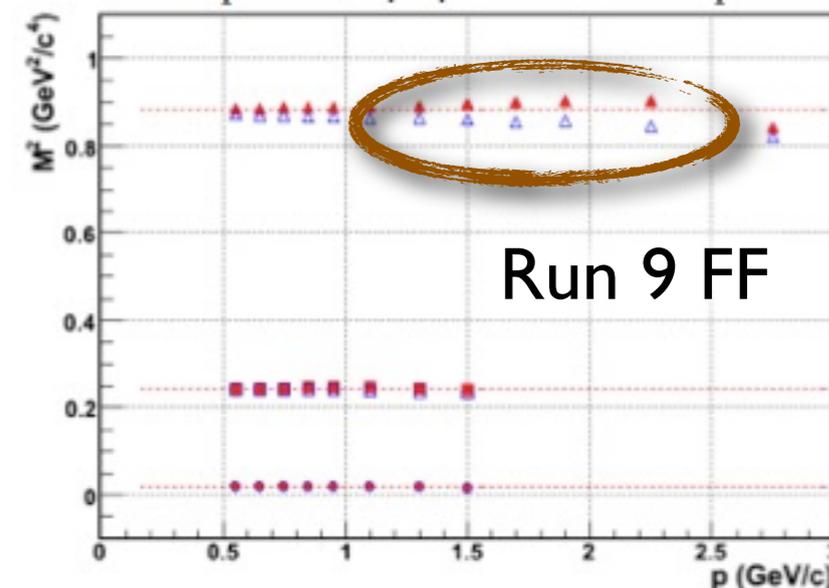
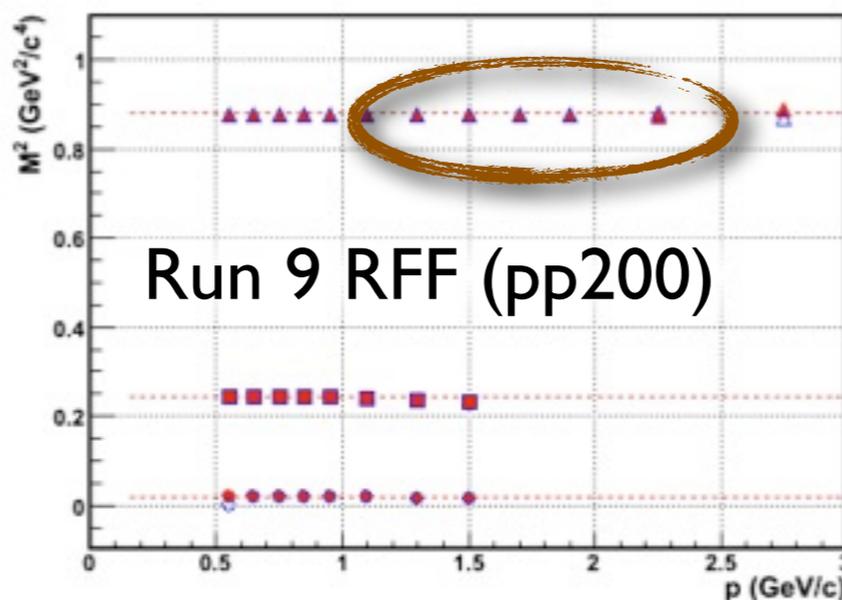
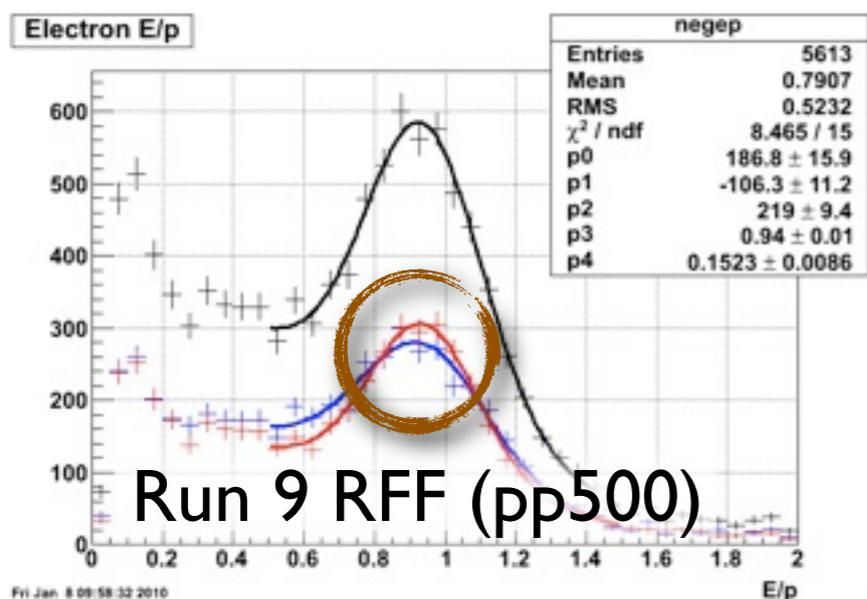
Rashmi Raniwala: SC
Dronika Solanki
Prithwish Tribedy
Nihar Ranjan Sahoo

Beamline

Alexander Schmah

Run 9 Momenta

- Momentum distortions observed in FF data, but negligible RFF



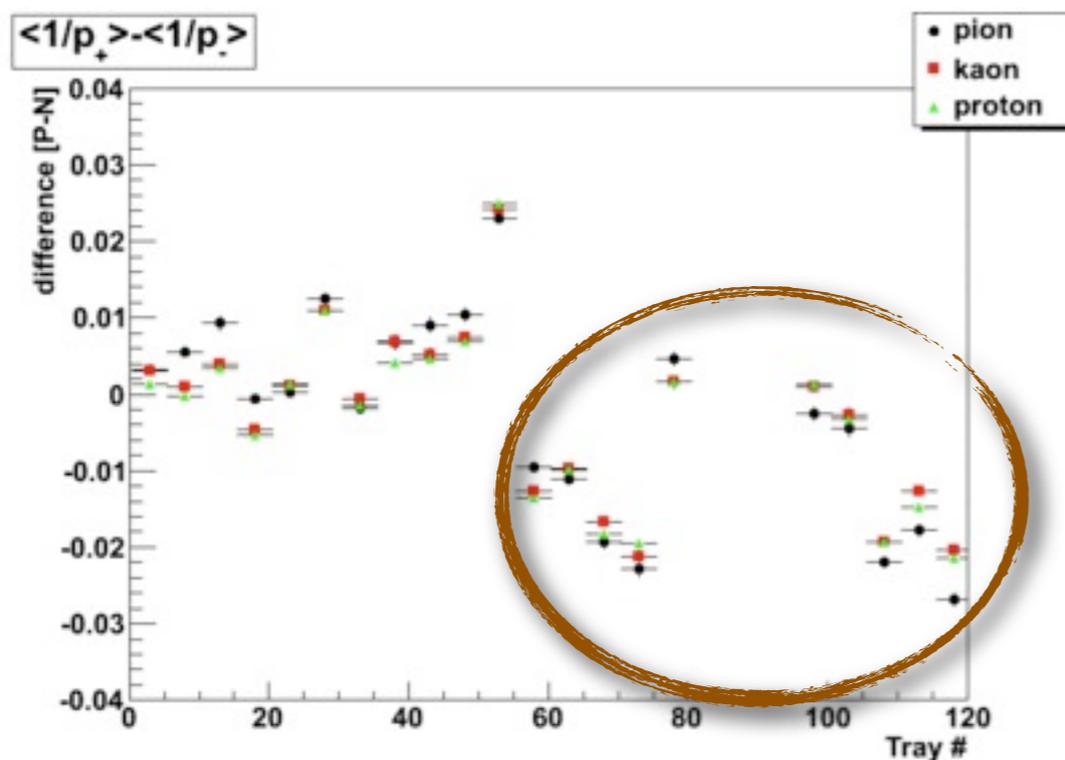
Using $\Delta(p_T) = q \cdot C \cdot p_T^2$
 These plots show $2 \cdot C$.
 Run 8 h^-/h^+ consistent
 with $C = -0.002$ difference
 east vs. west.

High p_T e^-/e^+ shows smaller
 issues in other datasets:
 Run 5 pp200: $C = 0.0009$

- Similar scale and p_T dependence as seen in Run 8

Run 9 Momenta

- Plotted vs. sector shows predominantly east-side issues



- Again, most difference in TPC alignment seen on east-side
- Will re-examine with fix to R alignment

