π/K Ratio Analysis Progress

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MIPP Software Meeting

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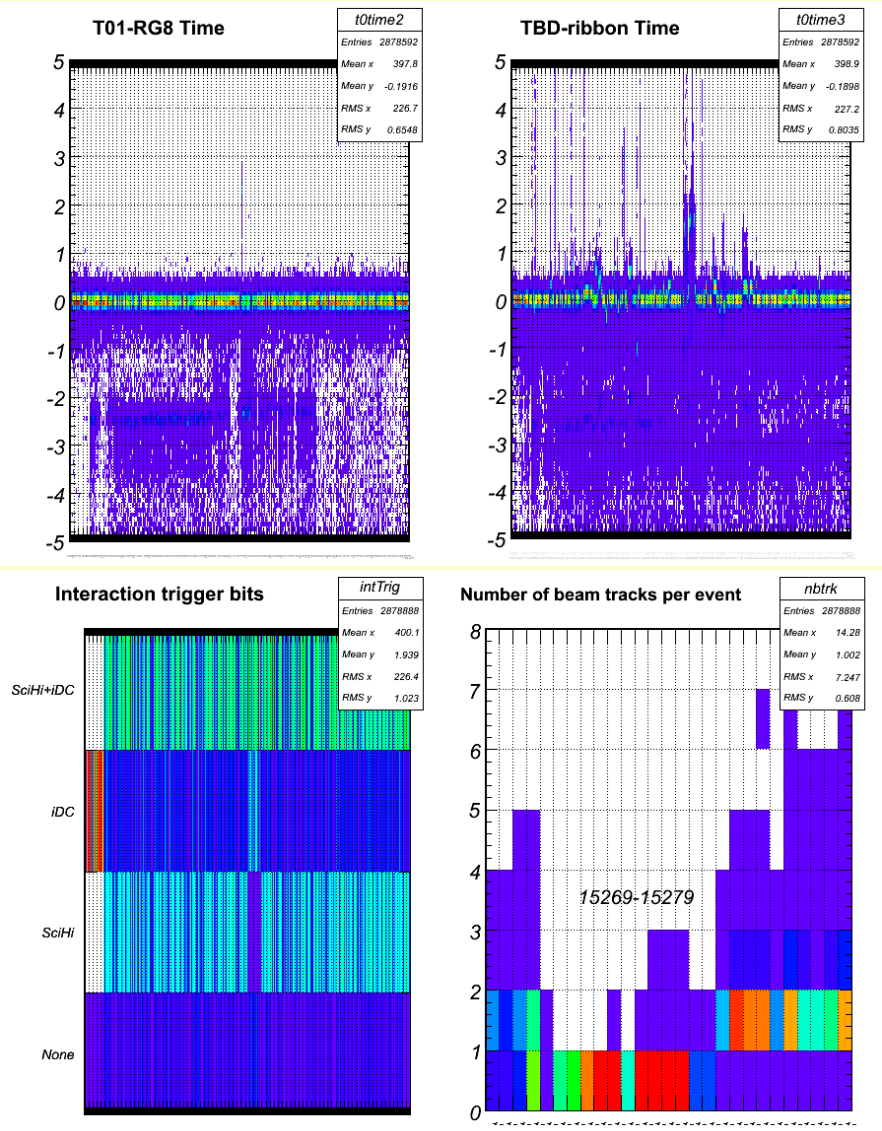
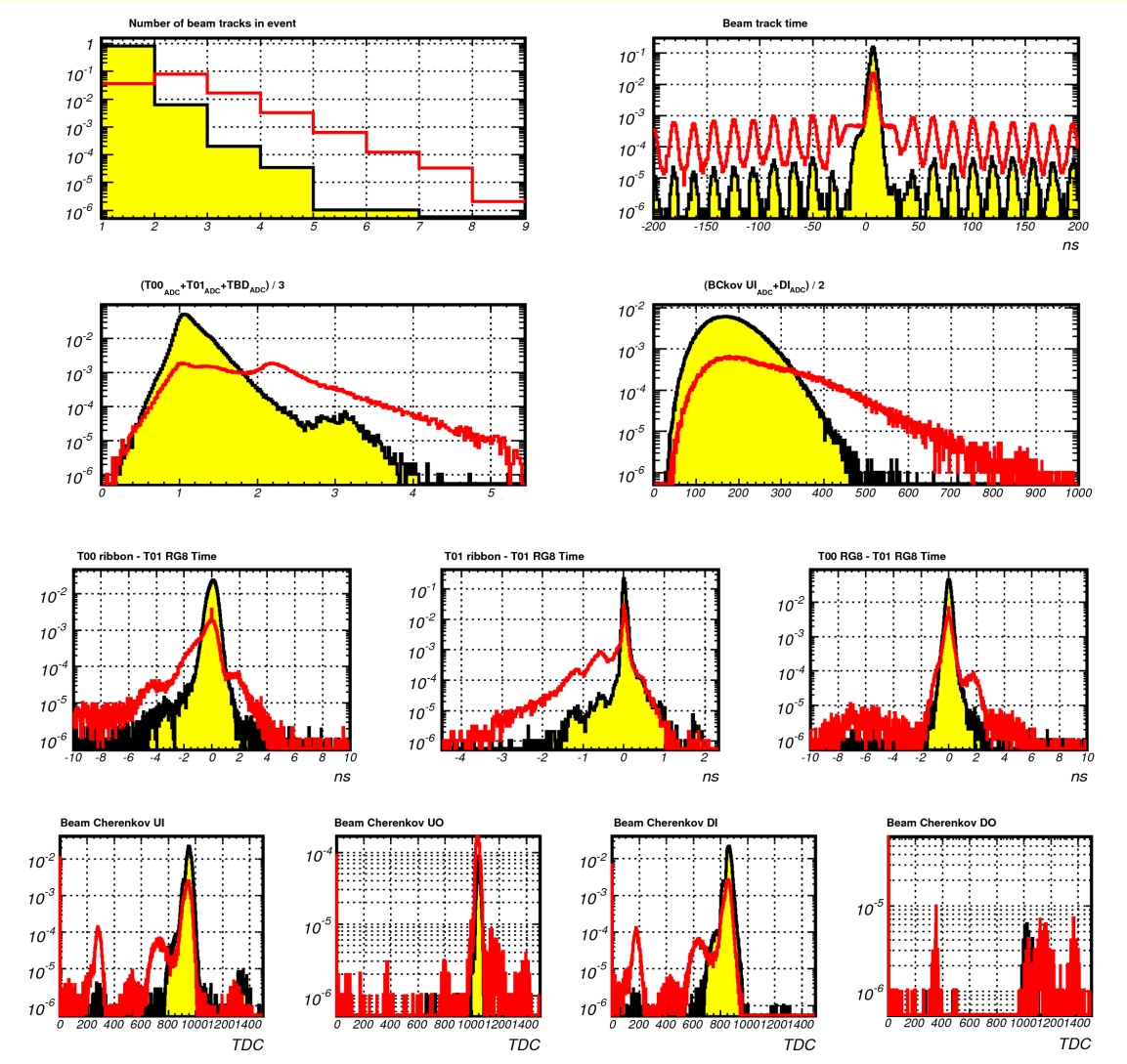
Issues in pass 4 DST's



- The plots from valiRuns show that
  - TBD is not well calibrated in some runs
  - We have no Scint before run 15310
  - We have no BC tracks in runs 15269-15279
- The latter two issues are documented in the logbook

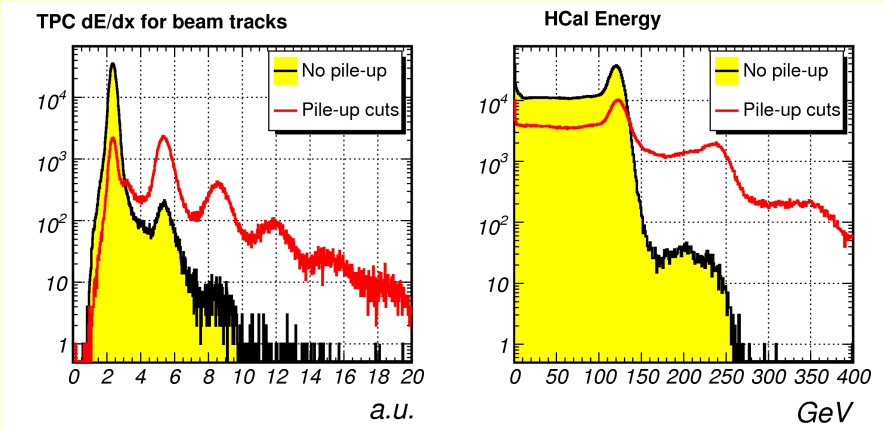
Pile-up Clean up

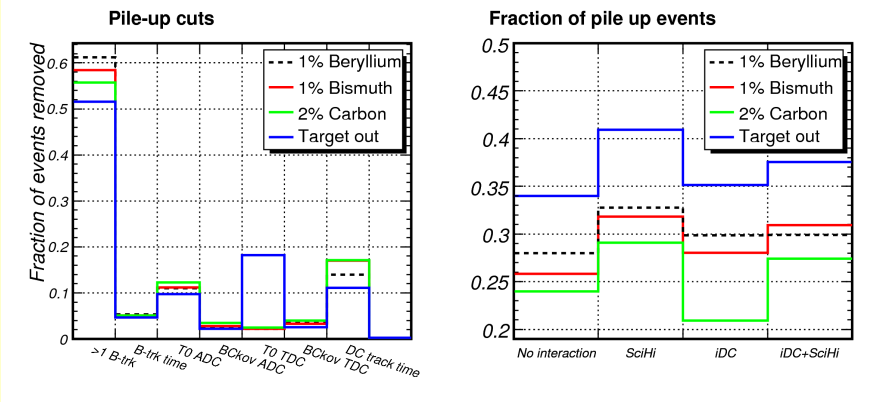


- Using all of 120 GeV data, I retuned the cuts for pileup clean up
  - Pile-up candidates selected based on TPC dE/dx
- Where possible, I cut at the crossover point where pile up histogram goes above single-track histogram

Pile-up (cont.)

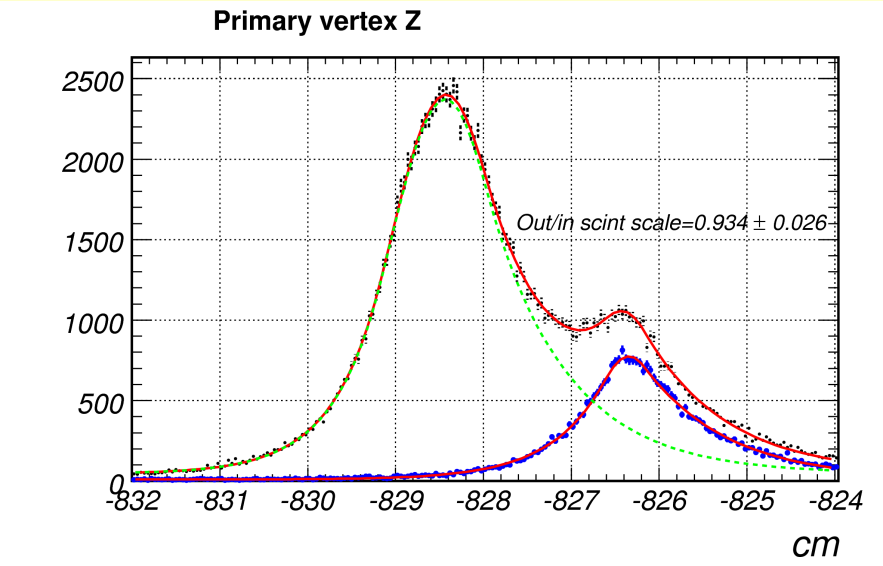
- Based on the tuned up cuts, I believe I'm left with less than 1% of pileup
- As expected, different targets have different amounts of pile-up
  - Target out is the worst (as it has nothing but the scint to trigger on)





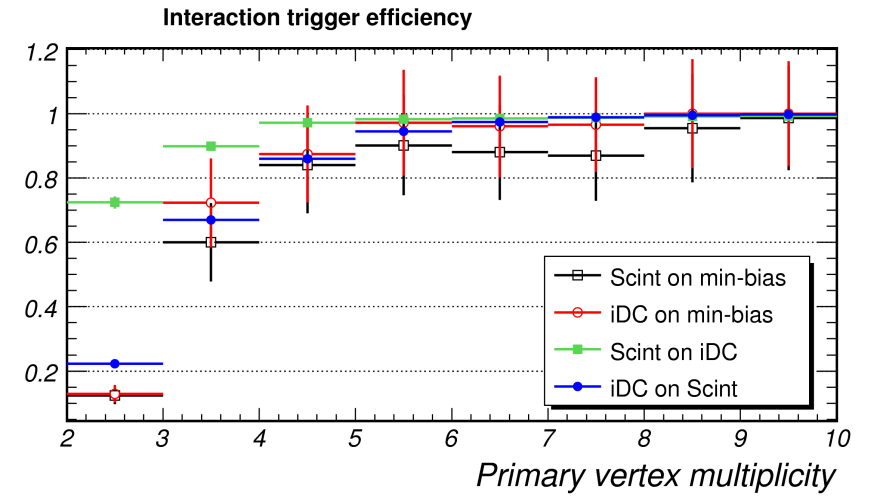
Target out subtraction

- I think for carbon measurement, less bias will be introduced by defining the signal region in z between -832 and -825 cm
- Target shape is modeled quite well by Gaussian with asymmetric exponential tails
- Target in fit done with Scint shape held fixed



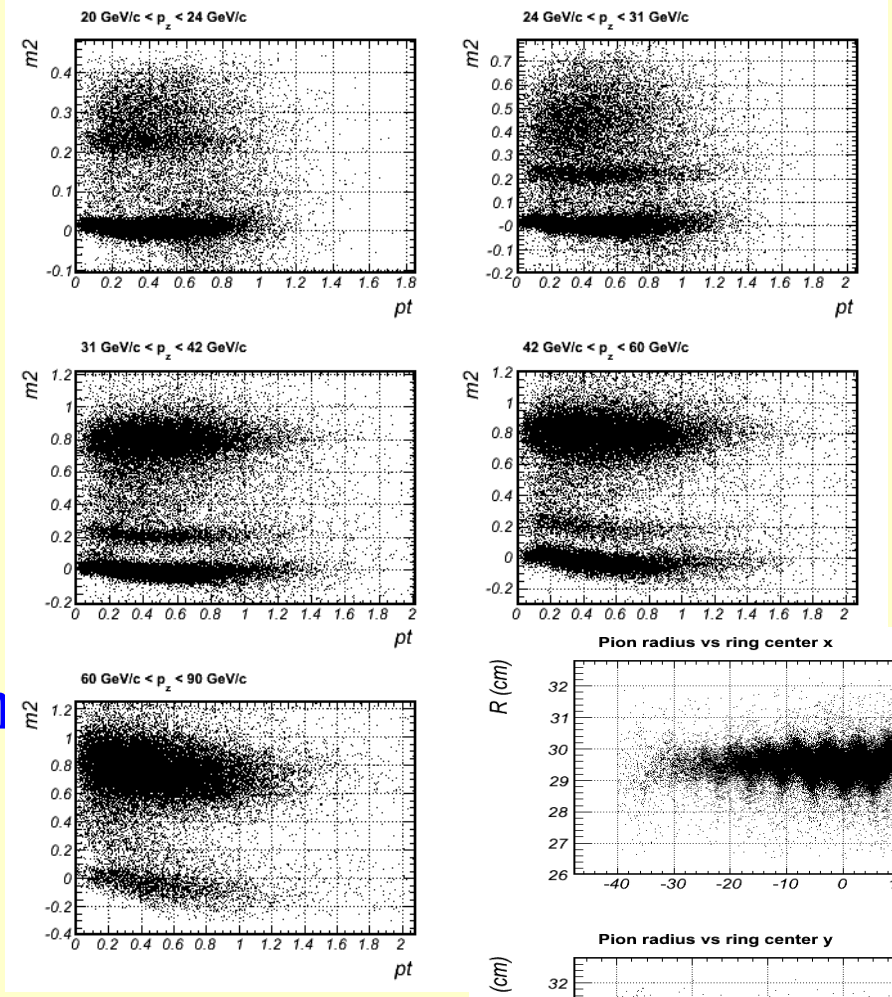
Interaction Trigger Efficiency

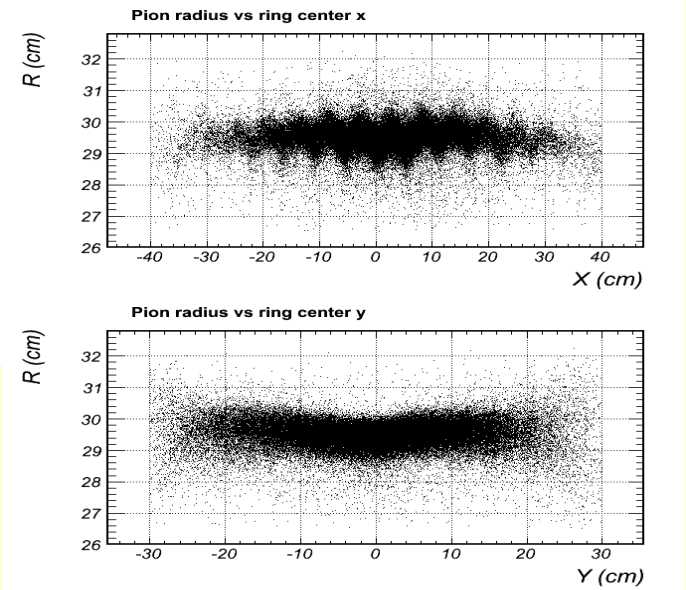
- All of 120 GeV/c data has 1200 reconstructed interactions with z [-831:-827] cm
- Efficiency measured by beating one trigger against the other is biased, so it can only be used for upper limit on efficiency
- I do not yet understand apparent Scint inefficiency >5 track final states



RICH Ring Radius Correction

- I found a somewhat unpleasant effect: computed mass squared varies with pt
- Effect is purely geometric
  - Every 4th PMT row is missing: period of 5.5cm
  - As the ring moves up or down and loses hits at the top, the fitted radius changes





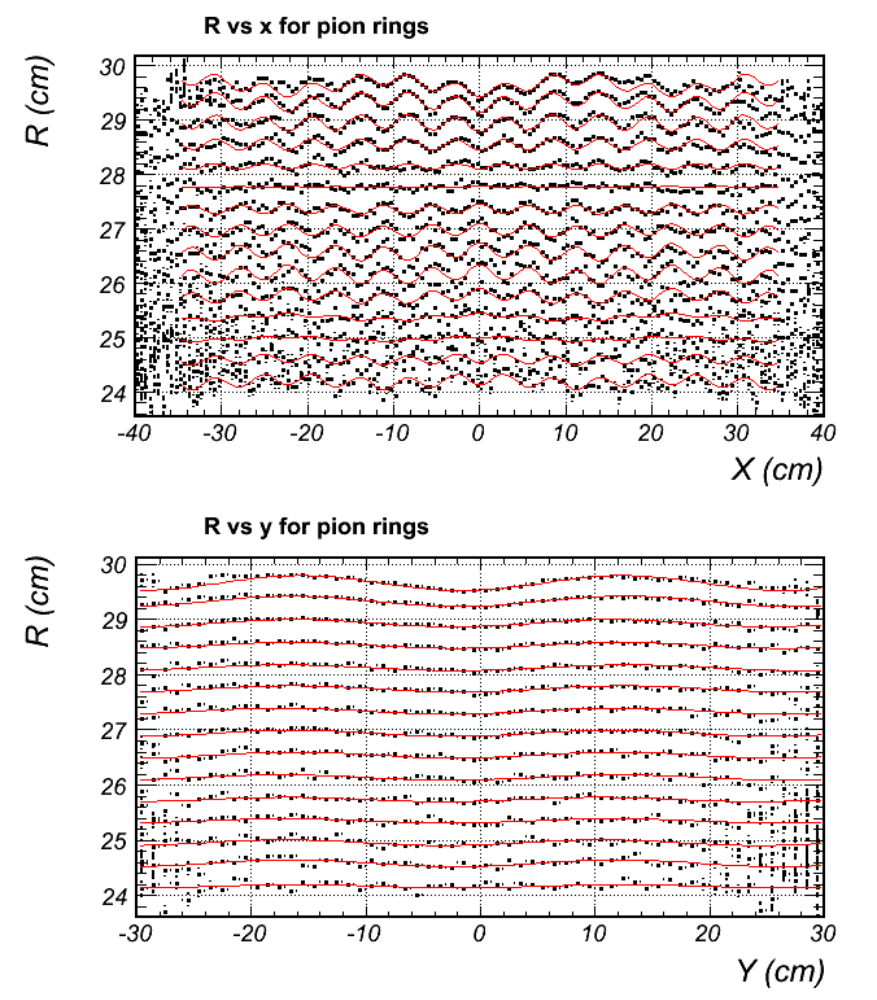
Correcting the ripples

- Select pion rings for a momentum slice where the computed radius should vary by 0.2 cm peak-to-peak
  - Scan radius in 1 mm steps
- Fit histograms to

$$R(x) = A_x \cos(\omega_x x) + A_{x4} \cos(\omega_x x/4)$$

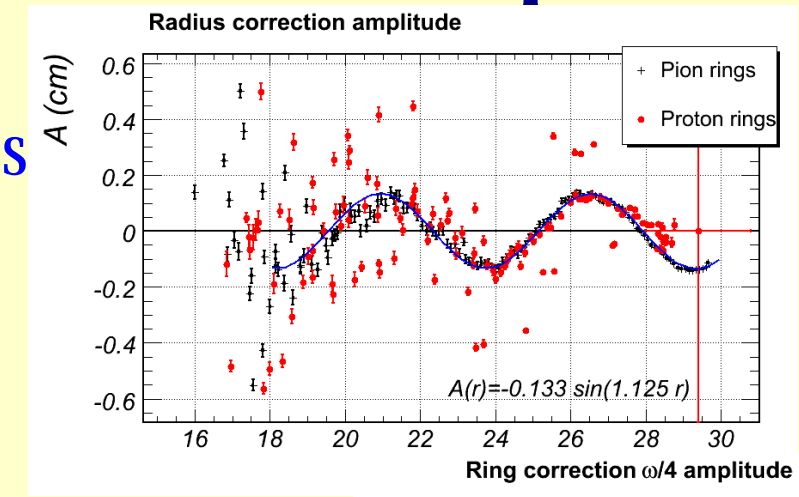
$$R(y) = A_y \cos(\omega_y y + \phi)$$

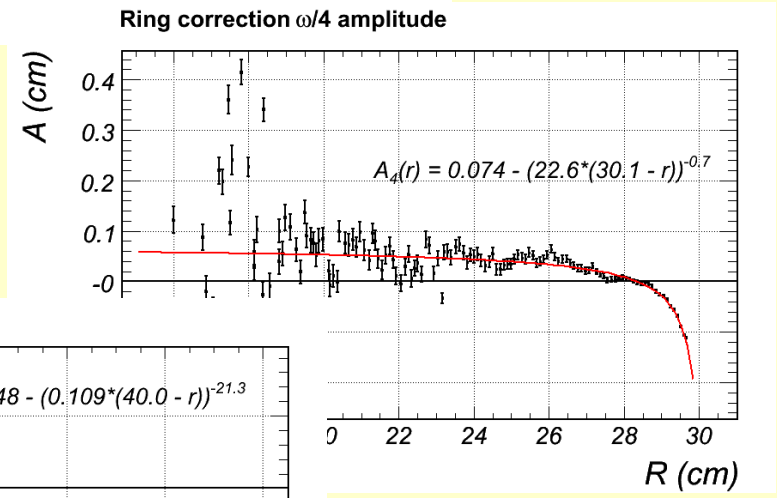
- Fix ωx to 2π/5.5cm
- Float ωy, ϕy

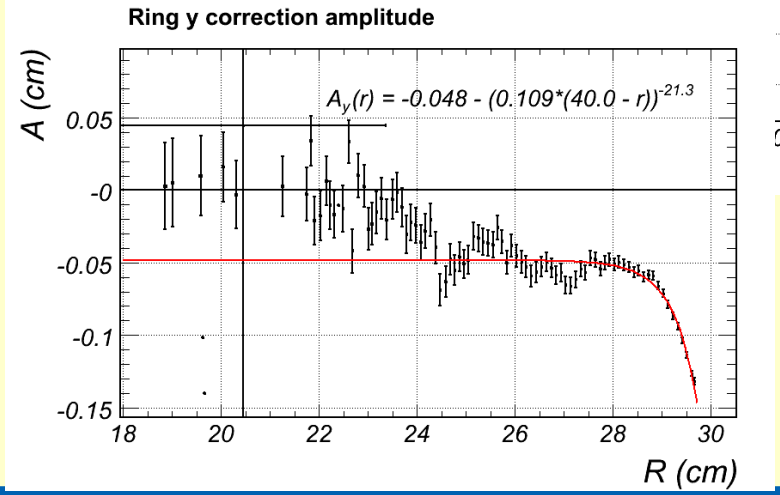


Parametrization of amplitude

- To double check that this is a geometric effect, I redo the scan in ring radius selecting proton rings
- All amplitudes have a fairly simple parametrization as functions of ring radius
- ωy, ϕy end up being fixed as they do not vary appreciably

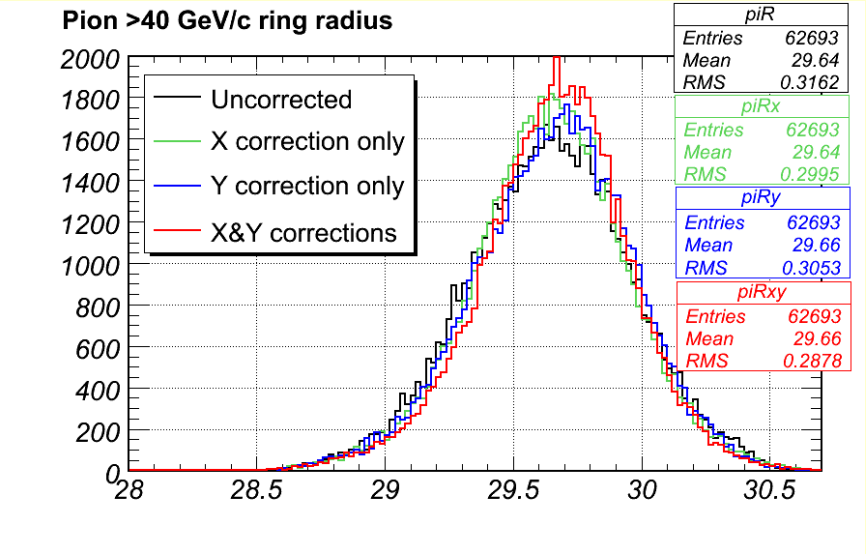


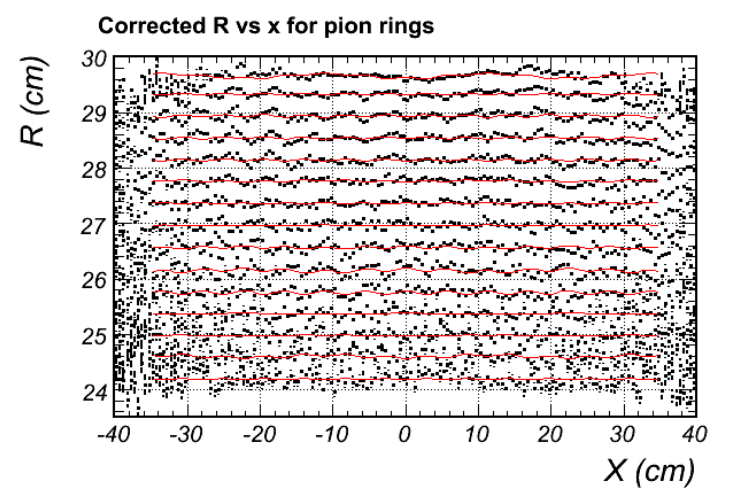


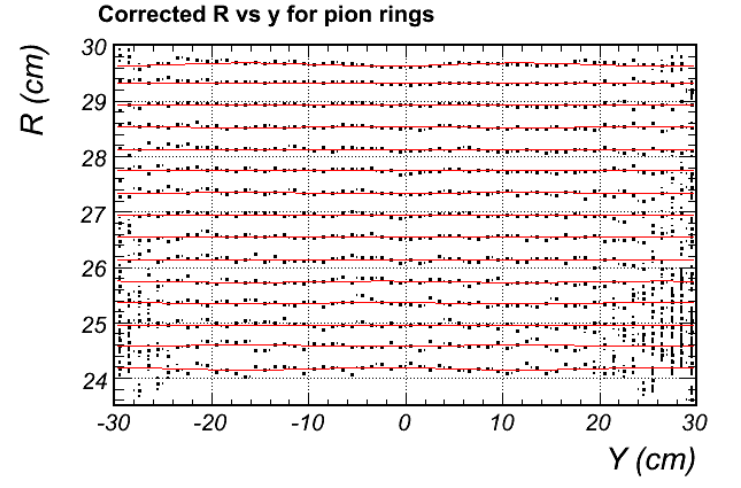


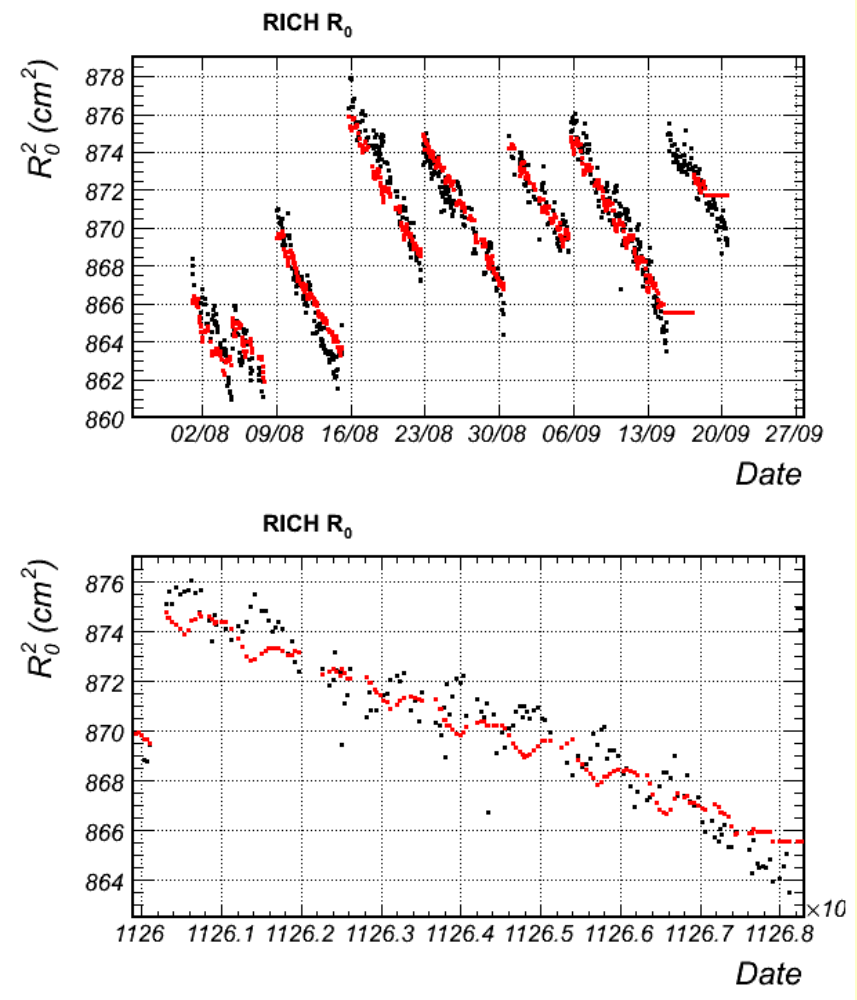
Does it work?

- The ripples in X get smaller and the width of high momentum pion ring radius gets narrower by ~10%, so while this is not perfect it's better than nothing







R0 variations

- One more thing that I found strange
  - Computed R0 decreases with time much like the density ratio during a week
  - It anti-correlates density in daily fluctuations