

Analysis Progress

for the d_2^n analysis meeting

Diana Parno

Carnegie Mellon University

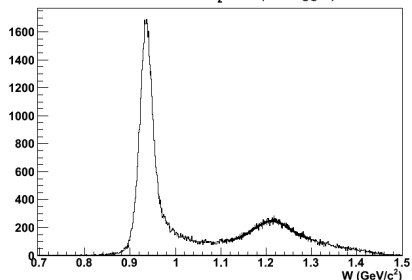
December 16, 2010

- 1 BigBite Optics
- 2 Farm Replay
 - 32-Bit Farm
 - 64-Bit Farm
- 3 Skimming
 - Beam Trips
 - Kinematic Variables
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Δ Placement from Monte Carlo

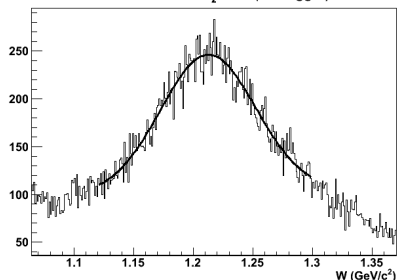
- Gregg's simulation predicts a Δ with these characteristics:
 - ▶ Strength about $\times 1.5$ less than proton peak
 - ▶ Peak location around $1215 \text{ MeV}/c^2$
- Is the infamous low-momentum correction even necessary? Suppose we remove it from our T1 data...

Invariant Mass for H_2 Data (T1 Trigger)



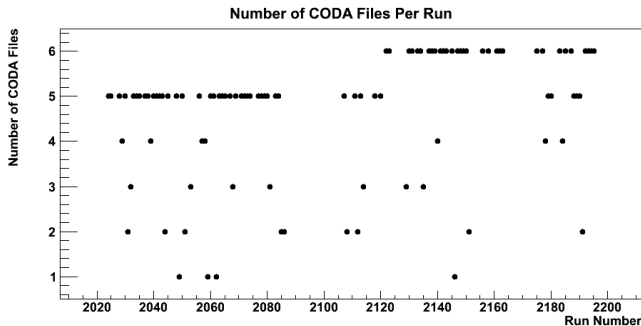
- Relative strength: $\times 2.5$
- Δ peak: $1212 \pm 1 \text{ MeV}/c^2$

Invariant Mass for H_2 Data (T1 Trigger)



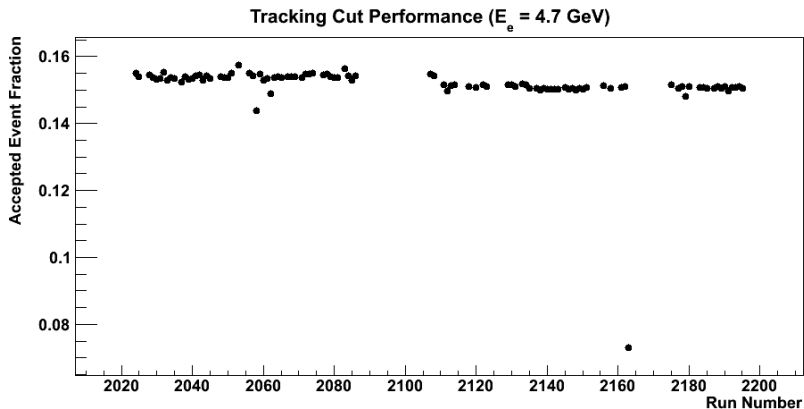
Four-Pass Production BigBite Replay Complete

- 102 runs
- 477 jobs
- 243.55 GB
- You can even see when the number of events per run was increased from 5M to 6.5M:



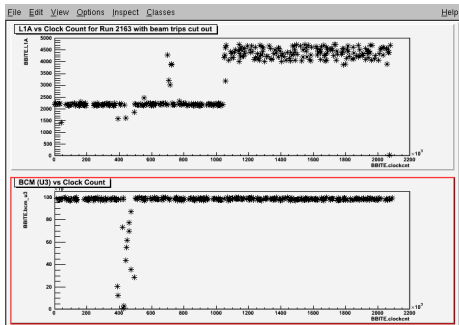
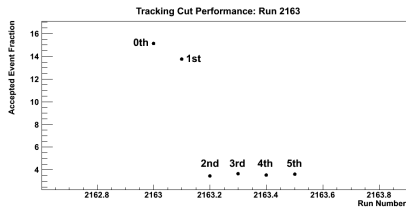
Tracking Cut Performance (i)

- To conserve space, we only wrote CODA events with $\text{BB.tr.n} > 0$
- Does this cut perform consistently across all runs?



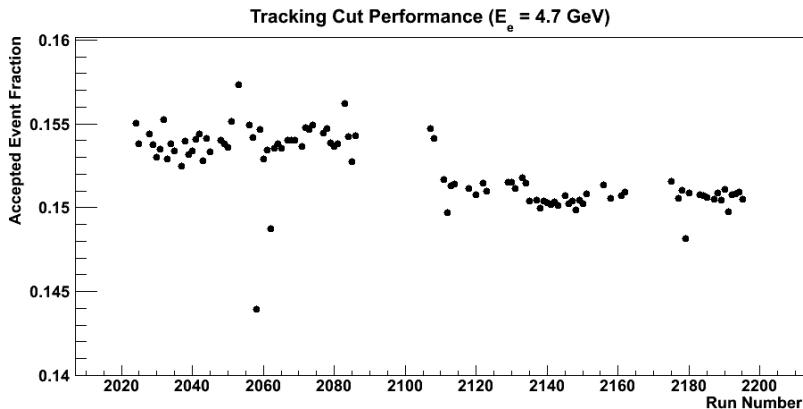
Tracking Cut Performance (ii): Run 2163

- Run 2163 is the only big outlier
- Problems began only partway through the run (left)
- HALOG entry shows onset of L1A double-pulsing (right)
- Problem was eventually fixed by re-seating T8 cable



Tracking Cut Performance (iii): Zoom

- We see a $\sim 2\%$ drop in accept ratio around Run 2110.
 - ▶ Run 2107 was the first production run after the long beam down in which several cryomodules were taken out of commission.
- Remaining outliers are low because of a single data file with a lower percentage of accepted events.

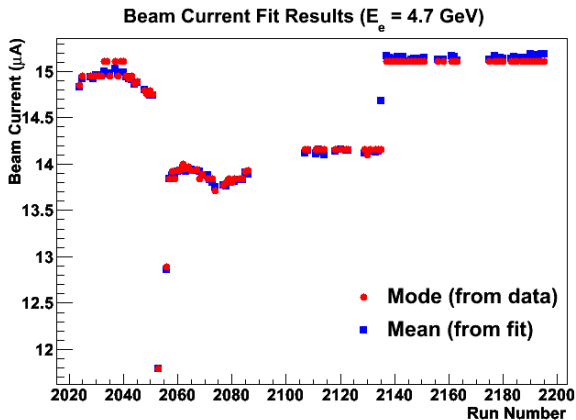


64-Bit Replay

- We'd like to have this available for future rounds of replay
- Brad learned the secret to compiling a 64-bit version of the analyzer on ifarm16
- My test replays on the 64-bit farm aren't working
 - 1 With 1GB allocated memory, the analyzer worked but ran out of memory
 - 2 With 2GB allocated memory, the analyzer crashed in 4/5 runs (but successfully completed the 5th)
- This is not a very high priority for me

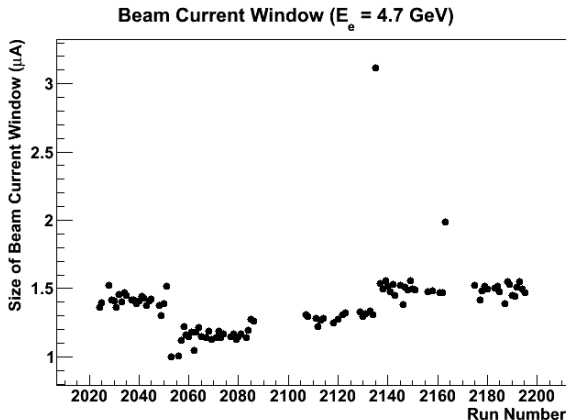
Beam Trips (i): Current Mean and Mode

- I ran beam-trip-finding code on the entire four-pass production dataset
- To check fit quality, I plotted results as a function of run number
- First up: mode (from data) and mean (from fit) of current distributions



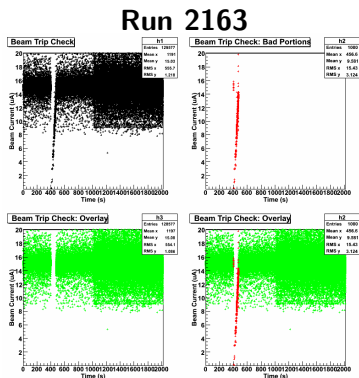
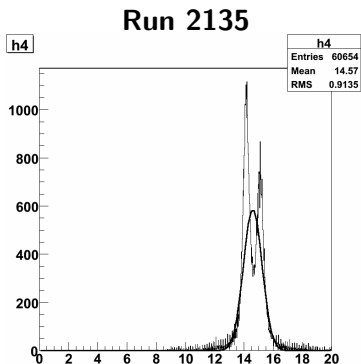
Beam Trips (ii): Threshold Distance from Mean

- The beam trip fit defines a window around the mean. Anything within the window is accepted.
- We measure window size by determining the distance of the threshold from the mean.



Beam Trips (iii): Outliers

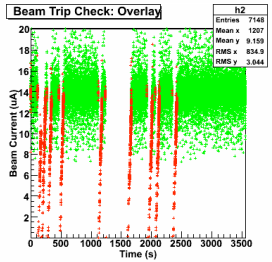
- Two runs have significantly different window sizes from their neighbors
- Run 2135: Current setpoint changed midway through
- Run 2163: L1A double-pulsing problem



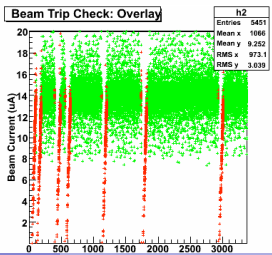
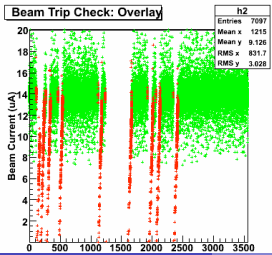
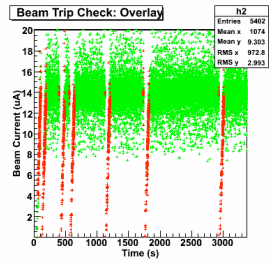
Beam Trips (iv): Glitches

- I made corrections to the automatic cuts in about 70% of runs

False Positives



False Negatives



Kinematic Variables in BigBite

- We don't currently have a good package for computing kinematic variables in the replay
- PriKineBB uses THaGoldenTrack, which just selects the 0th BigBite track
- To fix this, we introduce ν , Q^2 , W and x during the skim process
- New variables: `skim.nu`, `skim.q2`, etc

Summary

- BB Optics: Low- p correction may not be necessary at all
- Farm Replays:
 - ▶ Four-pass production runs done on 32-bit farm
 - ▶ Cut performance shows degradation in track finding over time
 - ▶ 64-bit farm replays not quite working
- Skim Process:
 - ▶ Beam-trip finding is well-behaved
 - ▶ Kinematic variables can be added simultaneously
 - ▶ I have skimmed all four-pass production data using the farm
- ROOT File Locations:
 - ▶ Replayed ROOT files: /w/halla/e06014/20101118/
 - ▶ Skimmed ROOT files:
/w/halla/e06014/20101118/SkimROOTfiles/

What's Next?

- Asymmetries
 - ▶ I'm working on getting my asymmetry-calculation code running on skimmed ROOT files
 - ▶ Finalize cuts
 - ▶ Account for IHWP switches
- BigBite Optics
 - ▶ Explain width of `BB.tr.tg_ph` distribution in positive optics