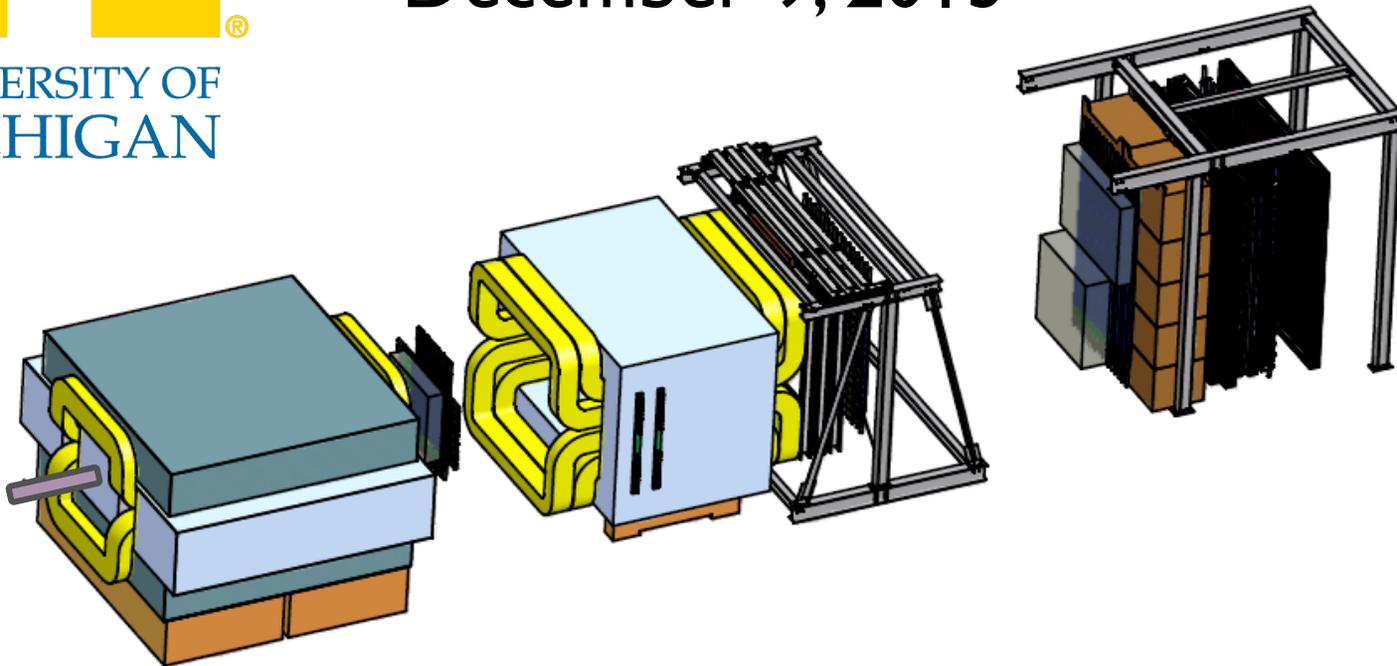


# SeaQuest AEM Report



Joshua G. Rubin  
December 9, 2013



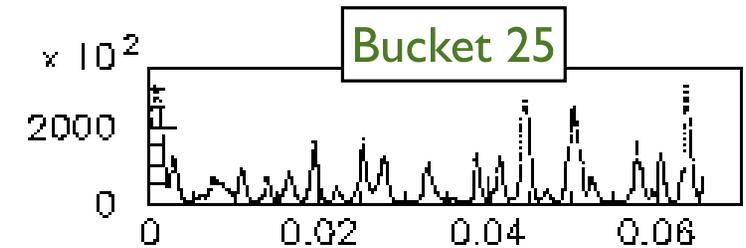
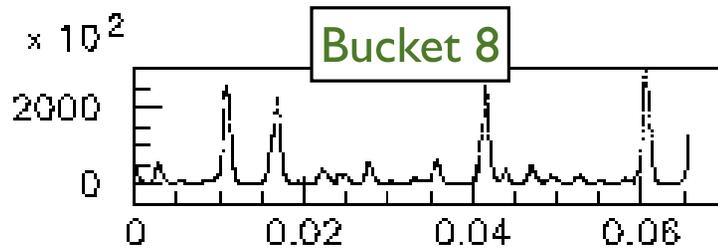
# Cherenkov Intensity Monitor

- Provides bucket-by-bucket beam intensity data
- Enabled trigger inhibit now nominal running condition AND encoding inhibit status in stored data stream for analysis or luminosity calculation.
- Providing access to low intensity periods of beam. i.e. reduced out-of-time pileup in chambers. Good for:
  - Plateauing and calibrating chambers
  - Finding tracks for fine-tuning alignment and looking at first momentum spectra

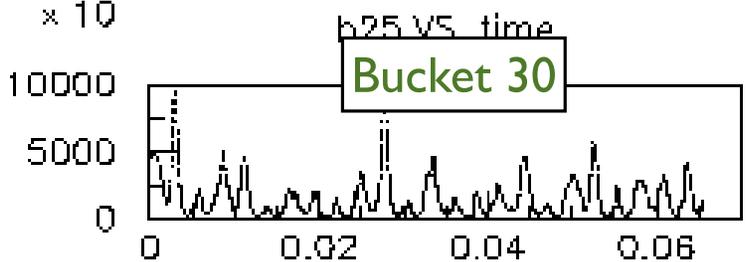
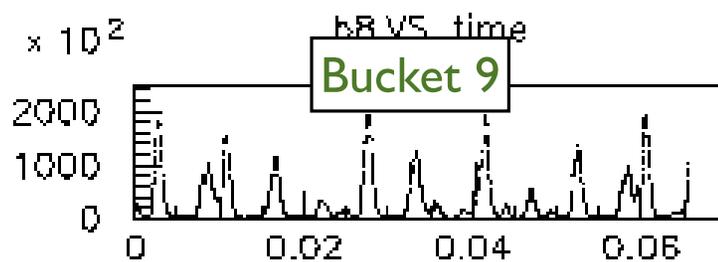
# Studies of intensity fluctuations using charge-integrated data stream

## Tracking single RF buckets over many Main Injector turns:

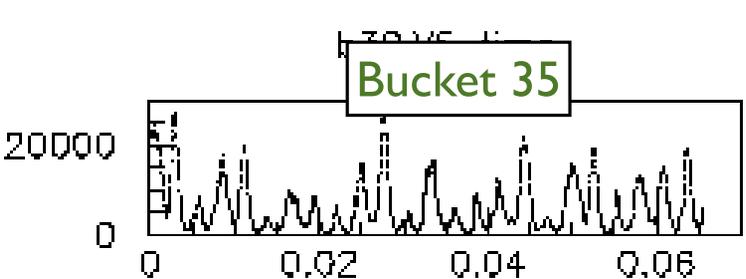
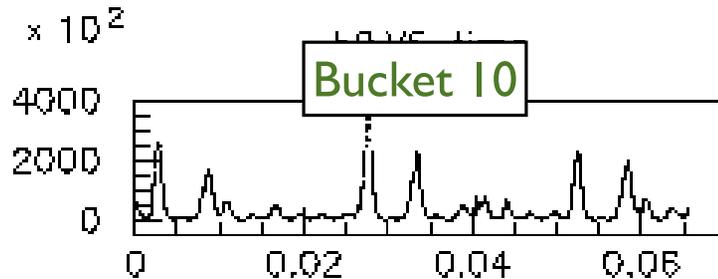
Buckets seem to extract in “burps” phase-locked to 360Hz



A particular bucket extracts for some intervals of turns and not at all for others



Varies bucket-to-bucket



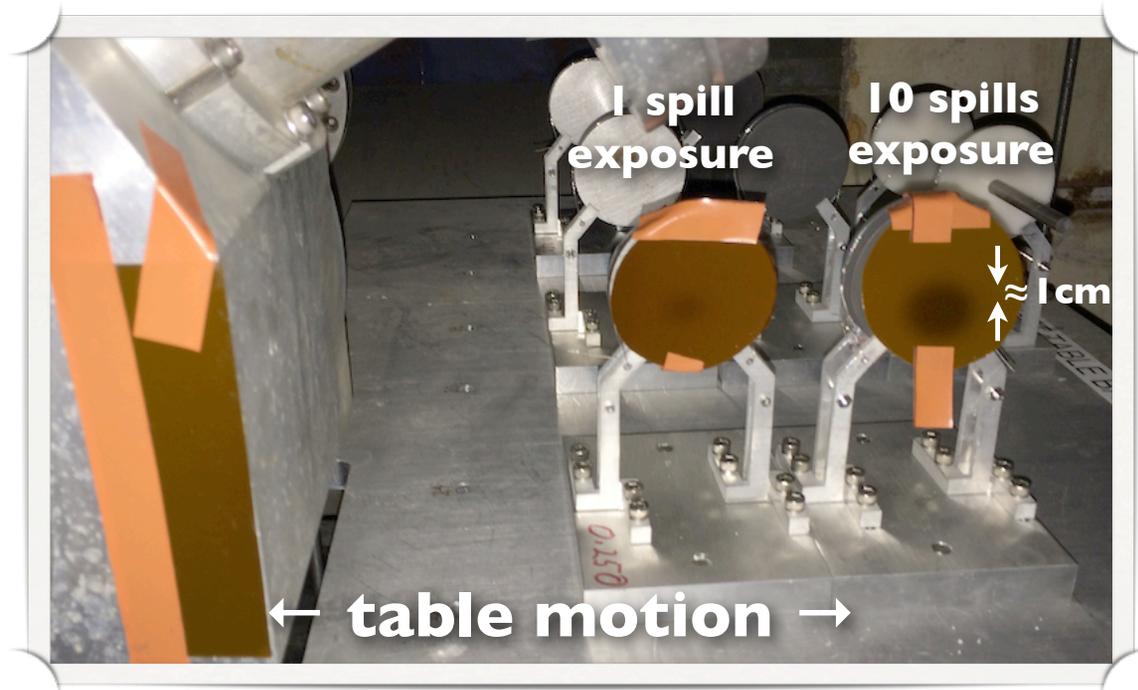
**Actively working with AD to provide the most useful representations for tuning. Meeting on Tuesday.**

# an unexpected complication...

- Rad monitor on NM4 loading dock showing more rate than same beam intensity a year ago. **Impact on commissioning/calibration period small.** However, until improved, this will be the upper constraint on beam intensity.
- As the only new beamline element, the Cherenkov is a likely suspect. It could be moved 200' ( $\times 2$  distance) upstream - requires air core coax.
- Beam position also being investigated using film

SeaQuest target table with film covering solid targets

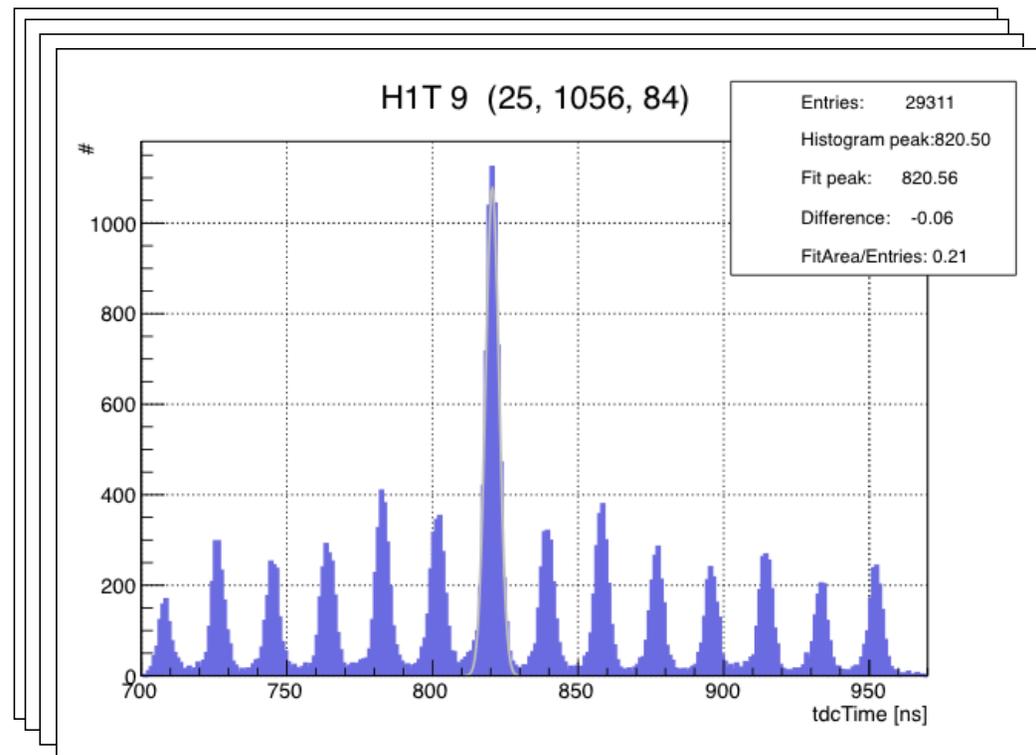
$\approx 1$  cm vertical offset visible



# Hodoscopes and Trigger

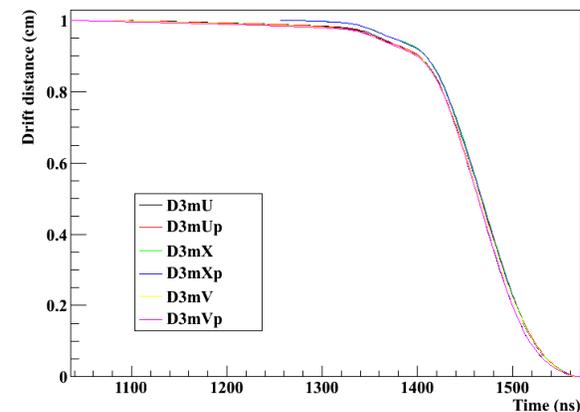
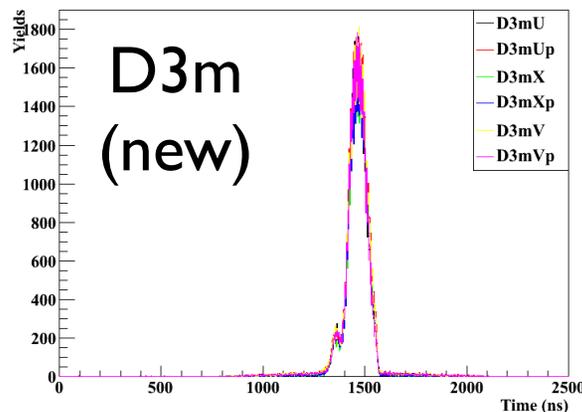
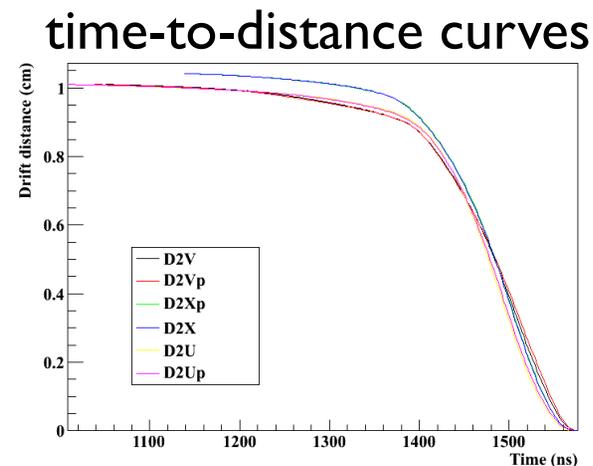
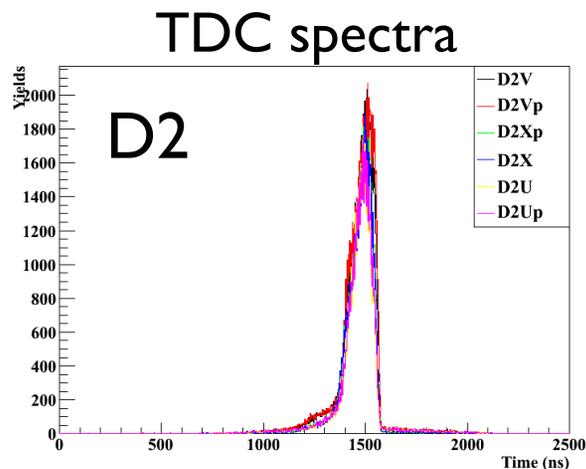
- Gain matching complete
- Hodoscope timing quite good ( $\approx 2\text{ns}$ )
- Primary FPGA trigger timed-in and working
- Trigger “roads” table for FPGA being refined

Example hodoscope  
TDC spectrum:



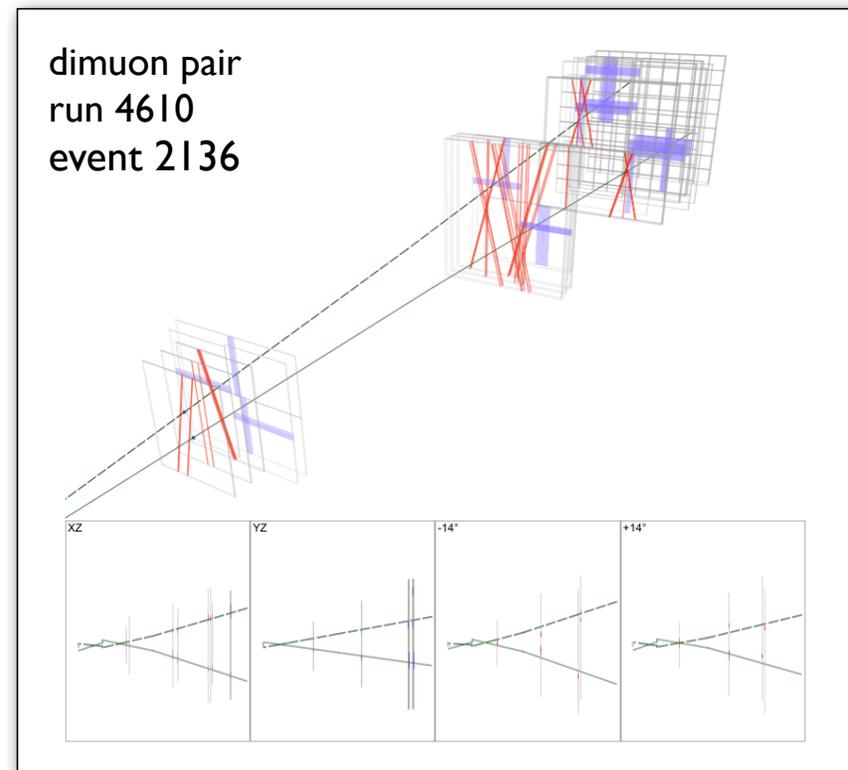
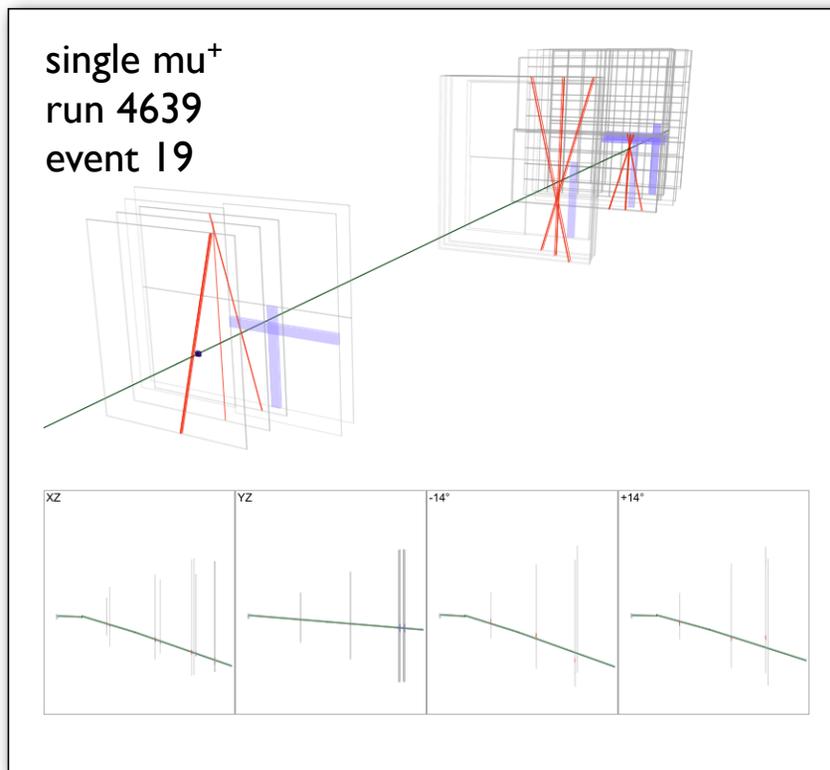
# Drift Chamber Progress:

- 23/24 planes working well. Station 1 x, problematic, but not holding up other progress.
- First calibrations made
- Some noise hits visible, but thresholds yet to be tuned



# Offline Software

- Reconstructing single muon trigger calibration data
  - single muon momentum spectra checked
  - fine alignment in progress
  - To-do: 2nd order chamber calibrations and efficiencies



- Reconstruction will benefit from chamber threshold tuning and fine-tuned alignment.

# Summary

- Intensity monitor in-use. Inhibit is providing clean data for calibration and alignment. Working to provide beam quality information to accelerator team.
- Detector systems mostly calibrated and timed-in
- Drift chamber adjustments in progress, but current settings usable for first event reconstruction.
- We expect to take “production” data shortly ( $\approx$  1 week). This will start at low intensity, but will provide access to physics variables (similar to last year’s commissioning run)