RUN II UPGRADE OF THE MINIMUM BIAS TRIGGER SCINTILLATORS

SUMMER 2014 PROGRESS

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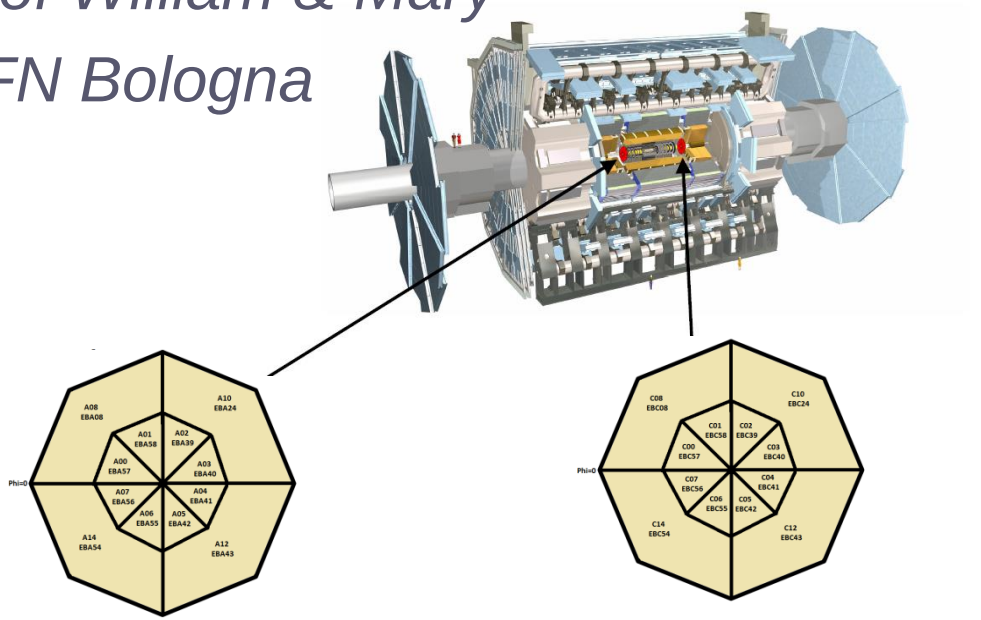
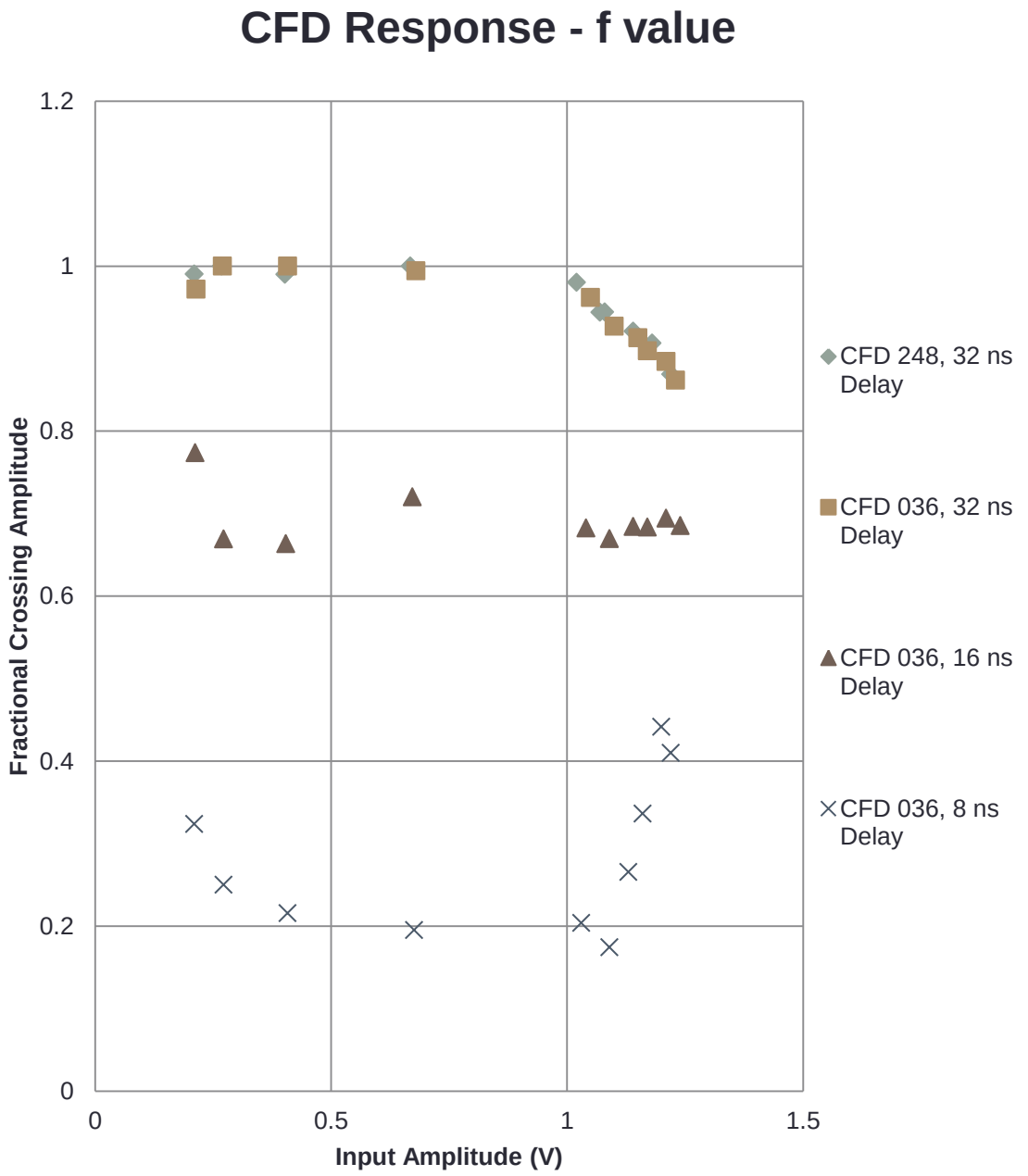


Major Completed Tasks

- Determine minimum time separation between two pulses for Constant Fraction Discriminators to fire twice
  - Already covered these results in previous talk
  - Check against another CFD module to confirm similar performance – results were good
- Determine “f-value” of CFD’s
  - Check against another CFD module
  - Check effects of changing CFD delay parameter
- Estimate MBTS counter efficiency using Run 1 data and measured deadtime
  - Rough estimation to determine usefulness of the MBTS for Run II Heavy Ion runs

F-Value

- “f-value” is determined by measuring the amplitude of the input pulse at the time of the zero-crossing, then dividing by the maximum amplitude to obtain a fractional value
- 32 ns Delay found to be best in earlier pulse-separation testing
  - Also seems most predictable for f-value
  - Output pulse will fall at ~peak of the input pulse
- As expected, with smaller delay, zero-crossing falls earlier along the pulse, hence smaller fractional amplitude

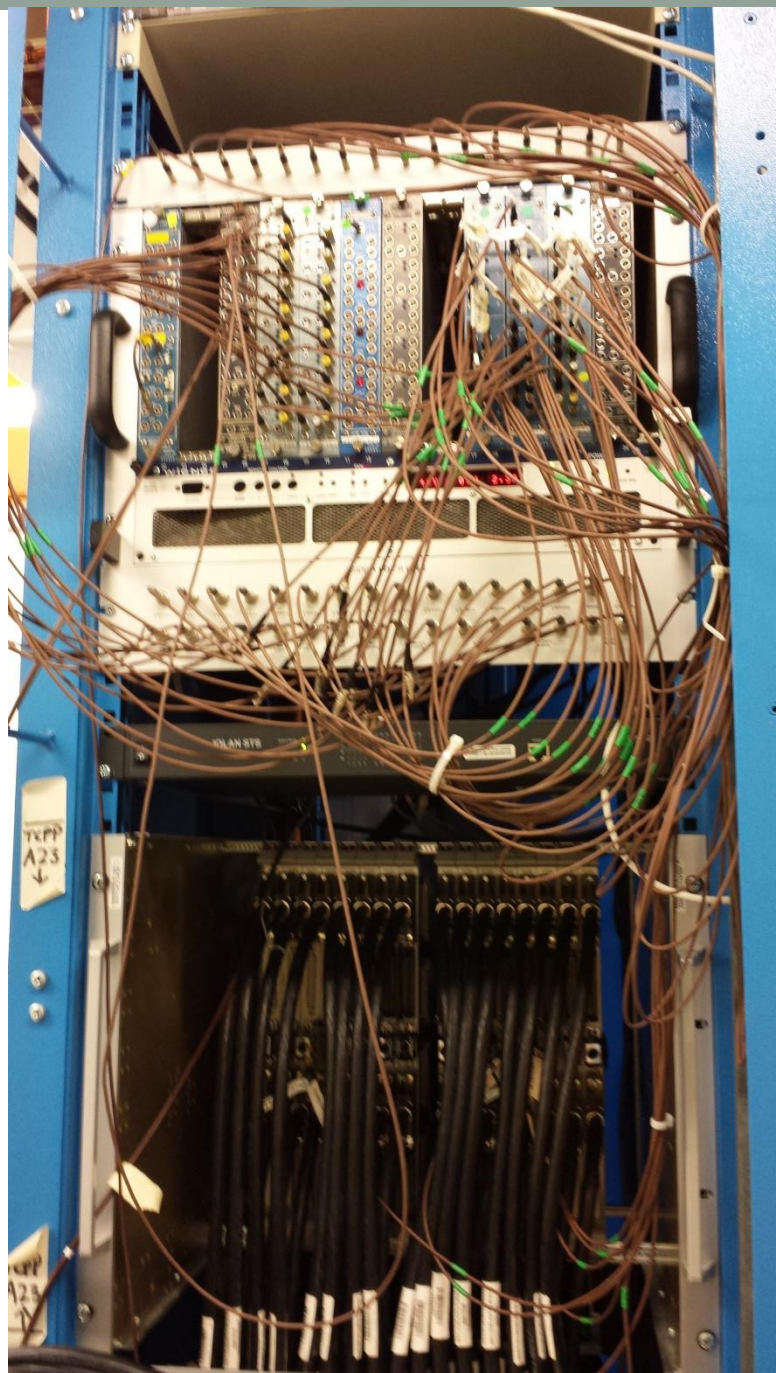


Estimate of Efficiency for Heavy Ion Runs

- Minimum Bias Trigger important for Heavy Ion analysis
  - More low pT particles created than in p-p collisions
- For Run II, bunch crossing rate increasing from 200ns to 100ns for Heavy Ion runs
- Looked at data from Run 1 HI Runs to estimate event frequency, then (roughly) calculated efficiency
  - Estimated a “miss rate” as 1 – efficiency
- Found no miss rates > 1%
- Good to go for HI Runs!

What next?

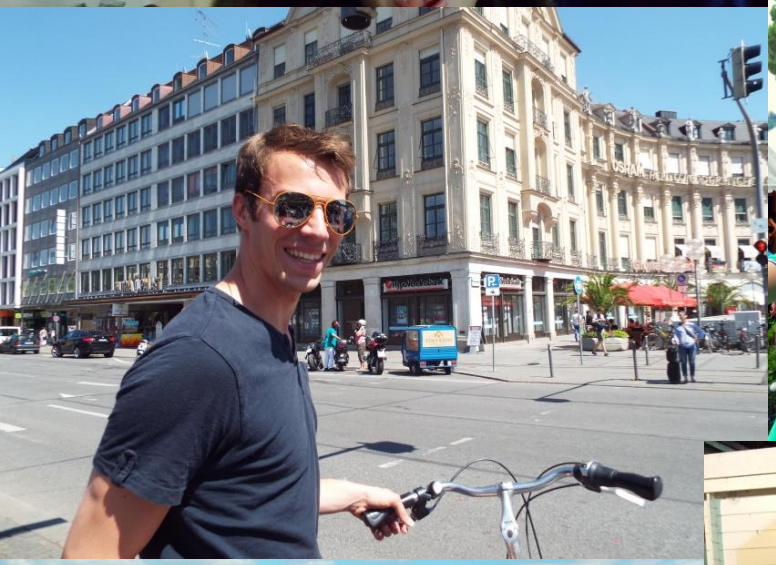
- Installation of scintillators themselves and updates to side A inner drawers (different PMT and 3-in-1 card output)
- One CFD doesn't work
- Two drawers have issues
- Better analysis of HI efficiency should probably be done
- Need to plug in more wires! (Ran out…)



My Experience

- No one set project – did what needed to be done for different people at the time
- Worked almost completely on electronics
  - Gained more hardware experience than I was expecting
- Worked in the detector pits!
  - Very unique-to-CERN experience
- First time working in a very large collaboration

Favorites from the Summer…



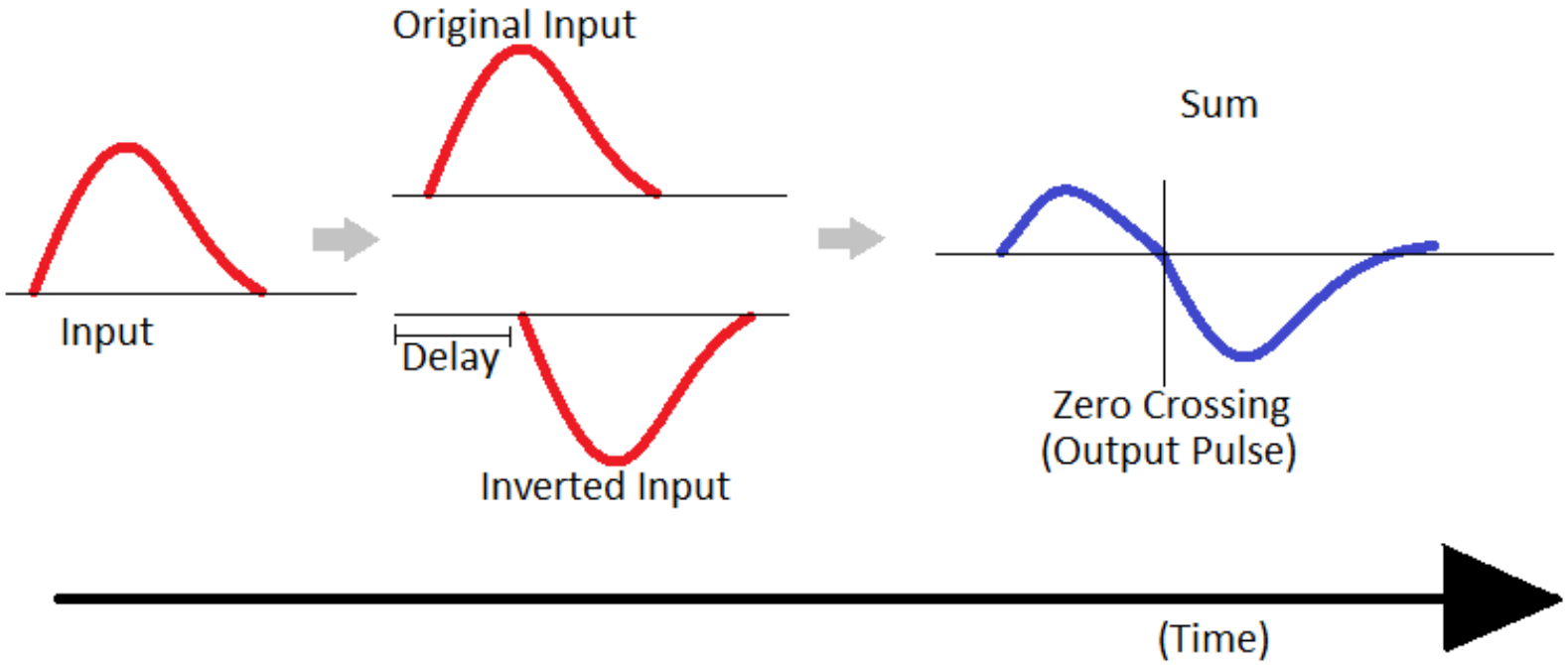
Acknowledgements

- Thanks to Antonio for supervising, to Sabrina for software help, to Oleg for electronics help, to Ivana for help obtaining Run 1 trigger rates, to Thilo and Kristof for helping test CTP connections, and to Luis for keeping me up-to-date on detector tests.

- Thanks to everyone at U-Michigan for hosting such a great summer program!

(Extra Slides)

An Overview of CFD Operation



- Can view Sum through “Monitor” output on CFD
- Delay is set by a cable; adjustable parameter
- Output is a square-wave pulse w/ leading edge at the zero-crossing

CFD Pulse Separation

- Used charge injection pulses from MBTS electronics (more realistic results)
- Minimum time depends on ratio of amplitudes, not absolute amplitudes
- Added results from testing another CFD module
  - Similar response between both
- ~130 ns appears to be worst-case-scenario