Cabling Lengths and Timing

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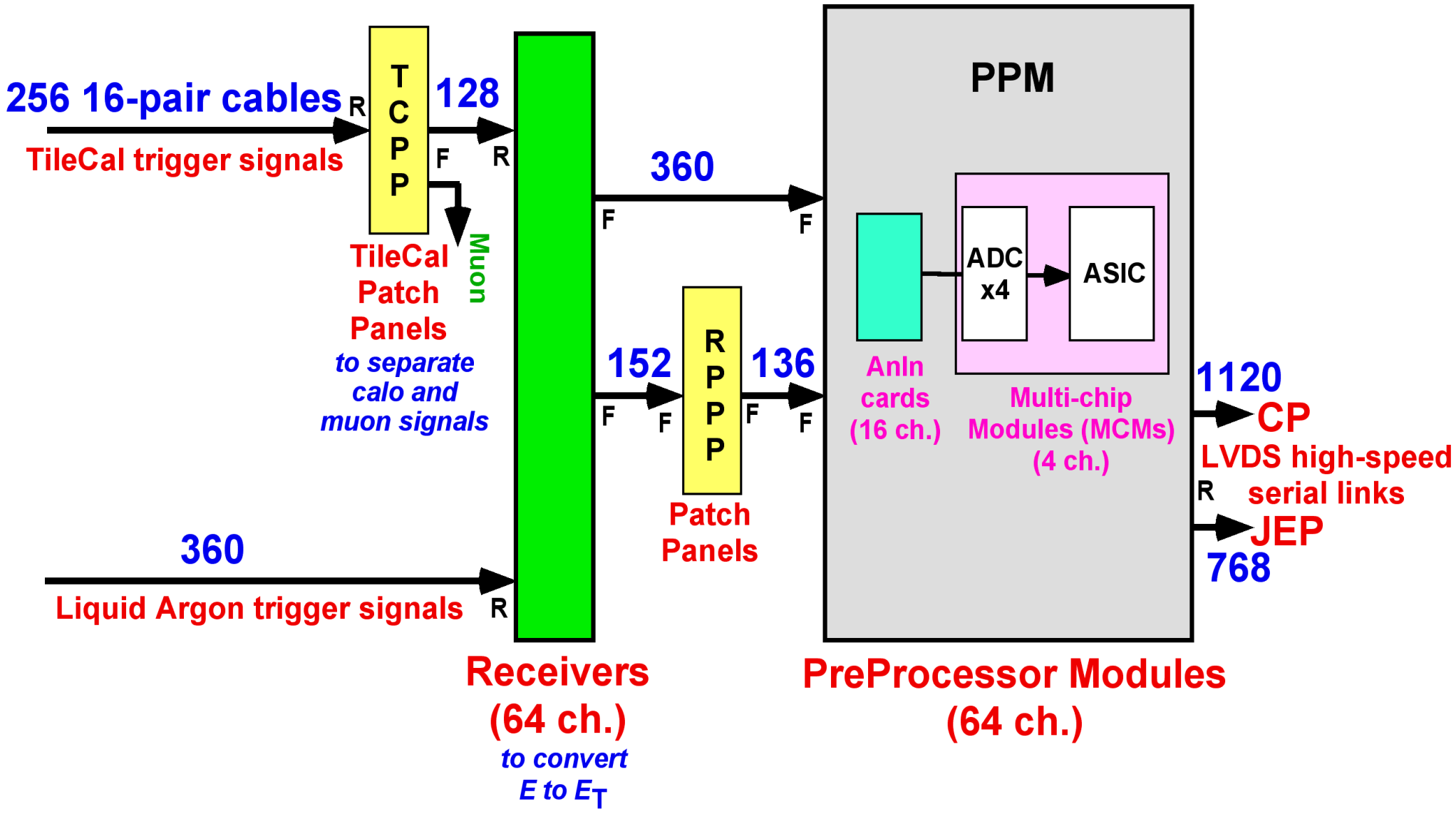
- Cabling Status
- LAr cable lengths
- Timing Strategy for Cosmics

Overview (Analogue cables)



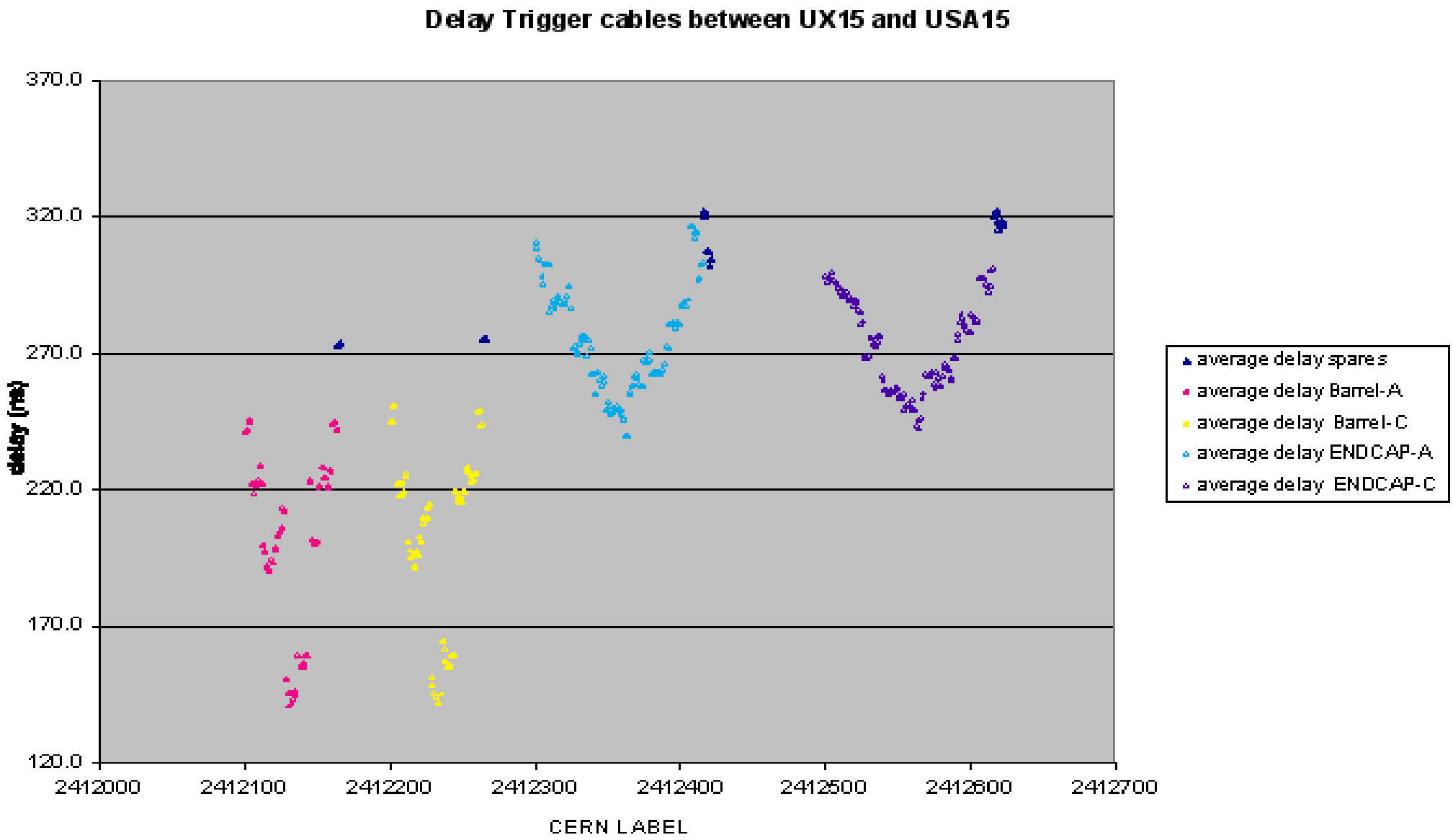
Reminder of Cabling Status

- All analogue cables installed
  - Connector screws to be replaced (at receiver/TCPP end)
  - Connectivity tests to be completed
    - Basic checks OK for LAr/Tile barrel
- All LVDS cables installed
  - Last PPM crate connected up this week(?)
    - Tests (endcaps) to be completed
- Some temporary Glink fibres installed
  - Final fibres arriving this week (>3 month delay)
  - Installation to be arranged (about 320 fibres)

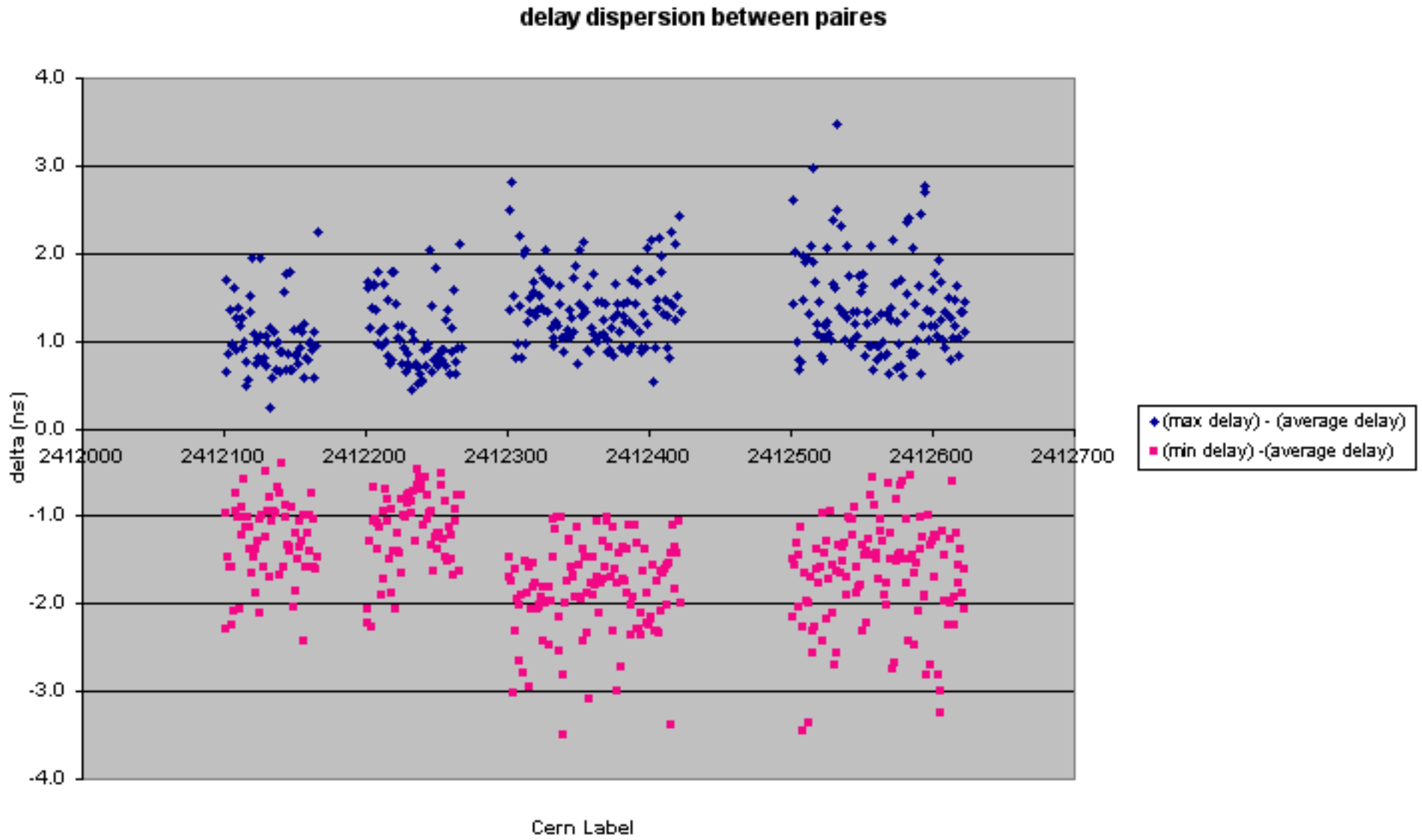
LAr Cable Lengths (Delays)

- LAr long cables were tested with the Saclay tester
  - Same system as used to test our short analogue cables
  - Measures "length" (ie total signal delay), cross talk, etc
- Michel Mathieu and Alain LeCoguie have processed all the test results (for the long cables)
  - Results in Excel spreadsheets (maybe DB?)
  - Summary histograms
  - Document destined for EDMS (in progress)
- Summary
  - Barrel cables: 140-250ns (5-10 BC)
  - Endcap cables: 240-320ns (9-13 BC)
  - This is about 2 BC (10m) less than expected
    - But it looks like TileCal cables may be as long as expected...

LAr Long Cables (Total Delays)



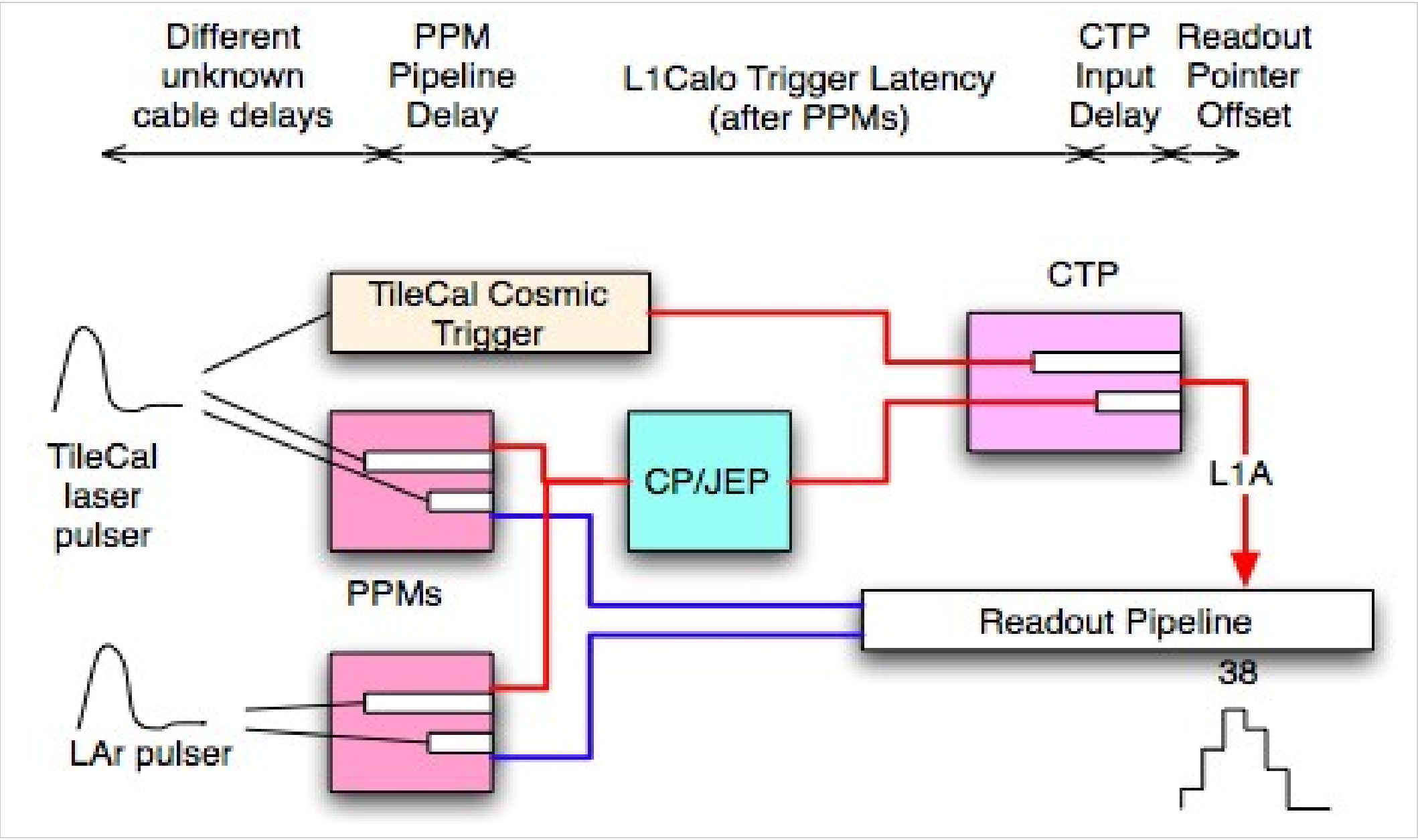
LAr Long Cables (Delay Dispersion)



How to Time in the Input Signals?

- To provide a trigger we need to align all the input signals from Tile, LAr barrel and endcaps
  - PPM has provision for fine (ns) and coarse (BC) delays
  - For physics (collisions) we need both of these
  - For cosmics, we only need the timing to BC accuracy
    - But with an offset around phi to coincide top/bottom towers
- How to do this before beam?
  - Cosmic muons (~1Hz)are hard to see in TileCal and even harder in LAr
  - Pulser signals are easy to see and can be at high rate
    - But no correlation between Tile and LAr pulsers
      - And possibly not between different LAr partitions?

Timing and Delay Overview



Cosmics Timing Procedure (1)

- Start with TileCal: laser pulser and cosmic trigger
  - Use TileCal laser to pulse all TileCal towers
    - Except for a couple used to provide the cosmic trigger
  - Get L1A via standard CTP route
    - Should have the same trigger timing as a real cosmic
  - Keep readout pointers fixed (whole L1Calo system)
  - Set real time delay at PPMs to align TileCal signals in the fixed readout window
    - Add extra delay to cope with endcap towers being later
- Status: this was done last week
  - Results need checking and refining
  - Not using PPM readout pointer scan SW to update DB as (at the moment) that aligns the readout pointers not the real time delays

Cosmics Timing Procedure (2)

- Use L1Calo to trigger on TileCal laser pulses
  - Should now get same L1Calo L1A timing for any tower
  - Set up suitable trigger menu (tau)
  - L1Calo trigger needs an RoI maximum
    - So rely on variations in energy seen by different towers
    - Or disable 3 in 4 towers and cycle through them all
  - Adjust delay of L1Calo L1A at the CTP to match that from the TileCal cosmic trigger
    - Hopefully we dont need to change the TileCal cosmic trigger timing as that would affect everyone
- Status: tried to send L1A to CTP
  - But problems with CMM firmware (intercrate link)
    - Firmware needs fixing (also cp0 problem?)
    - Meanwhile be less ambitious and try using just one CP crate?

Cosmics Timing Procedure (3)

- Set LAr timings using LAr pulser and L1Calo trigger
  - Keep readout pointer window fixed
  - Keep L1Calo L1A timing at CTP fixed
  - Send LAr pulses to get L1Calo trigger
    - Typically from the earliest tower until all are aligned
  - Set real time delay of LAr signals at PPM inputs so they are aligned in the readout window
  - Now have Tile and LAr signals aligned with each other
    - Might see the occasional large cosmic shower in LAr?
      - Chaouki sees them in the receiver monitor system
    - Provide some kind of cosmic trigger for weekend runs?
- Status: to be done
  - Try this during M5 exercise
    - As with step 2, needs CMM to provide L1A to CTP