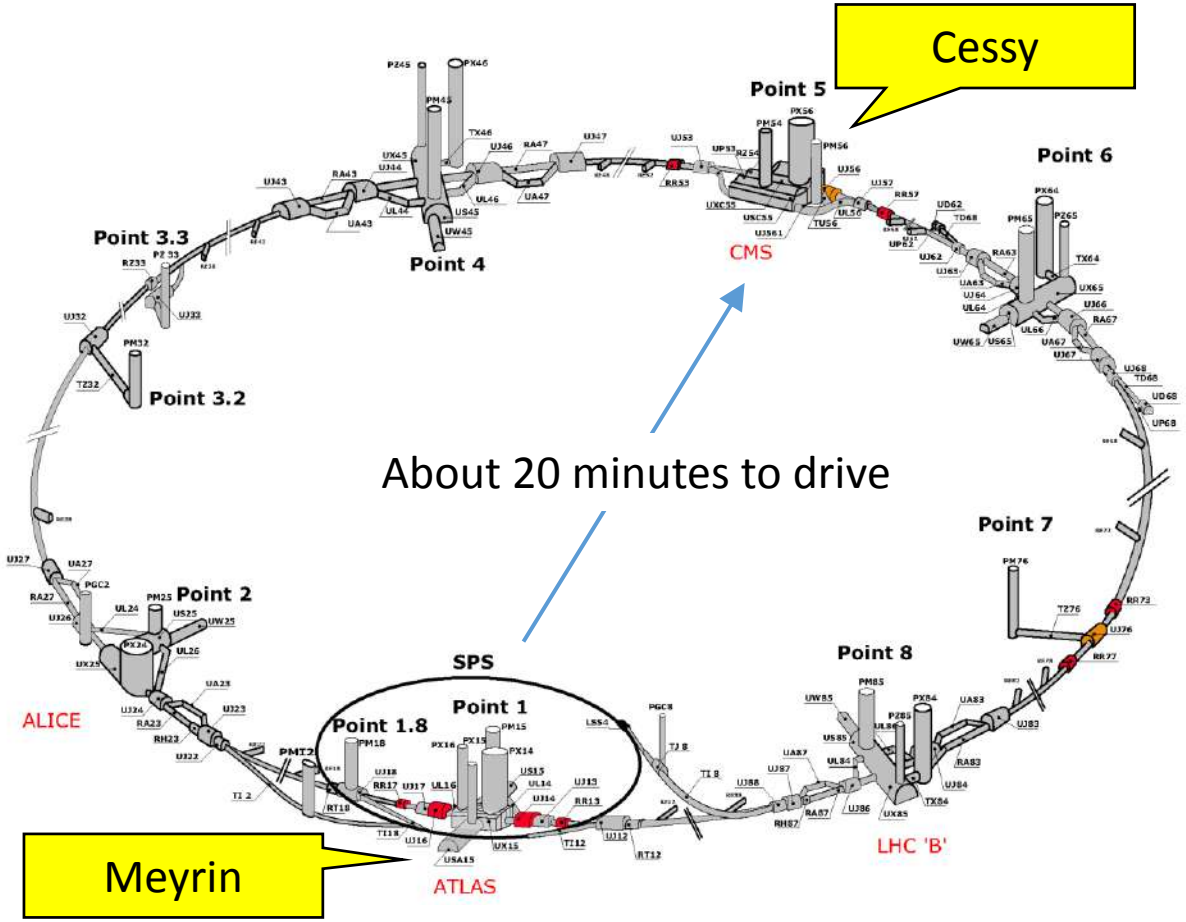
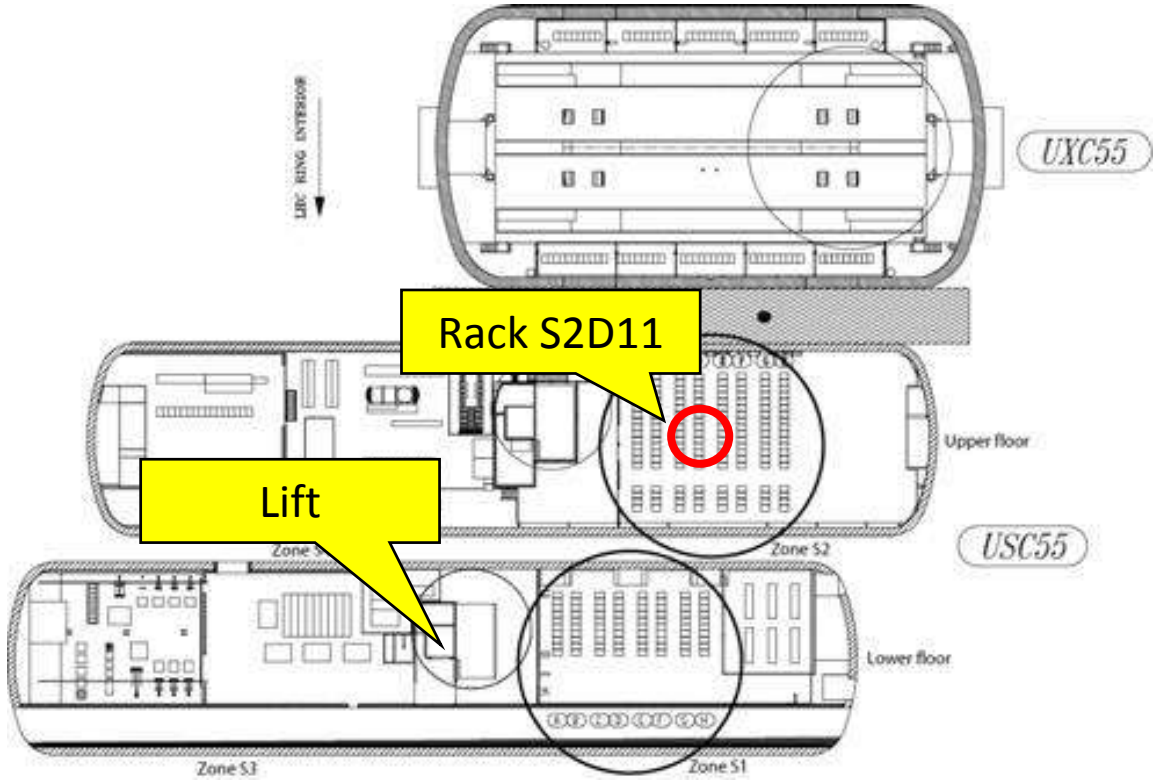
Imperial College London

Introduction to Calo-Layer-2

Greg Iles, 2017-05-08, v1

CMS & USC55

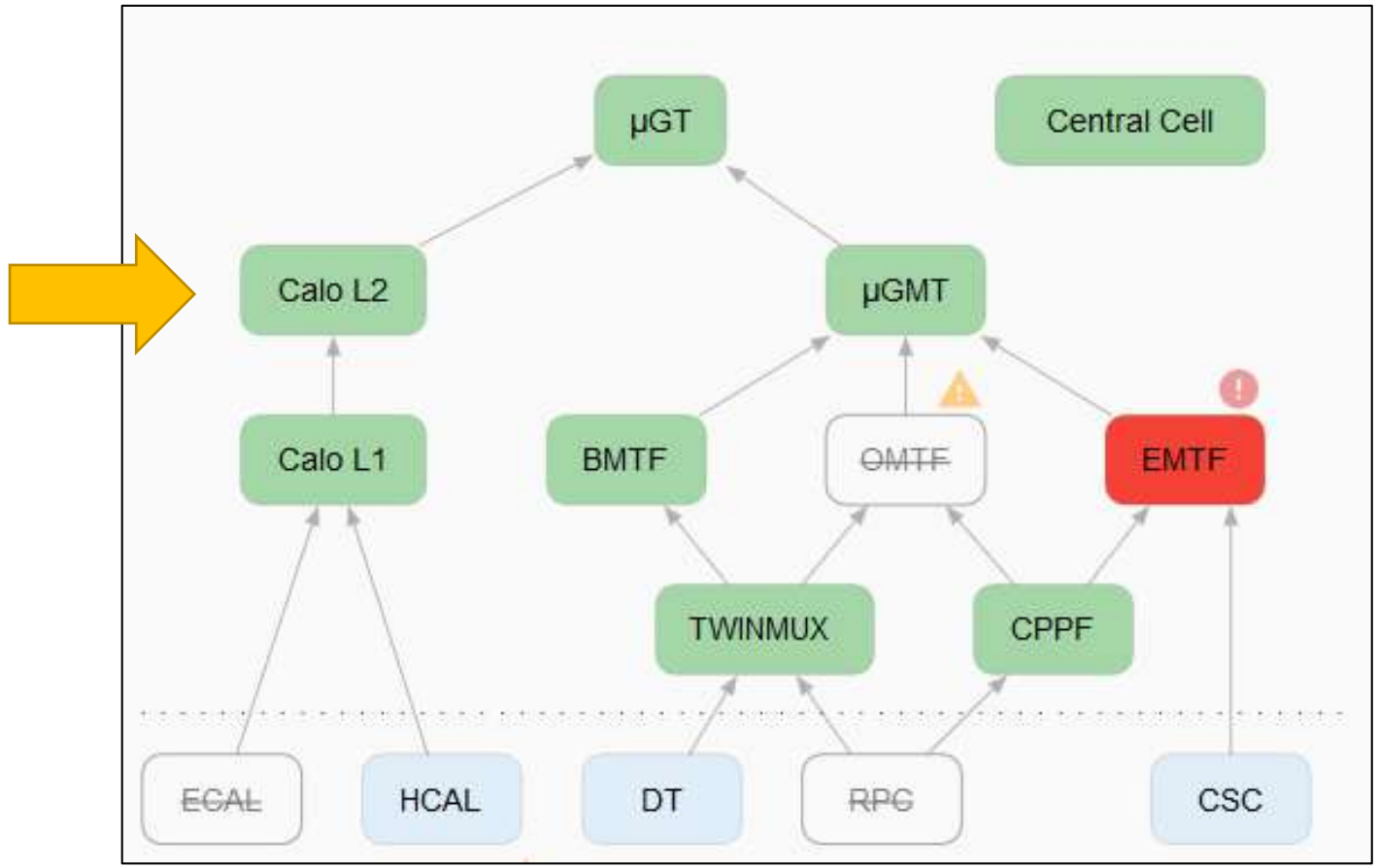




Floor naming convention perverse. Level -1 is S2, Level -2 is S1

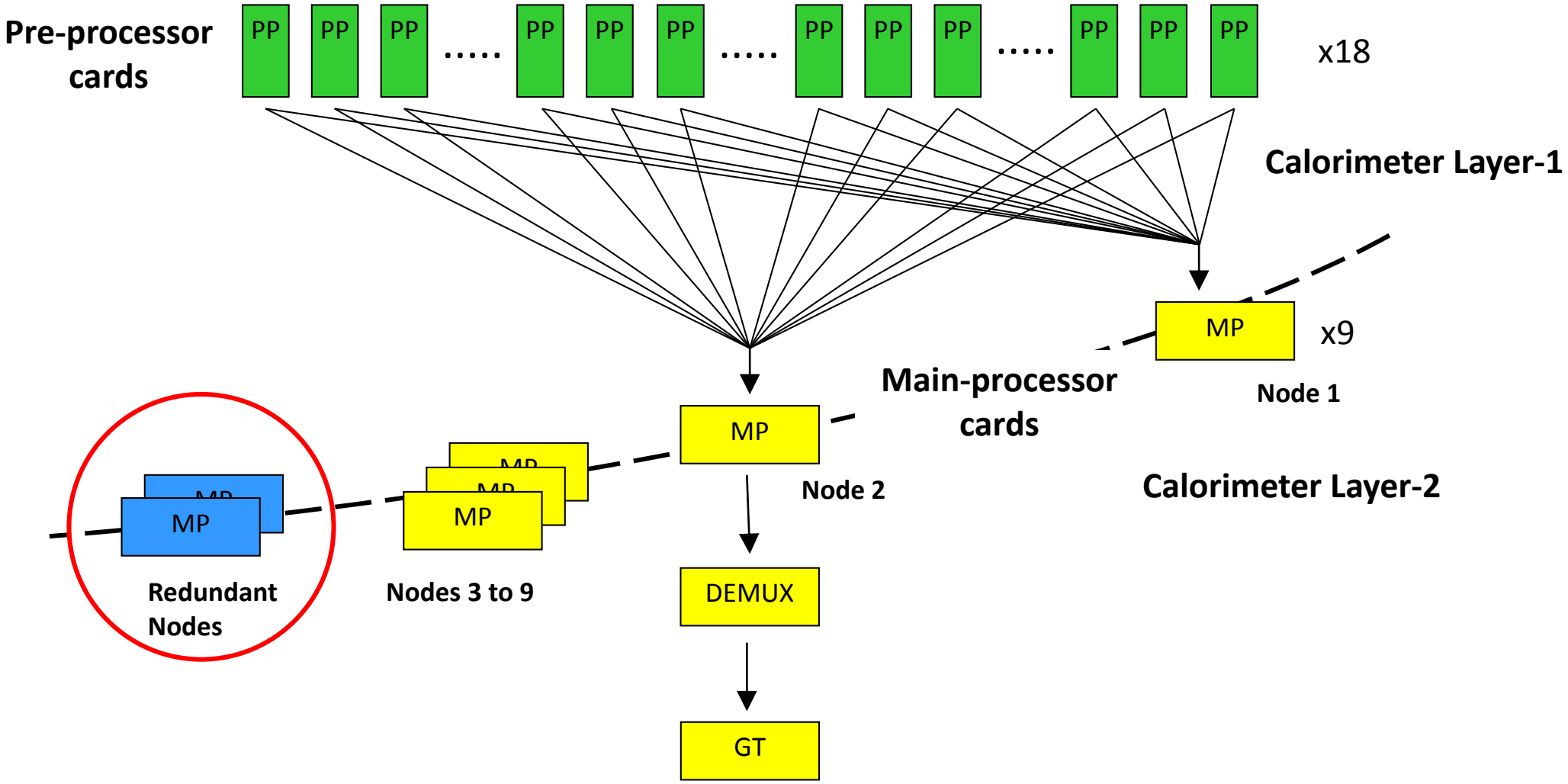
The Level-1 Trigger

- LHC Collisions @ 40MHz
- Far too much data to read out
- Keep data on detector in memory pipelines until receipt of a Level-1 Accept (L1A).
- 160 (ish) bunch crossing deep (4 us) to make decision
- Calorimeter & Muons read out trigger information at 40MHz so that a L1A decision can be made.



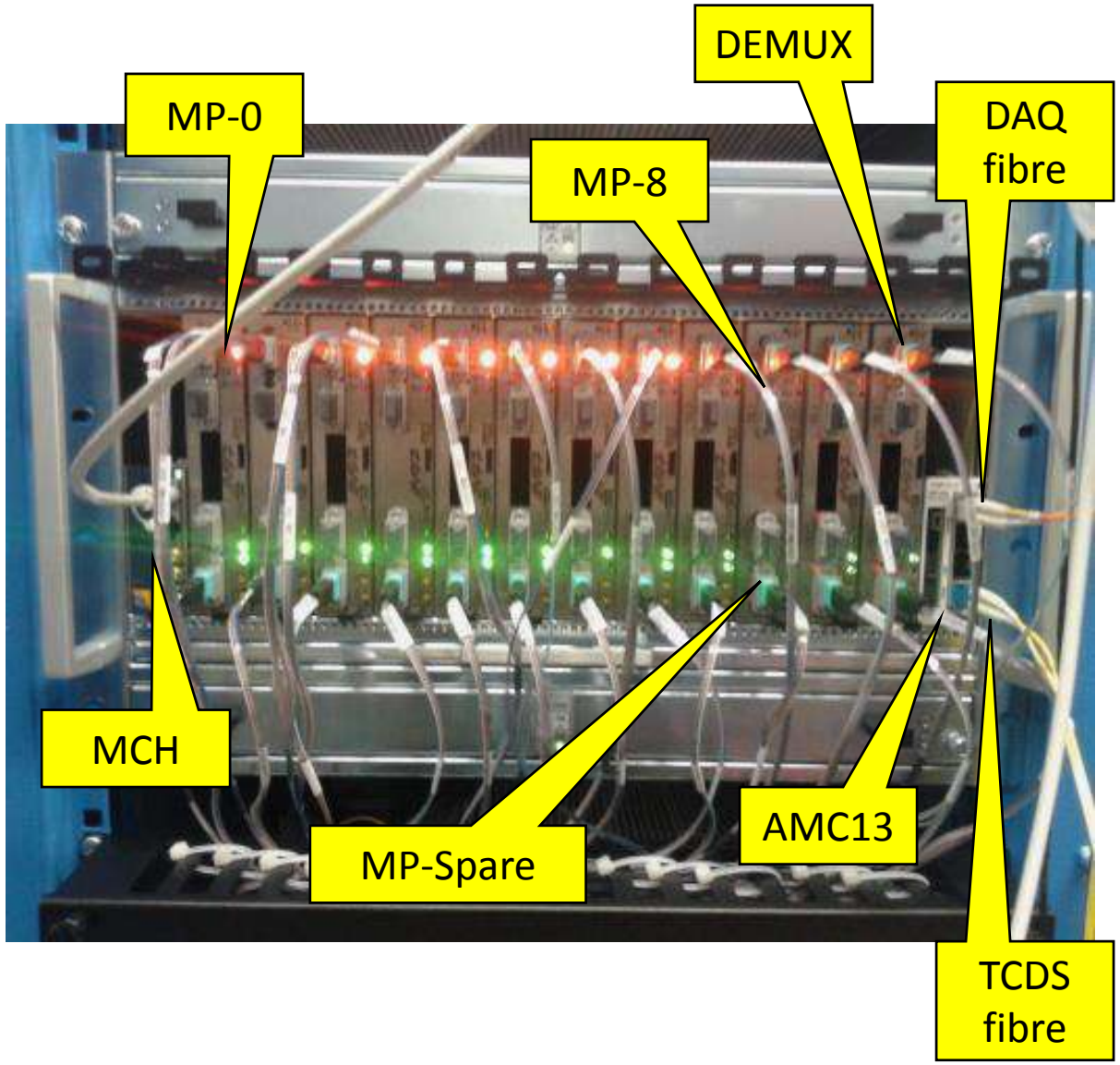
https://twiki.cern.ch/twiki/bin/viewauth/CMS/CMSUKL1TriggerUpgrade

Calorimeter Trigger Architecture

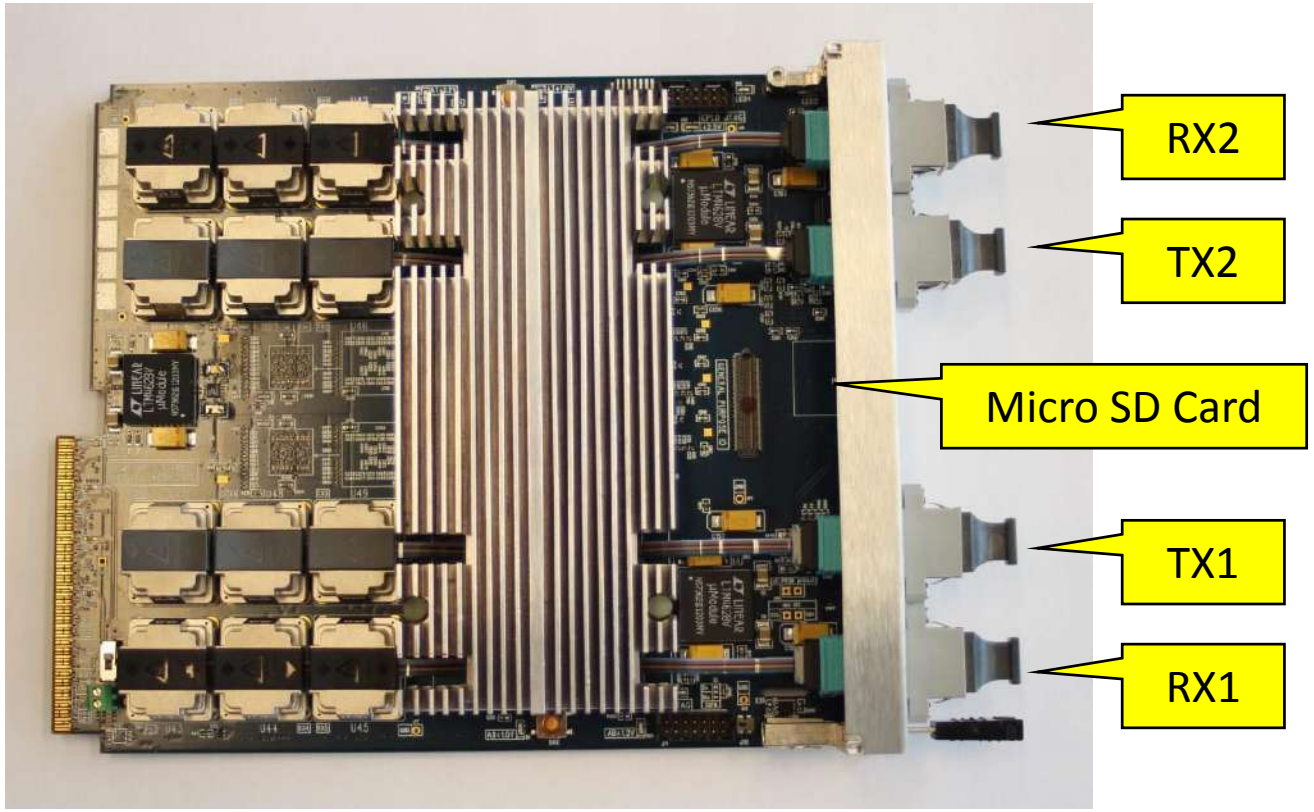


Calorimeter Layer-2

- Micro TCA Crate
- MP7 Processing Cards
- Time Multiplexed
- MPs Main Processors
  - 9 cards (nodes)
  - 1 card (spare node)
  - Process different bunch crossing
- DEMUX
  - 1 card for de-multiplexing



MP7



- AMC Card
  - Double width
  - Full height
- 72 optical links @ 10 Gb/s
- 36 links per connector
- Spare MicroSD Cards
  - Back of rack S2D11
  - Replace with SanDisk Ultra

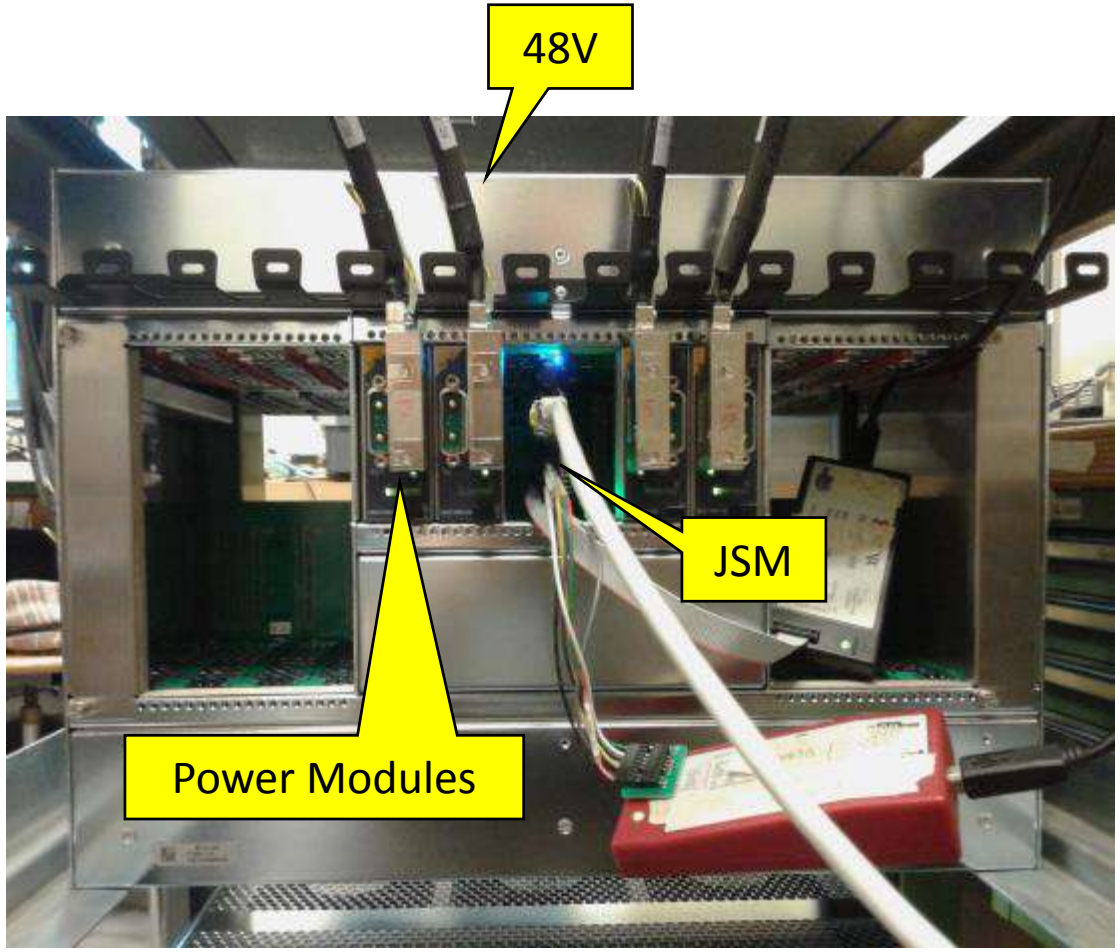
Safety

- Class 3R
- MP7 harmless as long as fibre more than 10cm from eyes. *
- Trunk cabling best done with fibres off.
- Use a mobile phone to observe light

* My calculations. To be confirmed by safety officer.

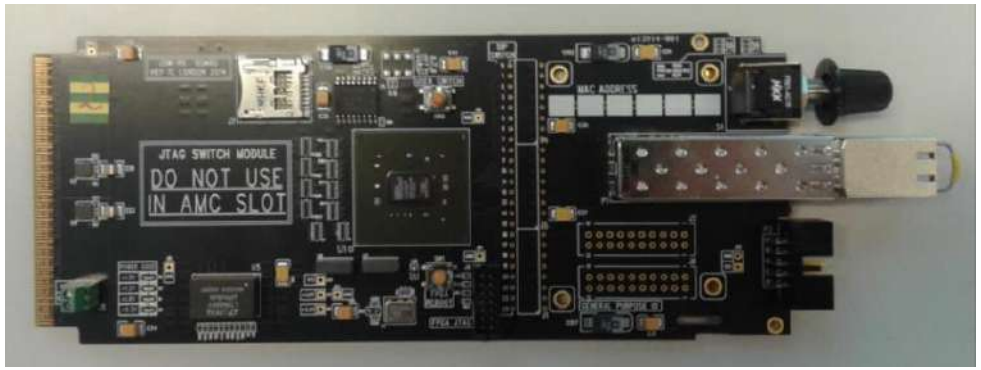
Power & Debug

- Dual 840W
- Total = 1.68kW
- Redundant
- JSM slot
  - JTAG Switch Module
- x6 RTM slots



48V Bulk Power & JSM

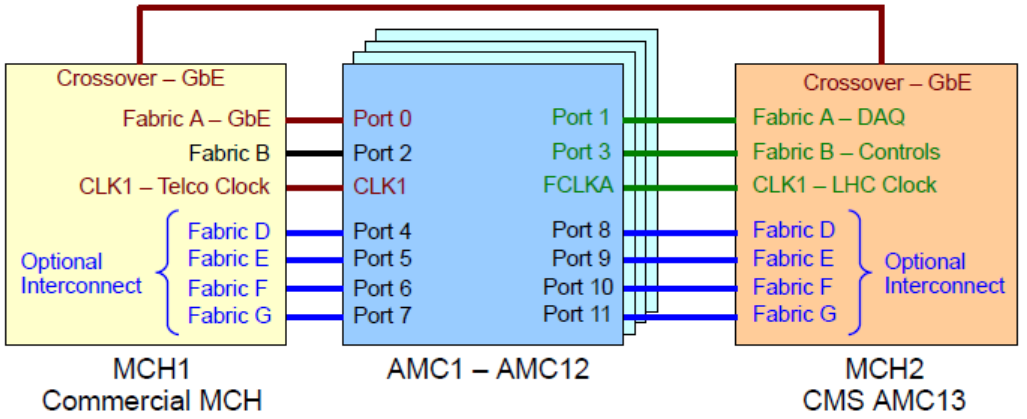
- 20A circuit breakers on outputs
- Will not provide controlled ramping of output power
- Can confuse PMs (Power Modules) in some special circumstances.
- PMs should have latest firmware to avoid this.
- If bulk power needs power cycle then best to toggle input power.

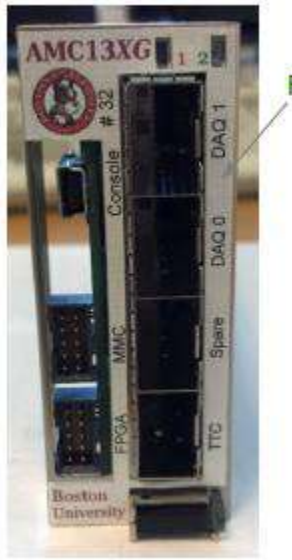


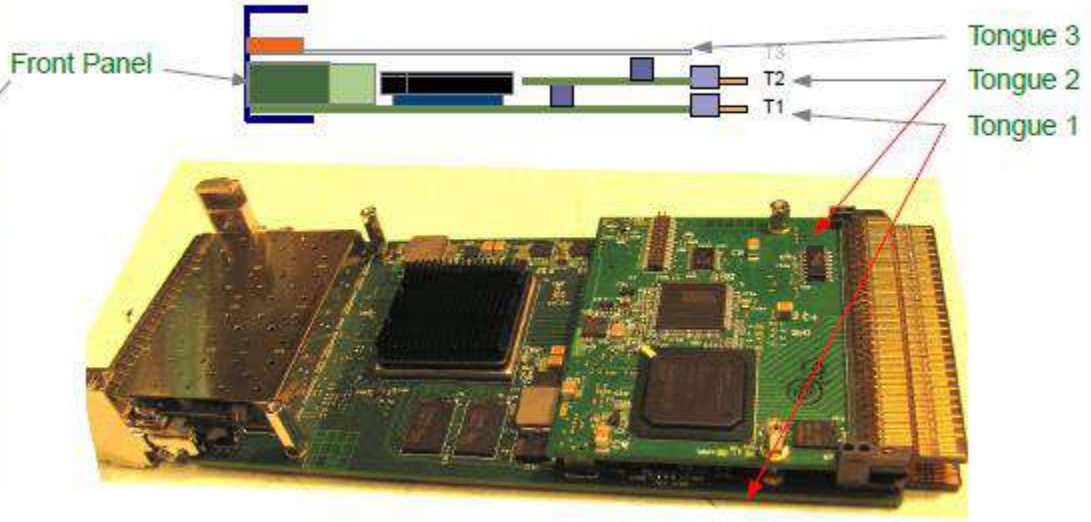
- JSM – JTAG Switch Module
- JTAG path controlled by Ethernet, MCH (untested) or front panel switch
- Now support for direct JTAG control via Ethernet (e.g. loading bitfiles)

AMC13

- TCDS
  - Distributes TTC
  - Trigger Timing Control
  - Receives TTS
  - Throttle System
- DAQ







TCDS - Timing and Control Distribution System

- Where – USC55, S1
- Jeroen Hegeman or Jan Troska
- Out
  - TTC – Trigger, Timing & Control
  - LHC 40.079 MHz clock
  - Chan A - L1A
  - Chan B – Fast Commands
- In
  - TTS – Throttle System