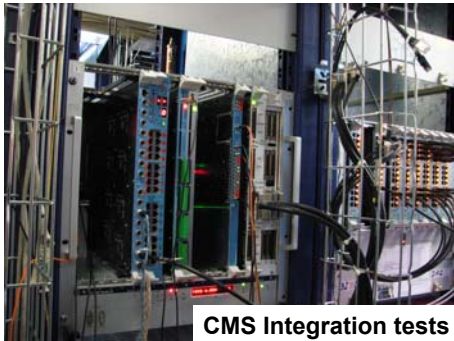


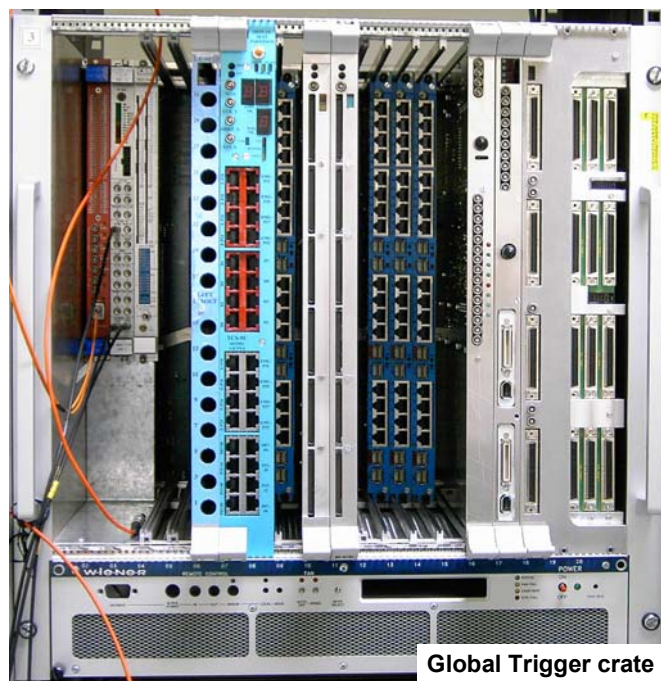
The Level-1 Global Trigger for the CMS Experiment at LHC

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 Institut für Hochenergiephysik der Österreichischen Akademie der Wissenschaften,
 Nikolsdorfergasse 18, A-1050 Vienna, Austria



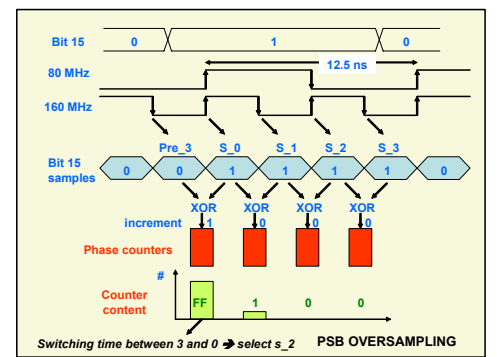
CMS Integration tests



Global Trigger crate



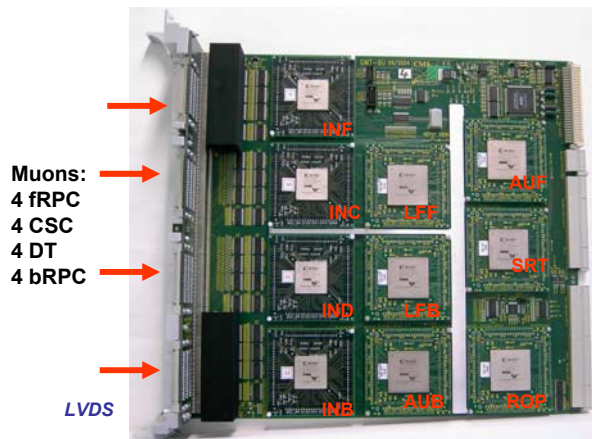
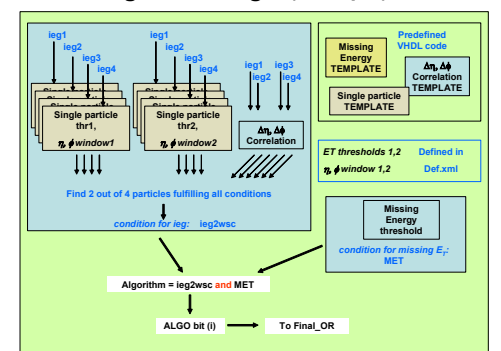
6U Conversion crate



3 PSB input & synchronization boards

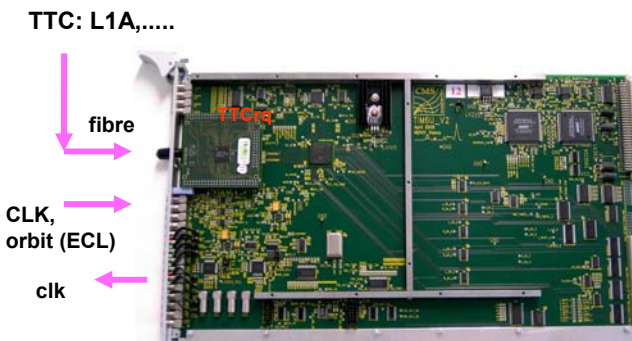
- 8 Serial Receivers
 - DS92LV16: 1.2 Gbps → 80MHz/16bits
- LVDS Receiver: 64 bits / 40 MHz
- PHASE synchronization:
 - oversampling of input signals
 - delay circuits for trigger data
- BC-synchronization:
 - delay circuits for trigger data
- Synchronization to LHC orbit:
 - SIM/SPY memories for each channel
- DAQ:
 - Ringbuffer + FIFO + ROP(state machine)

Algorithm Logic (example)



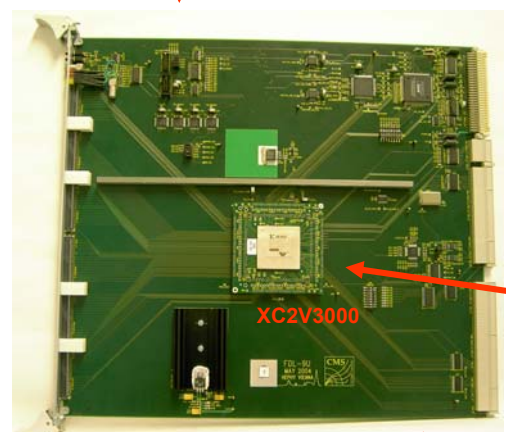
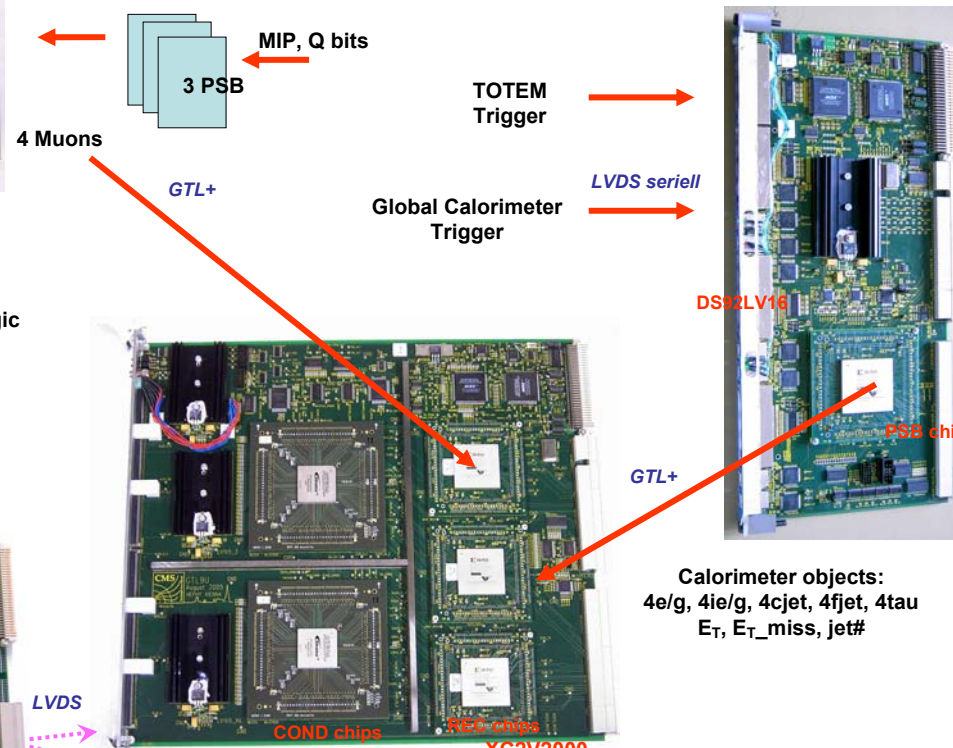
Global Muon Trigger GMT

IN chips: LVDS Receiver: 512 bits / 40 MHz
 PHASE + BC synchronization
 Spy mem, Ringbuffers + FIFOs
 LFF/LFB: find matching muons, cancel out logic order by rank, 1st-sorter stage
 AUF/AUB: assign MIP+ISO bits
 SRT: Final Sorter, Ringbuffers + FIFOs
 ROP: VME decoding, Readout processor

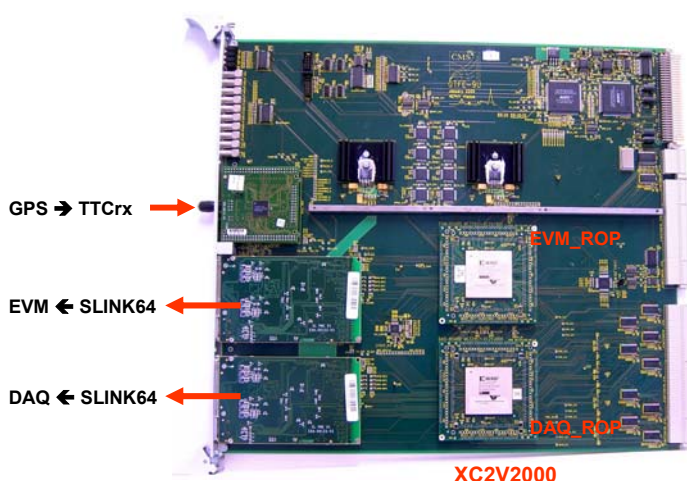


TTC: L1A,.....
 fibre
 CLK, orbit (ECL)
 clk

TIM broadcasts Clock, BCRes, L1A signals
 • TTCrq module: clk, bcrs, l1a, bgo-cmds
 • ECL signals: clk, orbit, l1a
 • Internal BCRes generation
 • BC-table: generates L1A, Bgo-cmds for tests
 • programmable delays for each board
 • common BCRes delay

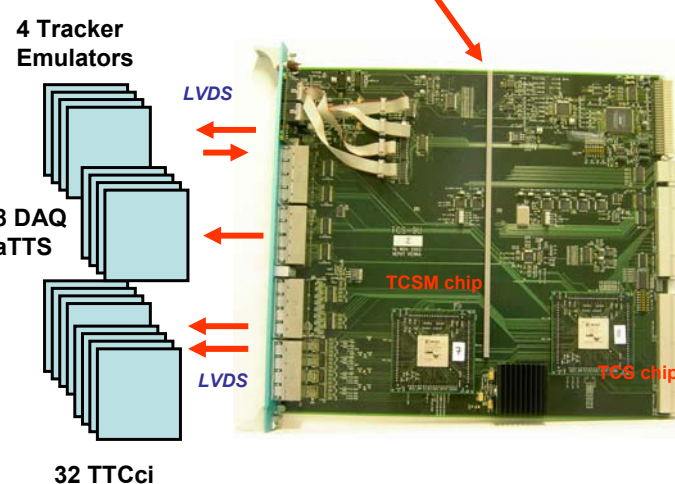


FDL makes FinOR signals
 • 128 Algorithms + 64 Technical Triggers
 • Rate Counters
 • Prescalers
 • Masks, Veto-mask for TechTrig's
 • DAQ: Ringbuffer + FIFO + ROP
 • SIM/SPY memories



GTFE readout → DAQ, Event Manager

- Event records via Channel Links from GMT, PSBs, FDL, TCS
- TTCrq receives GPS time
- SLINK64 → DAQ
- SLINK64 → Event Manager
- Record Formatting:
 - Special FIFO: 16 bits in → 64 bits out, sync. reset
 - Crate_ROP: state machine
- SIM/SPY memory



TCS Central Trigger Control

- 8 FinOR → 8 L1A
- 8 Partition Controller → 8 DAQ Partitions
- Throttle Logic
- STATUS Signals from FMM
- IO ↔ Tracker Emulator
- Counters: deadtime.....