

# *PulsarMon and Cluster Board readiness*

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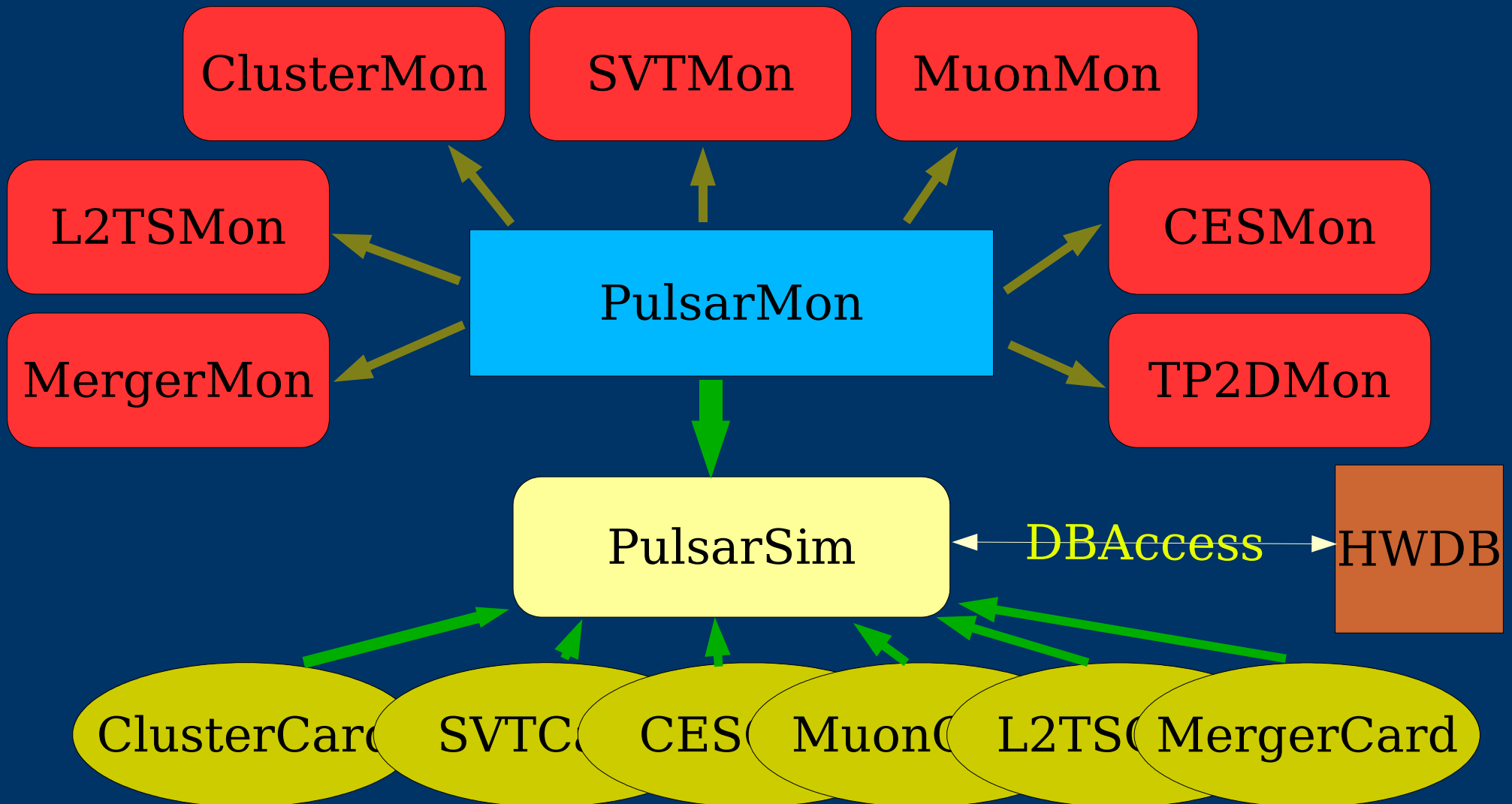
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# *PulsarMon design concept*

- Simulate and monitor the Pulsars
- Built in capability for error detection
- Produce detailed log files for faulty events for offline investigation
- Histograms for C/O consumption and for expert on fast debug track



# Block diagram



# *PulsarMon requirements*

- Compliant with TrigMon
  - Modular – more people can work independently
  - Common handling of the DB access
  - Flexible – to comply to Pulsar board multiple readout configurations possible
  - Easy to upgrade – we can/will add new monitors
  - Stable
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# *What we have so far ...*

- **ClusterMon** (Wojtek/VR)
- **SVTMon** (Shawn)
- **MuonMon** (Shawn)
- **CESMon** (Daniel/Chris)
- **TP2DMon**(VR)
- **MergerMon** (Wojtek)
- **L2TSMon** (Cheng-Ju)

**Fully integrated into TrigMon**

**We've been running online (separate TrigMon job) for 2 months now**

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# DB handling

- we need to get the readout configuration for the current run
- There are  $N+1$  db accesses at the beginning of each run
- Every 500 events we access the DB again to get history info (HRR, etc.)
- the code should be smart enough to figure out what needs to be checked and what not based on it
- DBAccess::getDBinfo takes this info from L2PULSAR\_CONFIGURATION db view

```
*****  
name: LEVEL2_PULSAR_CLUSTER  
minibank: 0  
sequence:13  
nChannels:8  
CONTROL_1: -1  
CONTROL_2: 0  
DATAIO1_1: 0  
DATAIO1_2: -1  
DATAIO2_1: 0  
DATAIO2_2: -1  
*****
```

# Logging error events

```
ERROR in event: 253
ISO Error is: 0
CLIST Error is: 2050
CONTROL Error is: 4
CLIST error type detected: CLIST_DATAIO_INPUT_TP2D_TL2D_MISMATCH
CONTROL error type detected: CONTROL_INPUT_BIT_ERR
CLIST error type detected: CLIST_DATAIO_OUTPUT_NCLUST_HEADTAIL_MIS
REAL: SIM:
```

```
*****
```

```
2f07607f 789012607 abbababe -1413825858
b0f00000 -1326448640 b0f00000 -1326448640
15001fc 22020604 0 0
e 14 e 14
701004 7344132 701004 7344132
b0f00000 -1326448640 b0f00000 -1326448640
1340000 20185088 1340000 20185088
1a0001 1703937 1 1
2422 9250 0 0
1eeee 126702 1eeee 126702
e0f00000 -521142272 e0f00000 -521142272
b0f00000 -1326448640 b0f00000 -1326448640
1000000 16777216 1000000 16777216
180003 1572867 2 2
27 39 27 39
424028 4341800 424028 4341800
2eeee 192238 2eeee 192238
e0f00000 -521142272 e0f00000 -521142272
eeee 978670 eeee 978670
e0f00000 -521142272 e0f00000 -521142272
```

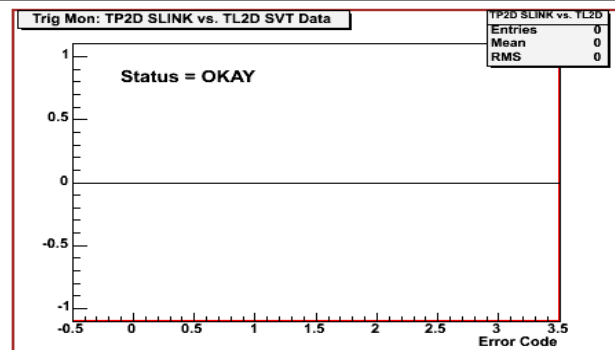
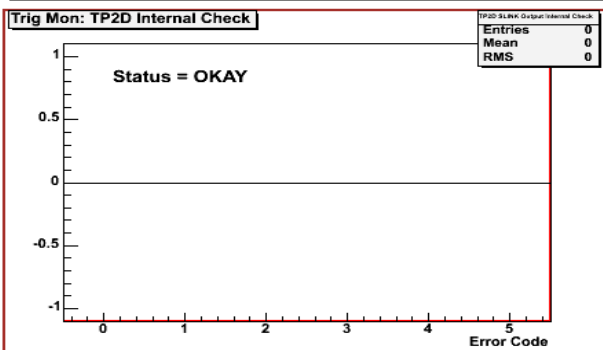
bit by bit comparison  
of the REAL/SIM banks

```
*****
```

# Histogramarama

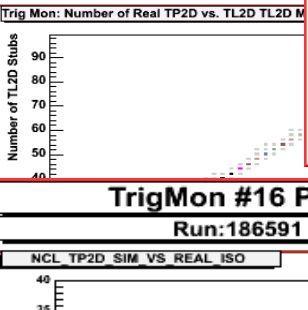
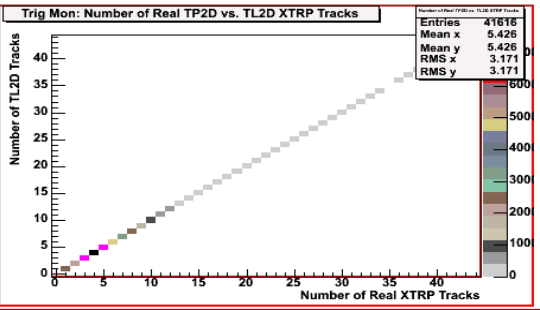
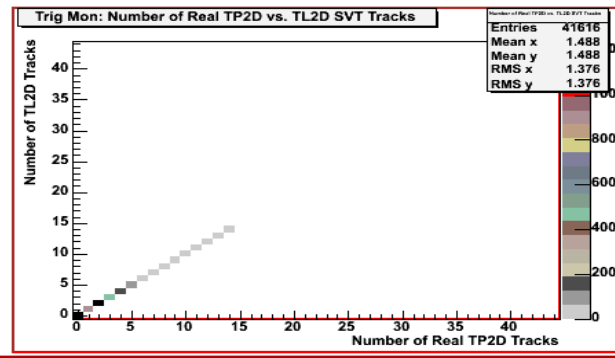
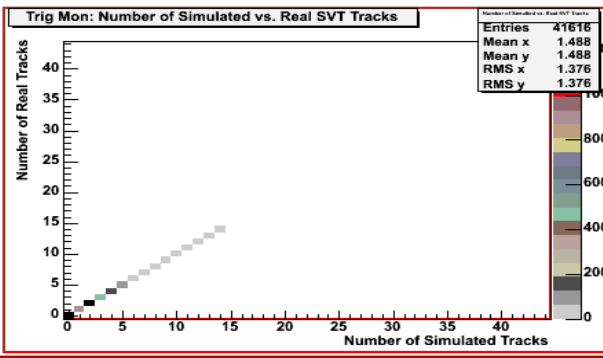
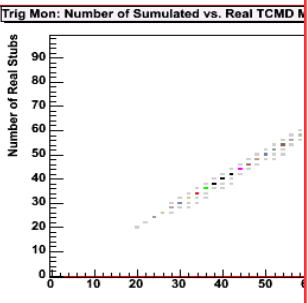
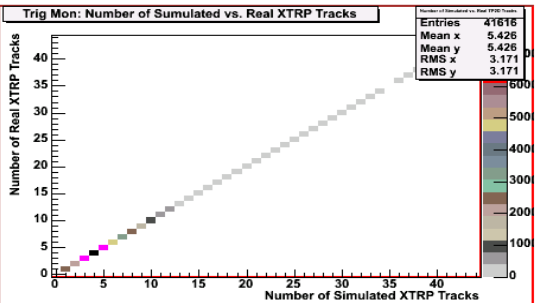
## TrigMon #15 PulsarMonitor E.F.G.H: PULSAR SVT List Board Monitoring Plots

Run:186591 Event: 3135314 # of Events:64998 Time: Wed Sep 22 13:45:47 2004



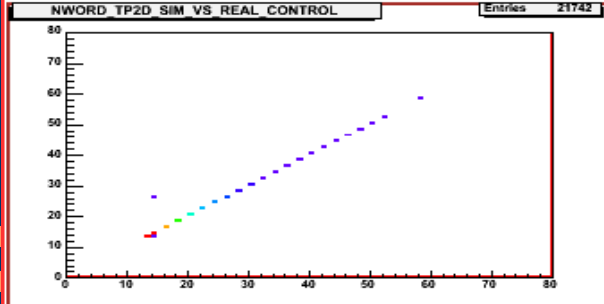
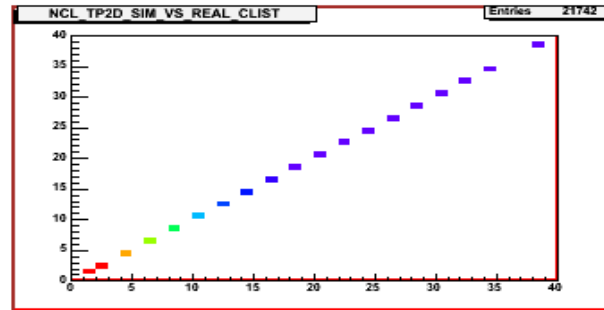
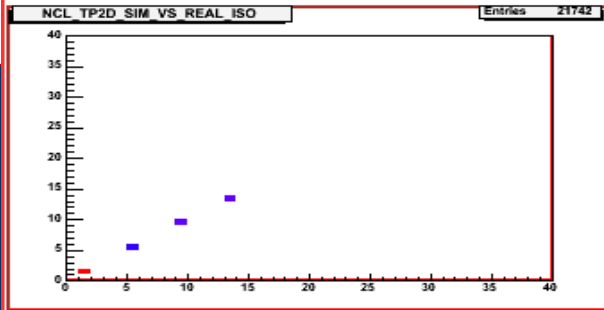
## TrigMon #13 PulsarMonitor A.B.C.D: PULSAR L1/XTRP/Muon Board M

Run:186591 Event: 3135314 # of Events:64998 Time: Wed Sep 22 13:4



## TrigMon #16 PulsarMonitor Pulsar Cluster: word count comparisons

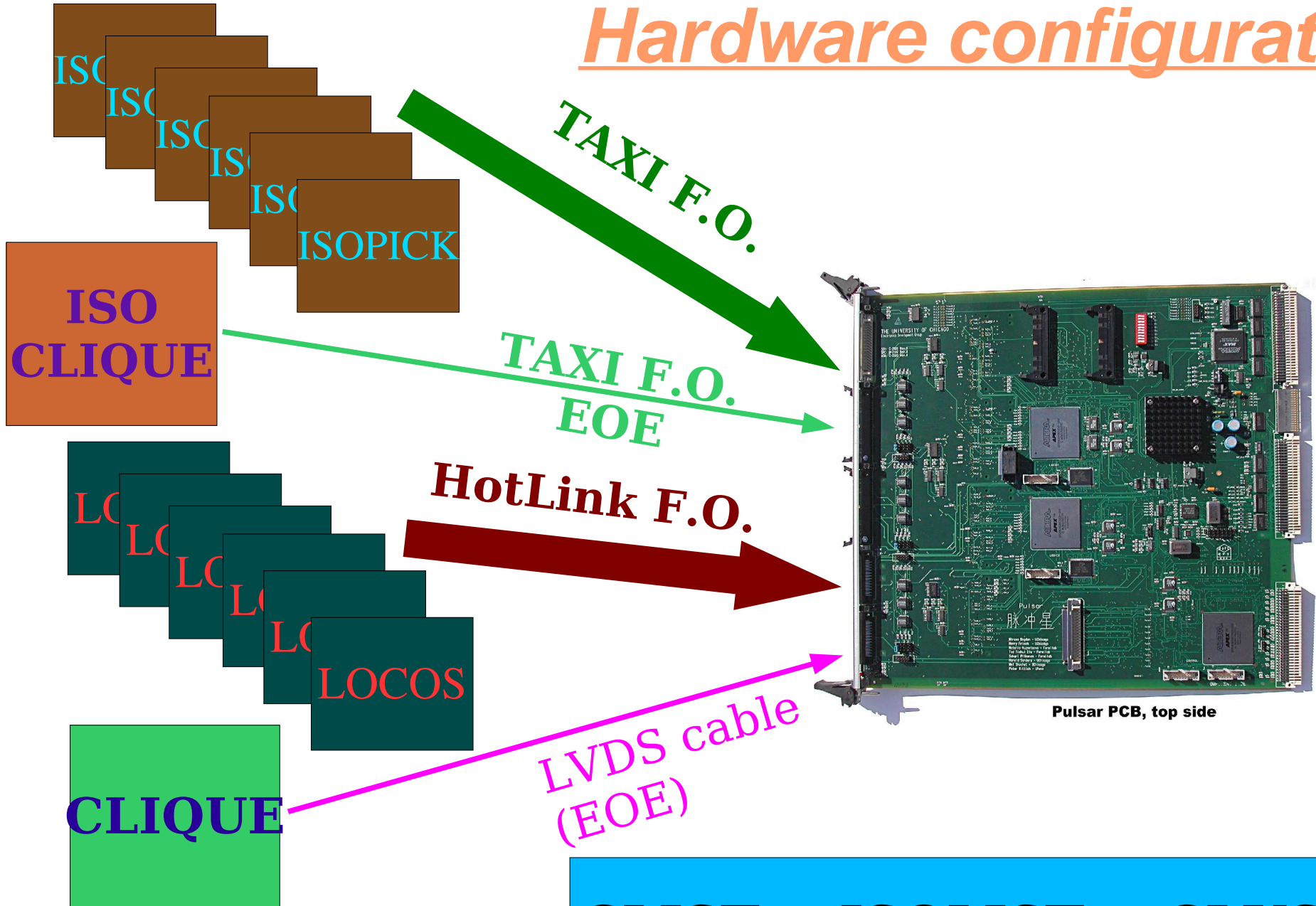
Run:186591 Event: 1476433 # of Events:34724 Time: Fri Sep 24 12:53:08 2004



# Documentation

- This is the hard part for now since things are changing and they will be changing even more when we install
- Even so...
  - pulsarmon.tex
  - [http://hep.uchicago.edu/~vrusu/pulsarmon\\_online.html](http://hep.uchicago.edu/~vrusu/pulsarmon_online.html)
  - [http://hep.uchicago.edu/~vrusu/pulsarmon\\_offline.html](http://hep.uchicago.edu/~vrusu/pulsarmon_offline.html)

# Hardware configuration



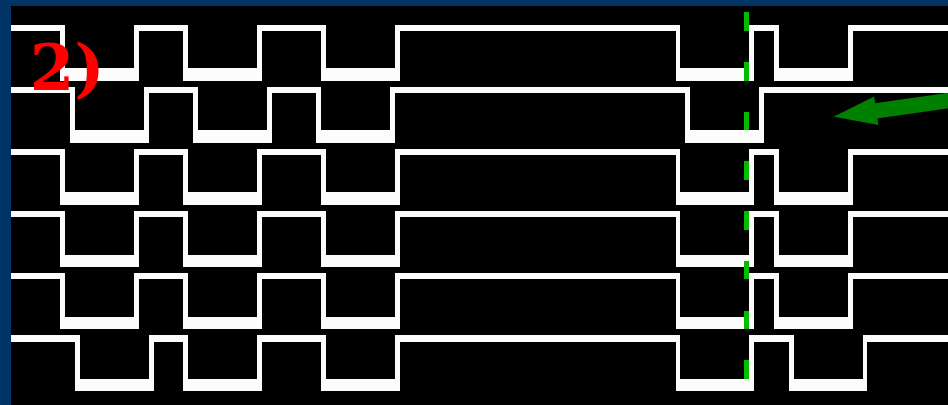
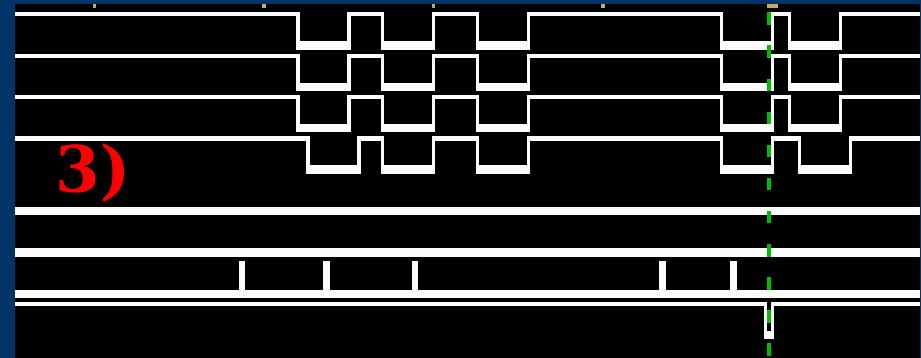
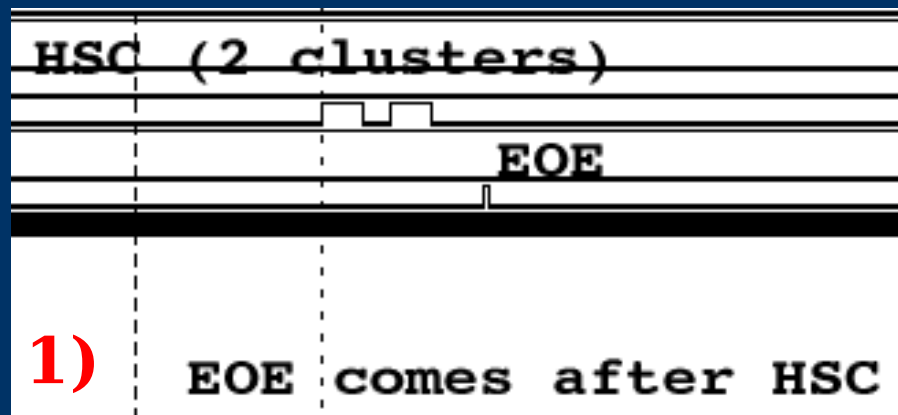
Pulsar PCB, top side

**CLIST + ISOLIST = CLUSTER**

# Cluster Board Firmware

clusters

- Firmware in working stage
  - takes Cluster/Iso-Cluster data and produces Slink package which is sent to the Merger
  - complication from multiple violations of protocol upstream
  - documentation



one cluster fragment dropped

# *Adapt Cluster Firmware*

- 1) Delay all EOE, so we ensure consistency
    - successful
    - make sure the delay is not more than the minimum time between clusters (Myron mode)
  - 2) Read if “at least one fiber has data”
    - read strobe delayed with respect to the arrival of the data through the fiber
    - cluster size = 300ns, between cluster ~ 200ns
    - 20MHz clock – all data has to come on the same clock edge – 100ns delay = 2xclock jitter(50ns)
  - 3) To be solved during shutdown
    - delay EOE even more (might run into the next cluster)
    - forced HRR from the CPU control node
- 
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# *Outstanding issues*

- During the last days before shutdown we found an internal problem through the iso-cluster path with the output SM being stuck
    - investigating
    - good news: problem reproducible in L2 torture
  - The EOE in cluster path coming during the transmission causes an overall offset in the FIFO
    - clear by the HRR
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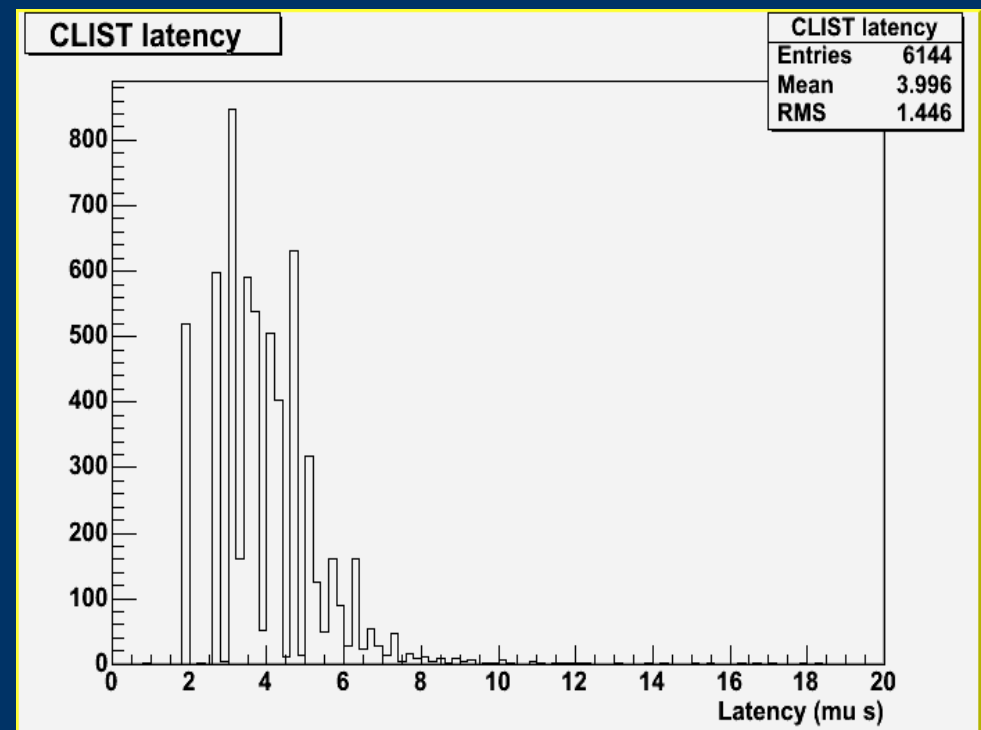
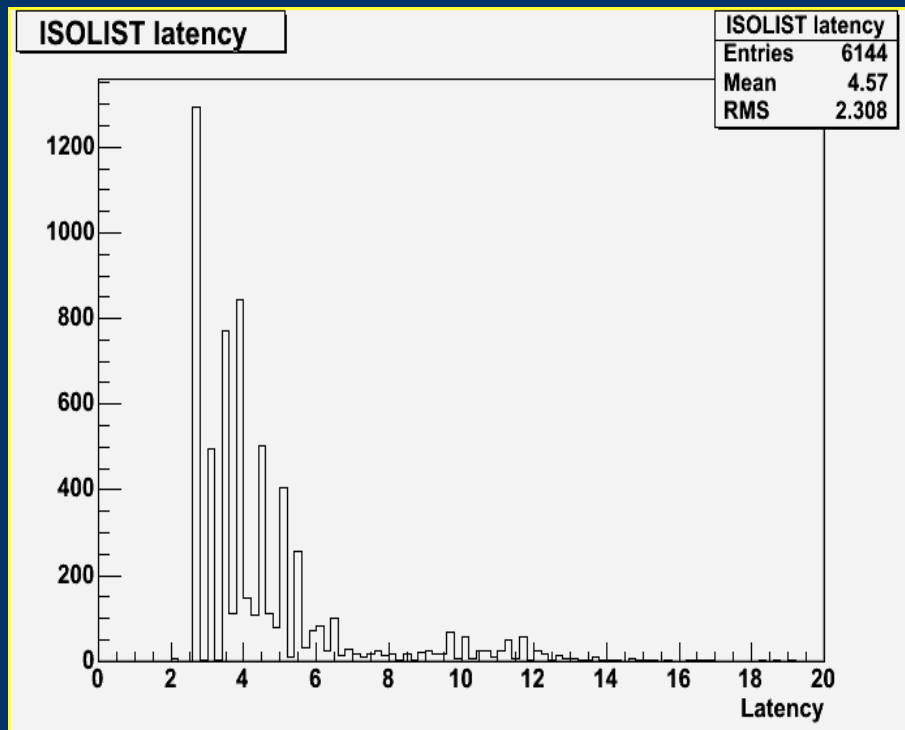
# *Current situation*

- Keep the Cluster board in the lower alpha crate so that we can spy on the data with the logic analyzer
- Split path using passive splitters
- Good opportunity to test the monitoring code and the DAQ readout with multiple minibanks



# Monitoring the Cluster data

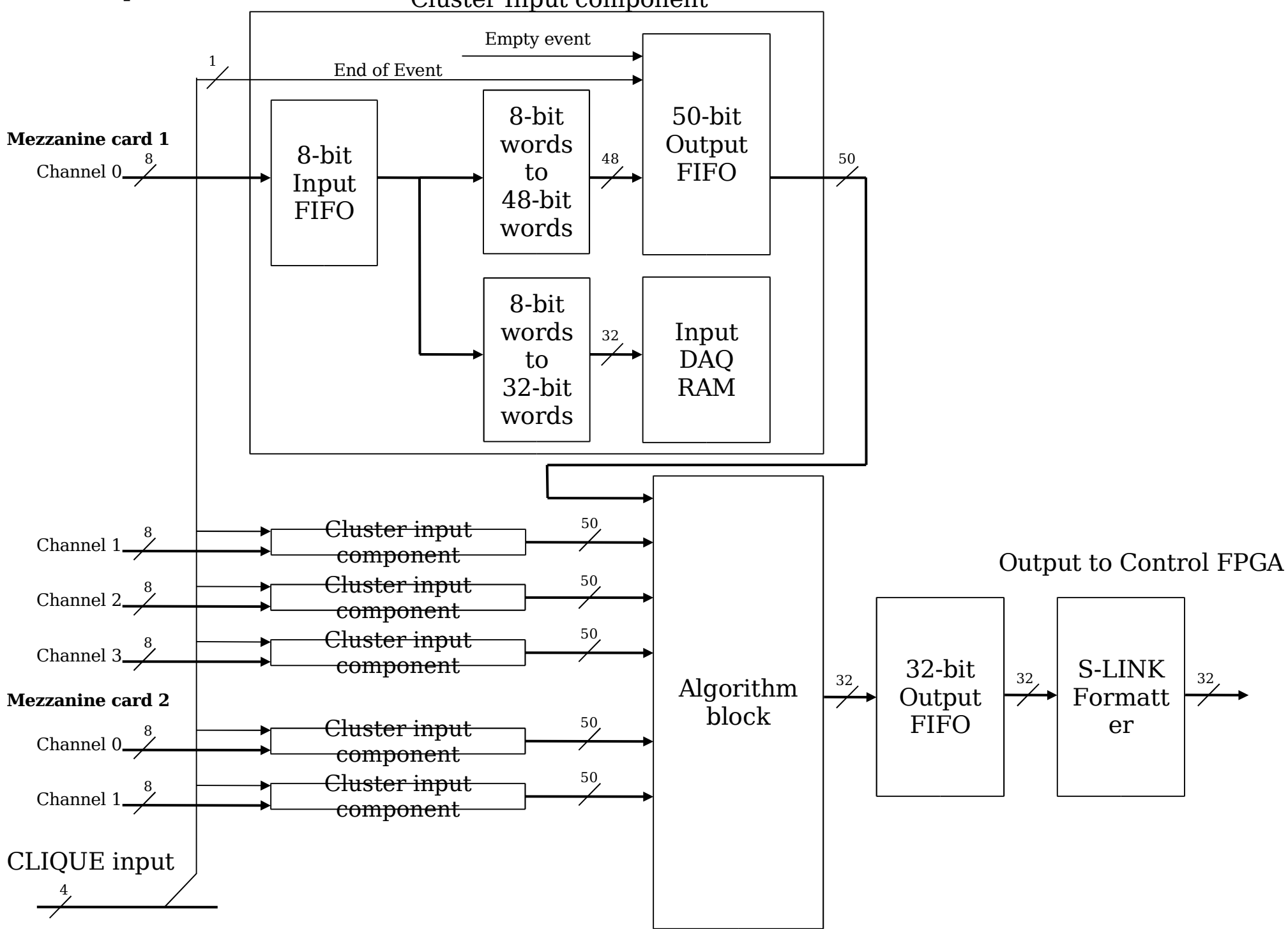
- The monitoring tools are in place
- This was the work horse to bring up PulsarMon
- This is how we found almost all problems



# *Commissioning man power and schedule for Cluster Board and PulsarMon*

- “Everything that can go wrong will go wrong”
  - Cluster board
    - Fix the firmware problems over the shutdown (L2 torture, test stand)
    - Keep running in the lower crate for beginning 1-2 weeks of beam
    - Wojtek(30%) + VR (40%)
  - PulsarMon
    - Keep running until mid October to nail every single potential bug
    - Move to trigger room (November) and keep running
    - everybody will/should chip in here as every expert will debug his own path
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# Cluster inputs



# Iso-cluster inputs

