



## DAQ system for TB 2010

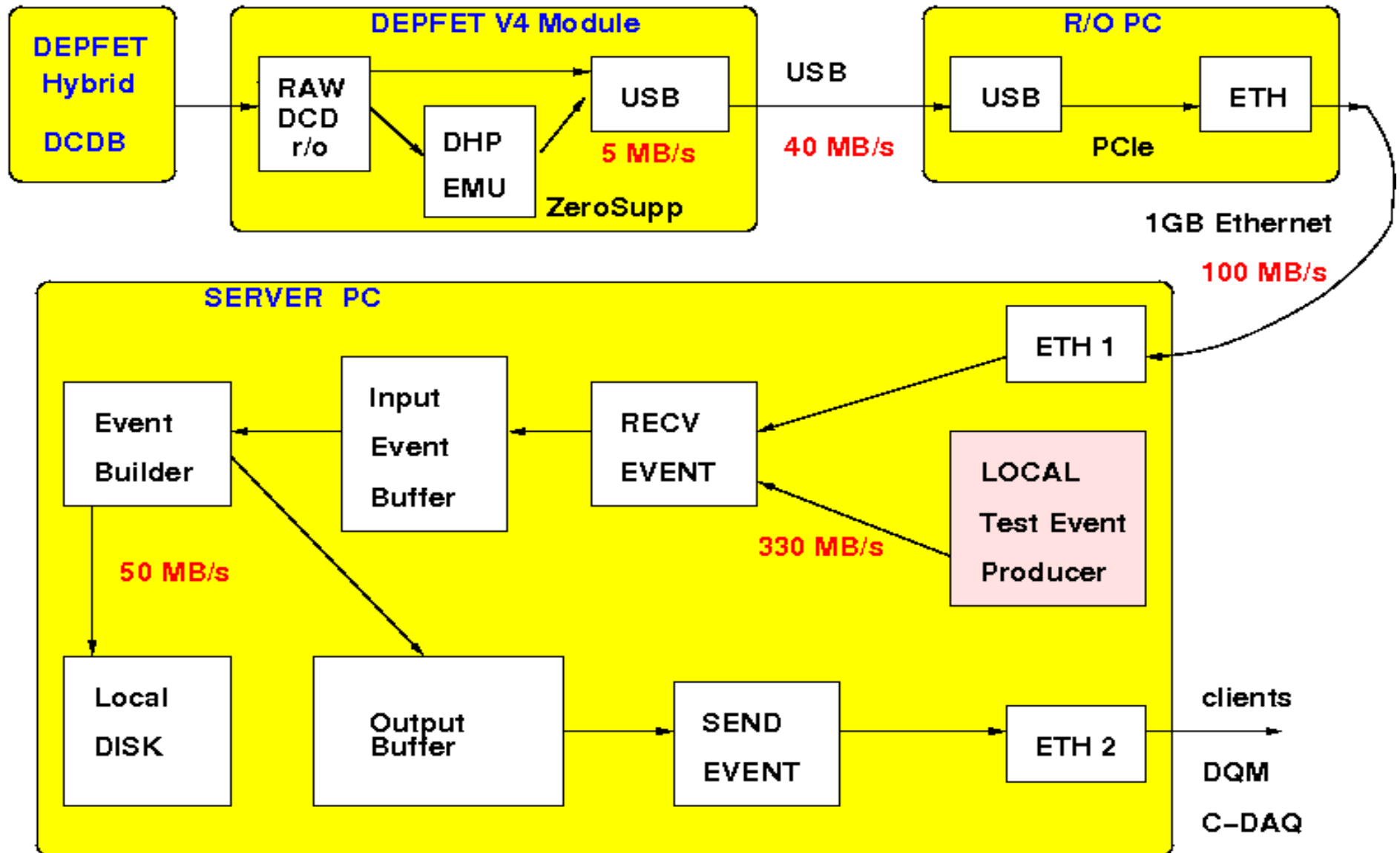
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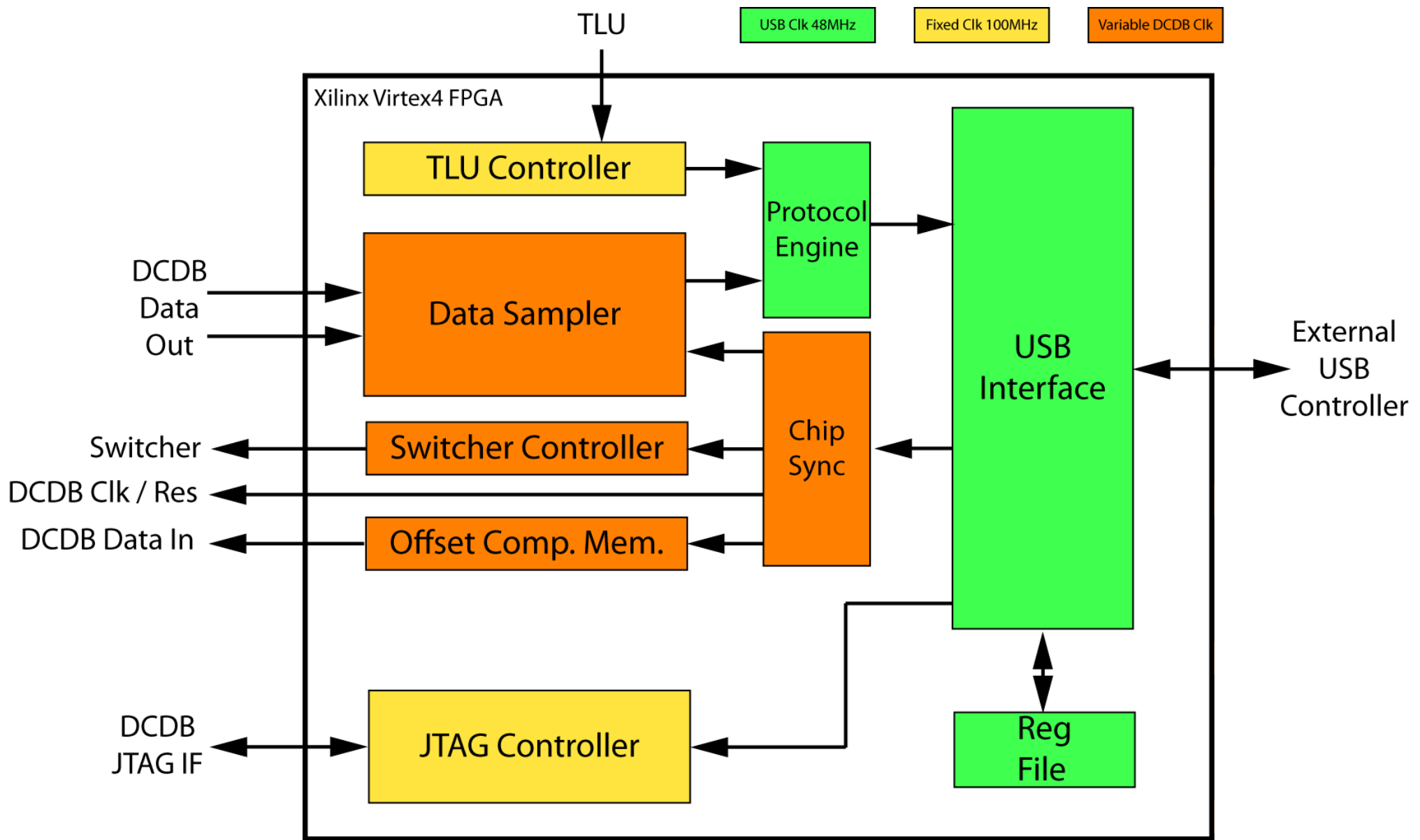
5th International Workshop on DEPFET Detectors and Applications  
Bonn, 8 Feb 2011

- *DAQ upgrade*
- *DCDB + V4 readout*
- *Mapping problem*
- *DEPFET + EUDET setup at CERN*
- *Conclusion*

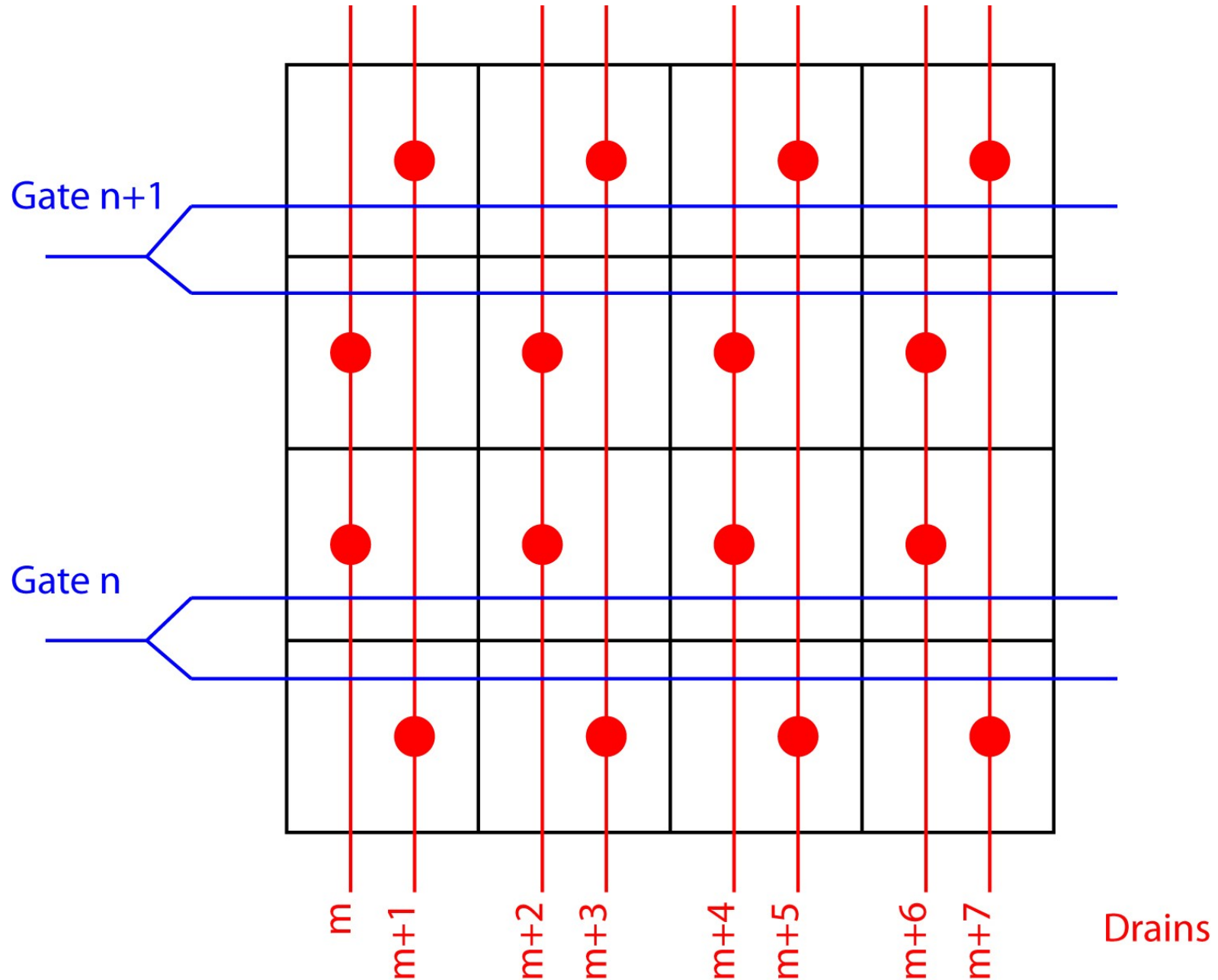
- *DEPFET Data acquisition system has been upgraded for DCD readout :*
  - New data format for RAW and Zero Suppressed data
  - Upgrade DQM for new matrices
  - Upgrade offline software
  - DEPFET DAQ is integrated into EUDET telescope DAQ
- *DAQ supports now 3 systems:*
  - CURO readout based on **S3A** and **S3B** readout board
  - DCDB readout based on Manuel's FPGA board (**Virtex 4**)
- *DAQ allows to build the system from different components : S3A, S3B, DCD/Virtex4*



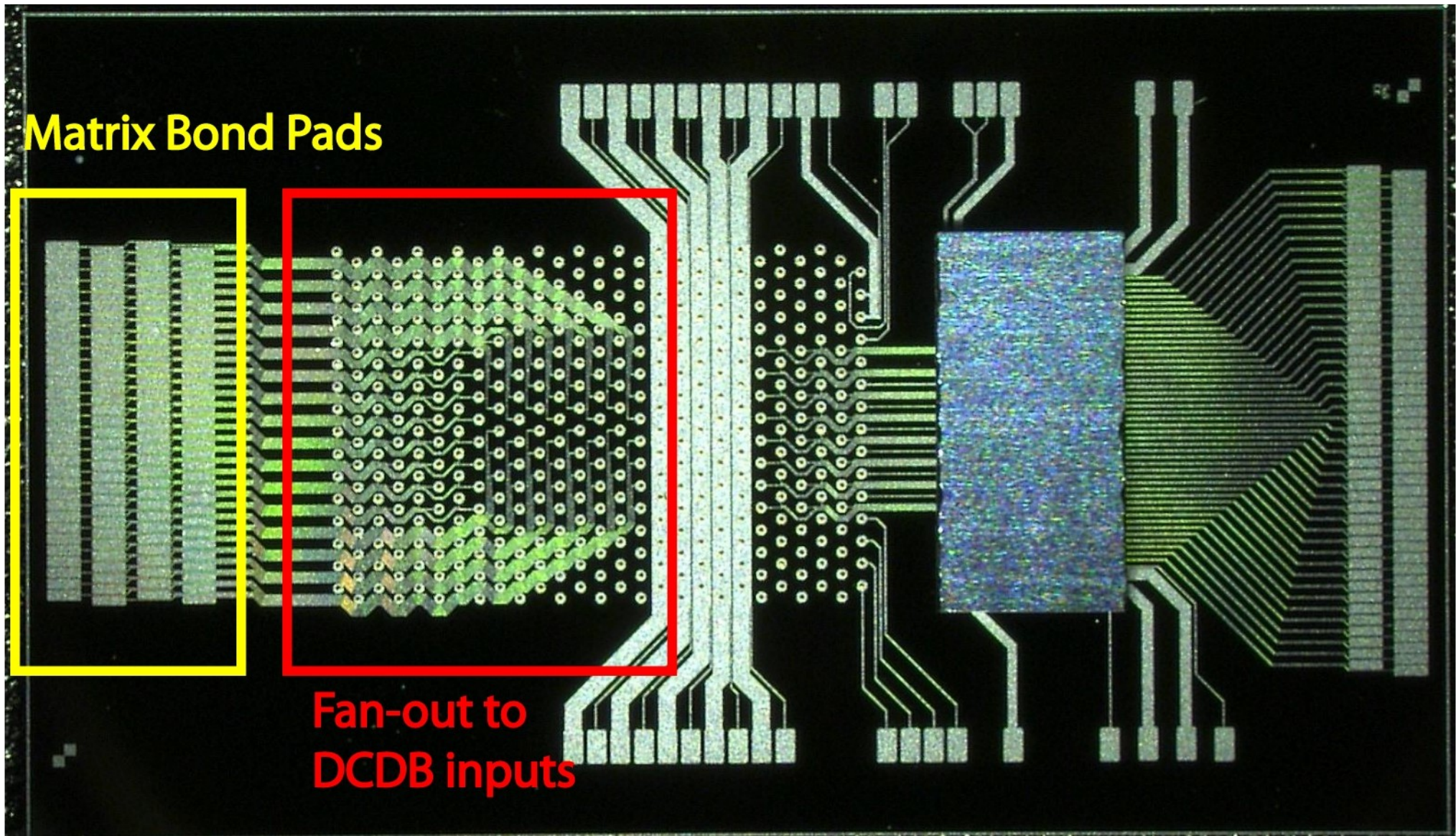
# FPGA Firmware - Overview



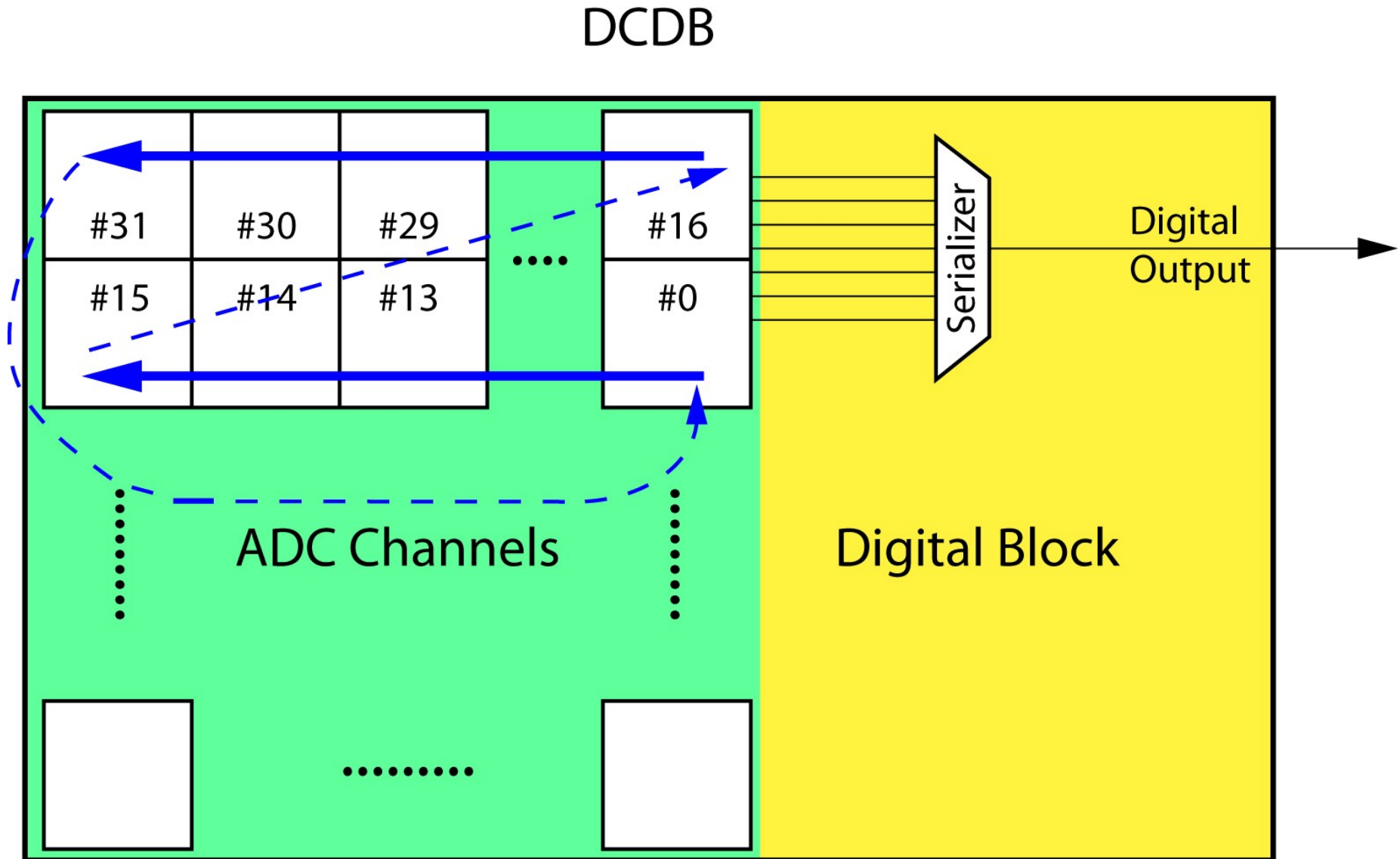
# Matrix Readout Mapping Step 1: PXD5 Layout



# Matrix Readout Mapping Step 2: Wirebond Adapter

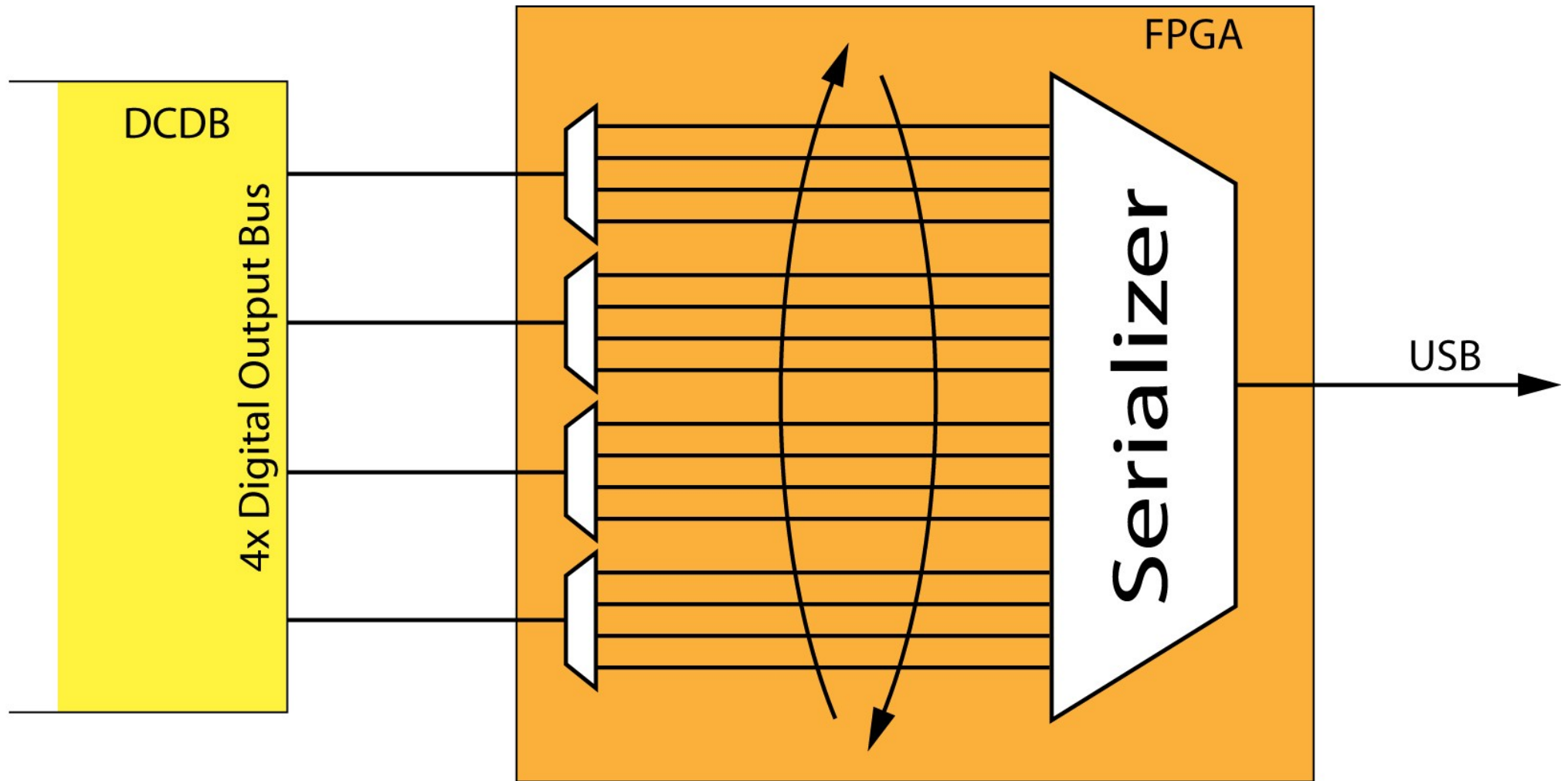


# Matrix Readout Mapping Step 3: DCDB Output Serialization



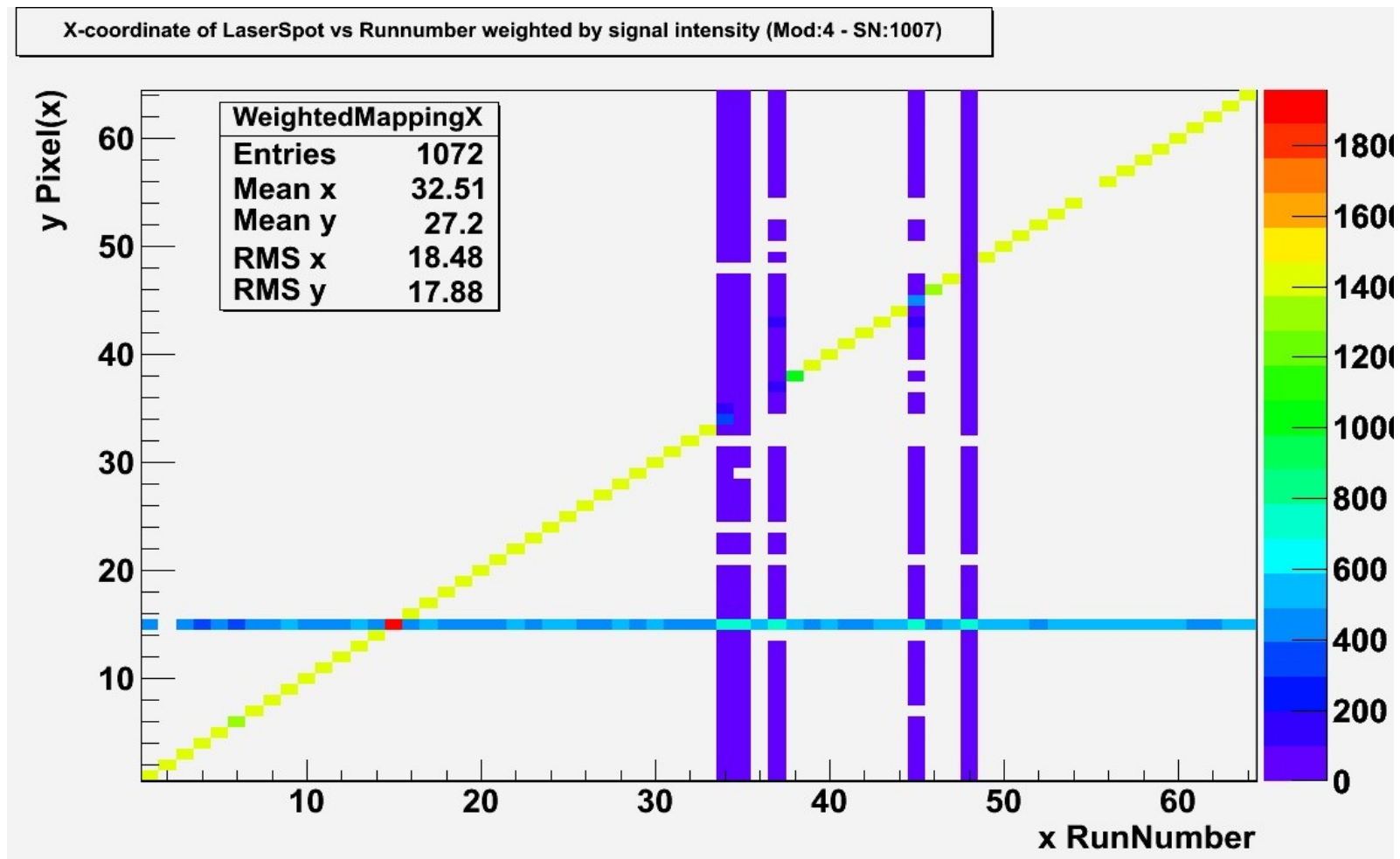


# Matrix Readout Mapping Step 4: FPGA Output Serialization

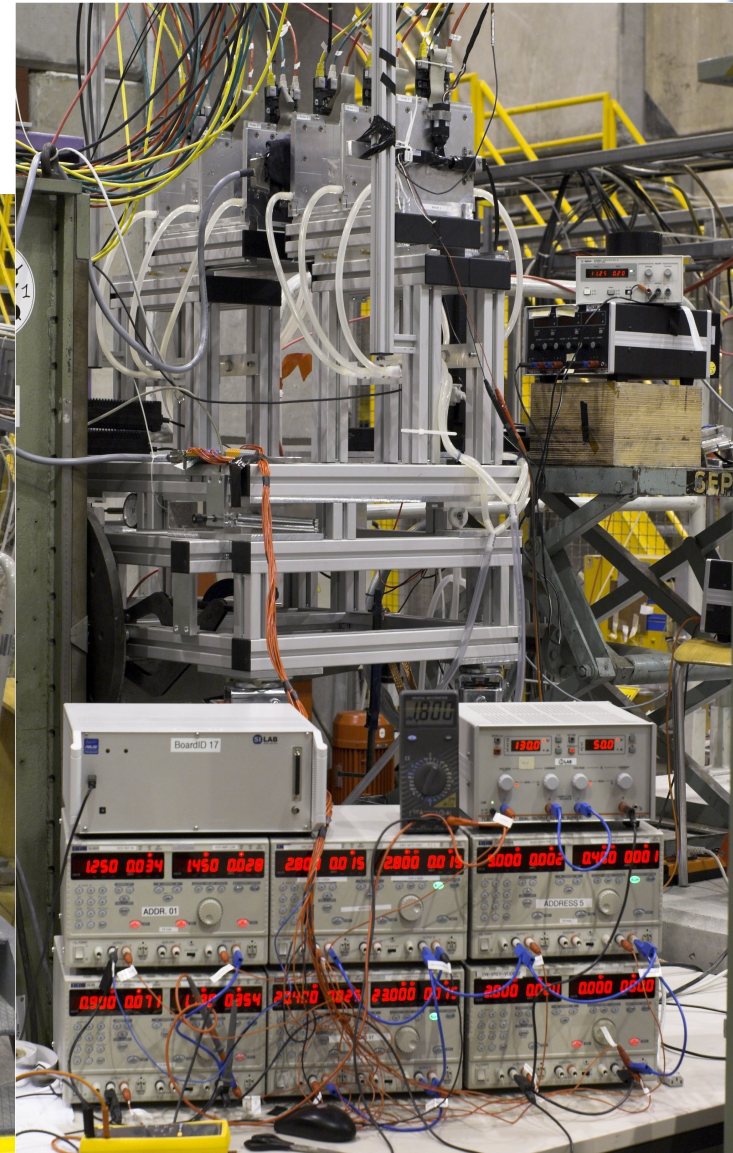
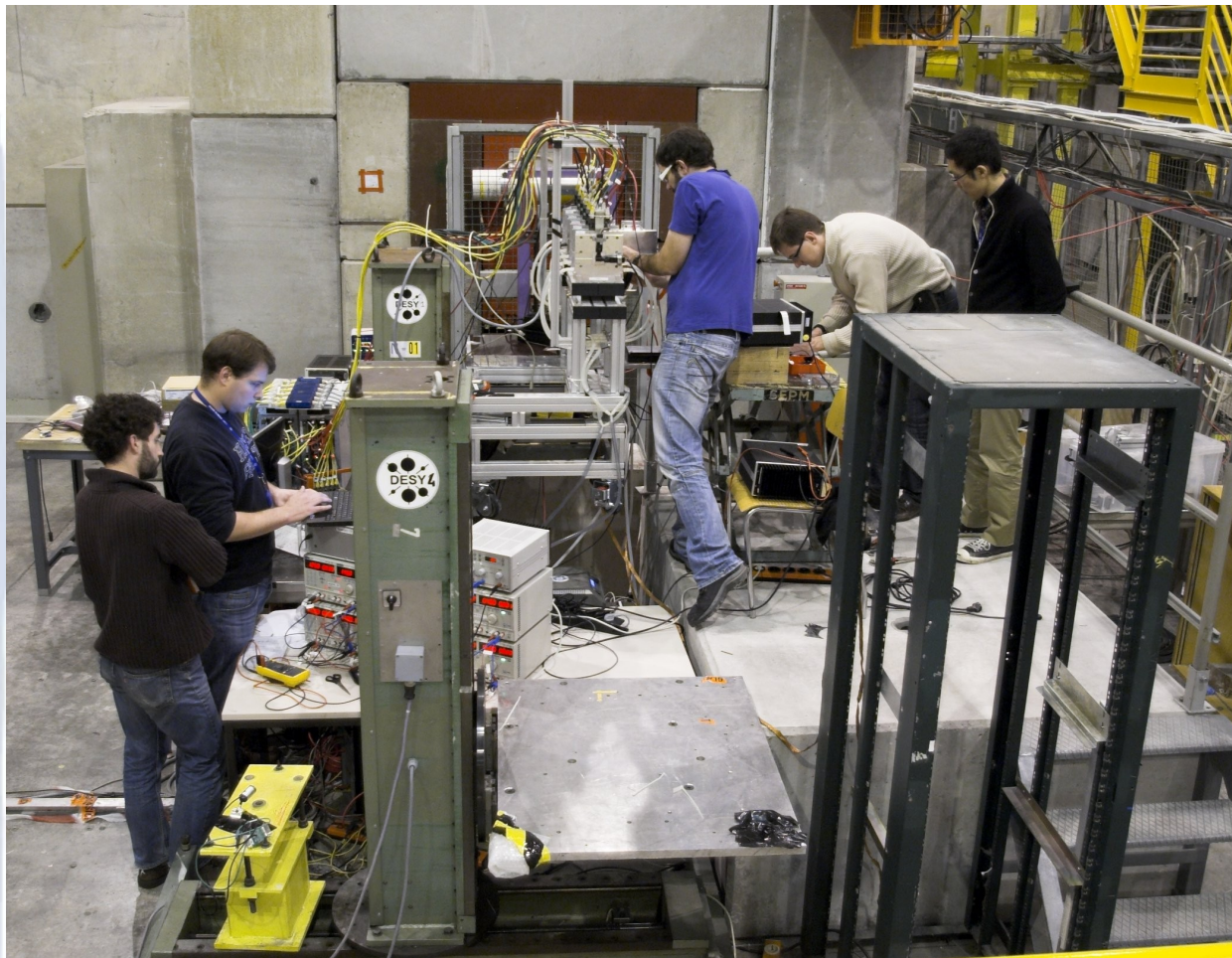


**Very difficult to keep track of all these mappings!!!**

- *Example of Laser scan to check the mapping:*
  - Correlation plot : laser position vs reconstructed cluster position
  - Yellow – correlation ; Blue – noisy channels

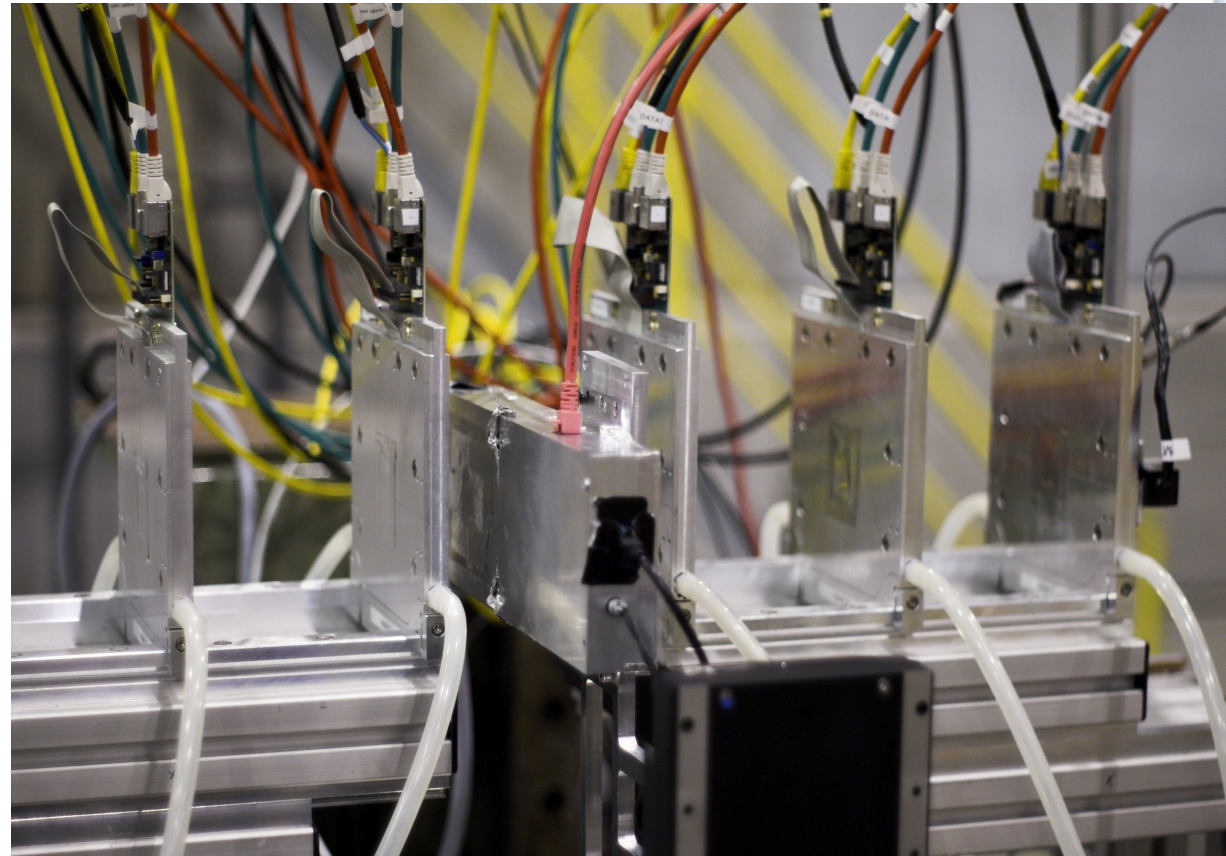


- November 14-21, 2010
- CERN SPS H6 beam line
- 120 GeV pions



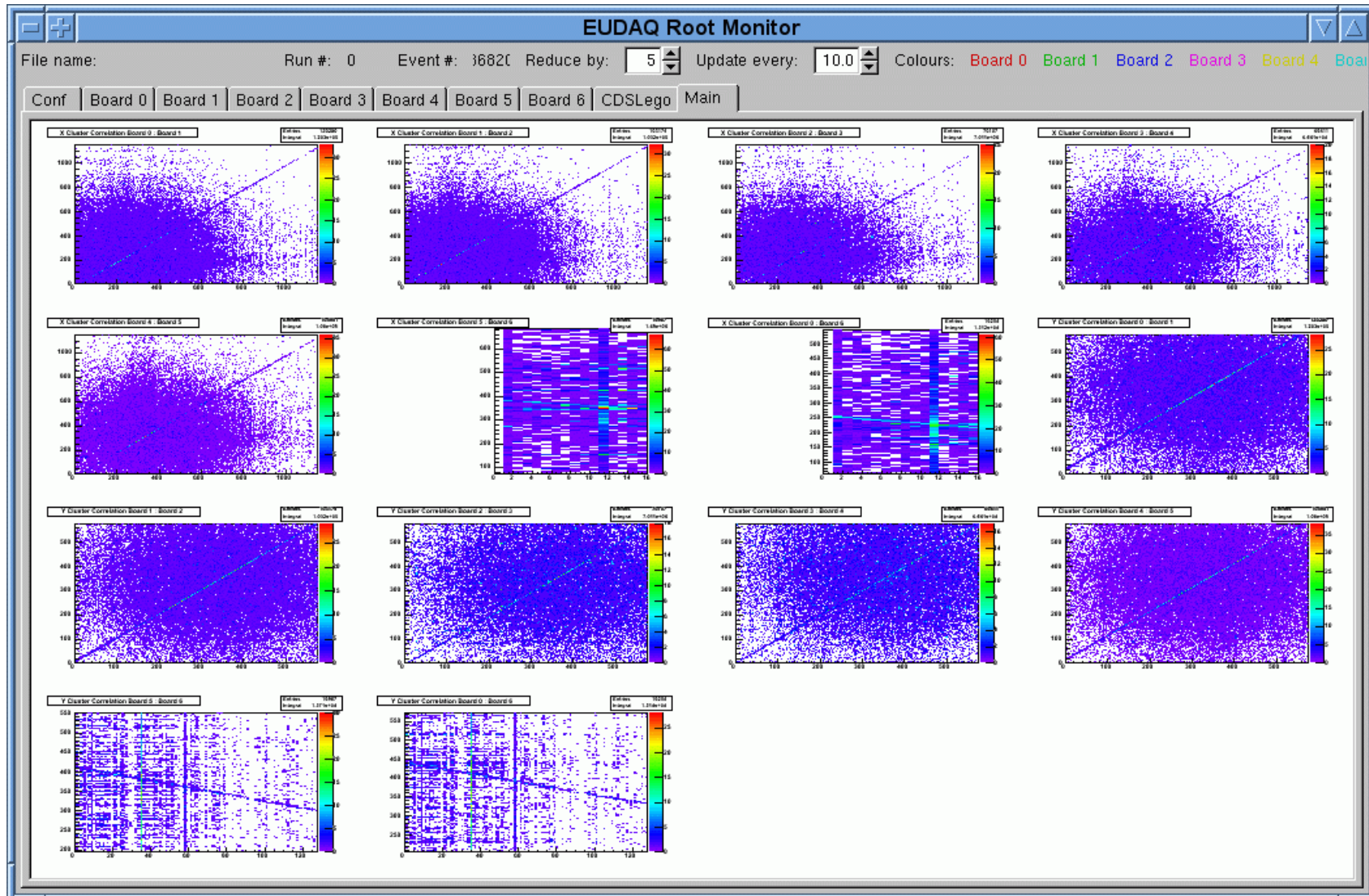
*6 EUDET Modules MAPS - Monolithic active pixel sensors – Mimosa 26 :*

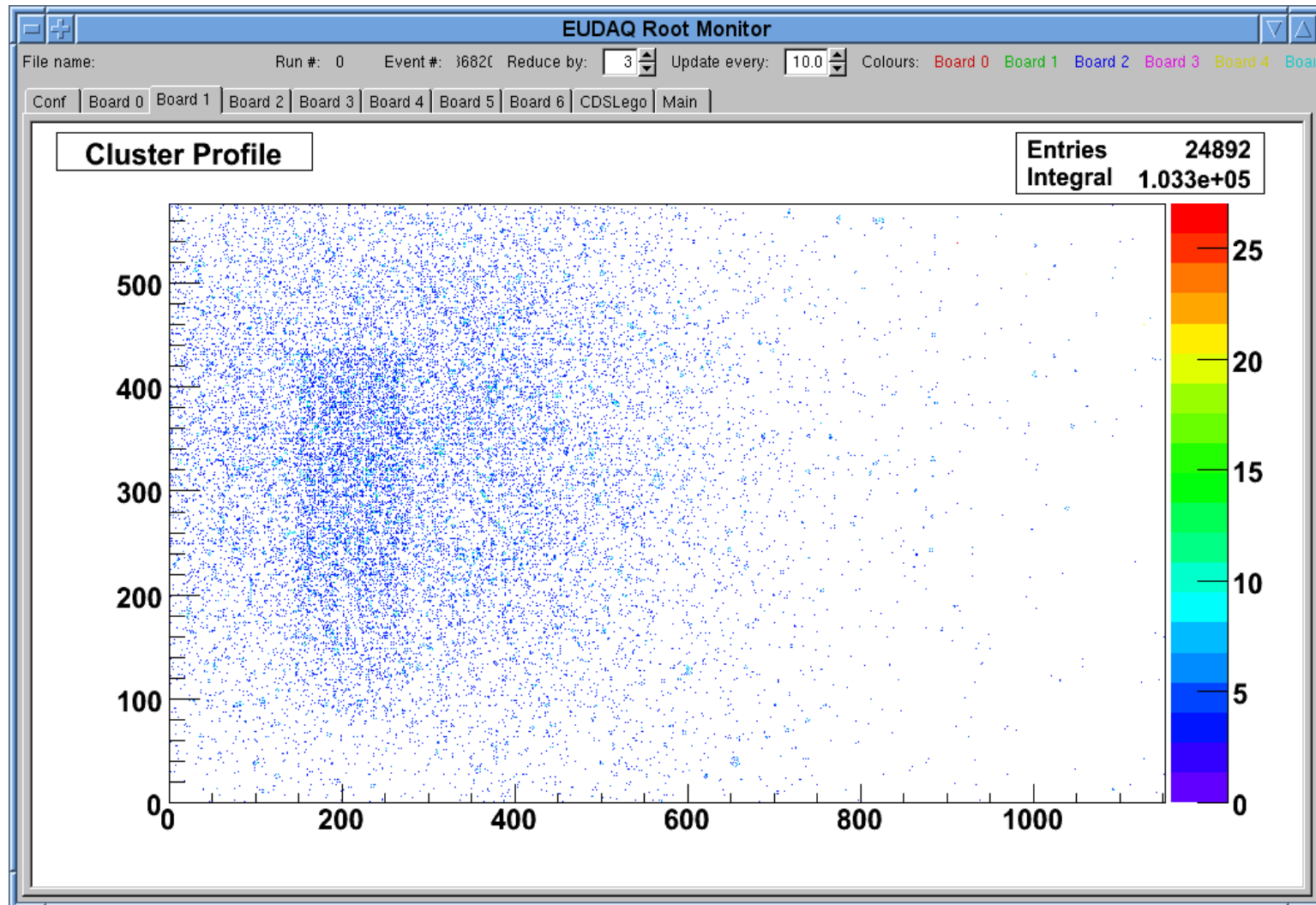
- 10.6 x 21.2 mm<sup>2</sup>,
- 576 x 1152 pixels
- Pitch 18.5 μm
  
- *MVME6100 PowerPC computer with general purpose acquisition boards (EUDRB) inside the VME64x crate connected to 1GB ethernet HUB*
  
- *EUDET DAQ server on MAC PC*
- *1GB Ethernet*
- *Trigger Logic Unit (TLU)*
- *DEPFET DUT with Readout PC*



- *Connection of DAQ computers to CERN network has taken almost a week*
  - From November 11-th to 16-th
  - Data base for network outlets is inconsistent
  - Phone support is bad – they use the same inconsistent data base
  - No support at all in evening and weekend
- *Also we had a bad luck with installation of our setup*
  - We came few days before our time to have a chance to install our setup
  - Unfortunately, the main user is not allowed us to enter into the beam area, despite the absence of the beam due to technical problems.
- *Additionally 3 days of our time was lost due to machine studies problems.*

- *EUDET trigger rate - 1 kHz*
- *DEPFET raw mode readout - up to 800 Hz*
- *DEPFET zero suppressed mode - limited by EUDET*
- *Collected data statistics:*
  - RAW data - 80 runs, 900 kEvents (with different settings)
  - DHP (zero suppressed) - 30 runs, 550 kEvents
  - 4-frame readout - 3 long runs, 260 kEvents
  - All files are converted to LCIO format
- *Not all events with track - acceptance of our DUT is too small in comparison to EUDET:*
  - Size of scintillators for EUDET trigger – 10 x 10 mm
  - Depfet active area is only 32 rows – 0.77 x 1.5 mm
- *Installation of scintillator with size of 2 x 4 mm increased a little bit tracking efficiency.*







- *DEPFET Data acquisition system has been upgraded for DCD readout*
- *DQM has been upgraded for RAW and ZeroSupp DCD readout*
- *EUDAQ: "DEPFETConverterPlugin" has been upgraded for DCD readout.*
- *Offline software:*
  - *Eutelescope: "DEPFETReader" has been upgraded for DCD readout*
- *Matrix geometry to r/o channel mapping is fixed*
  
- *Unfortunately wrong bonding of CLEAR switcher makes a problems in physics analysis of data*
- *Nevertheless data is useful for noise estimation and test Zero Suppression algorithm*
- *In addition, the study of matrix clearing helped to detect bonding bug in CLEAR switcher*
  - *It would be hard to find it in the LAB environment ( Laser or Source )*