CMS France, Annecy May 2004

XDAQ and communication between DCC, DAQ and laser monitoring farm

R. Alemany, N. Almeida, J. Bourotte, M. Dejardin, L. Durand, J.L. Faure, Ph. Gras, N. Marinelli, E. Meschi, J. da Silva, J. Varela, P. Verrecchia

Introduction

- Precalibration of a supermodule (1700 crystals, 1/36th of barrel) in Sept. 2004
- XDAQ will be used for the 1st time in ECAL test beam. Communication based on I2O and SOAP, the standard communication protocols of XDAQ
- Overview:
  - Laser monitoring of the crystal transparency
  - The test beam DAQ system
  - Communication and validation of data transfer time
  - Event filter unit test
  - DCC configuration

Laser monitoring of the crystal transparency

Laser monitoring

- The crystal light transmission varies with time due to the radiation conditions of the Calorimeter crystals.
- The crystal light transmission is measured online in order to correct the signal from these variations
- To perform this measurement each crystal is illuminated by an optical fiber

Laser monitoring

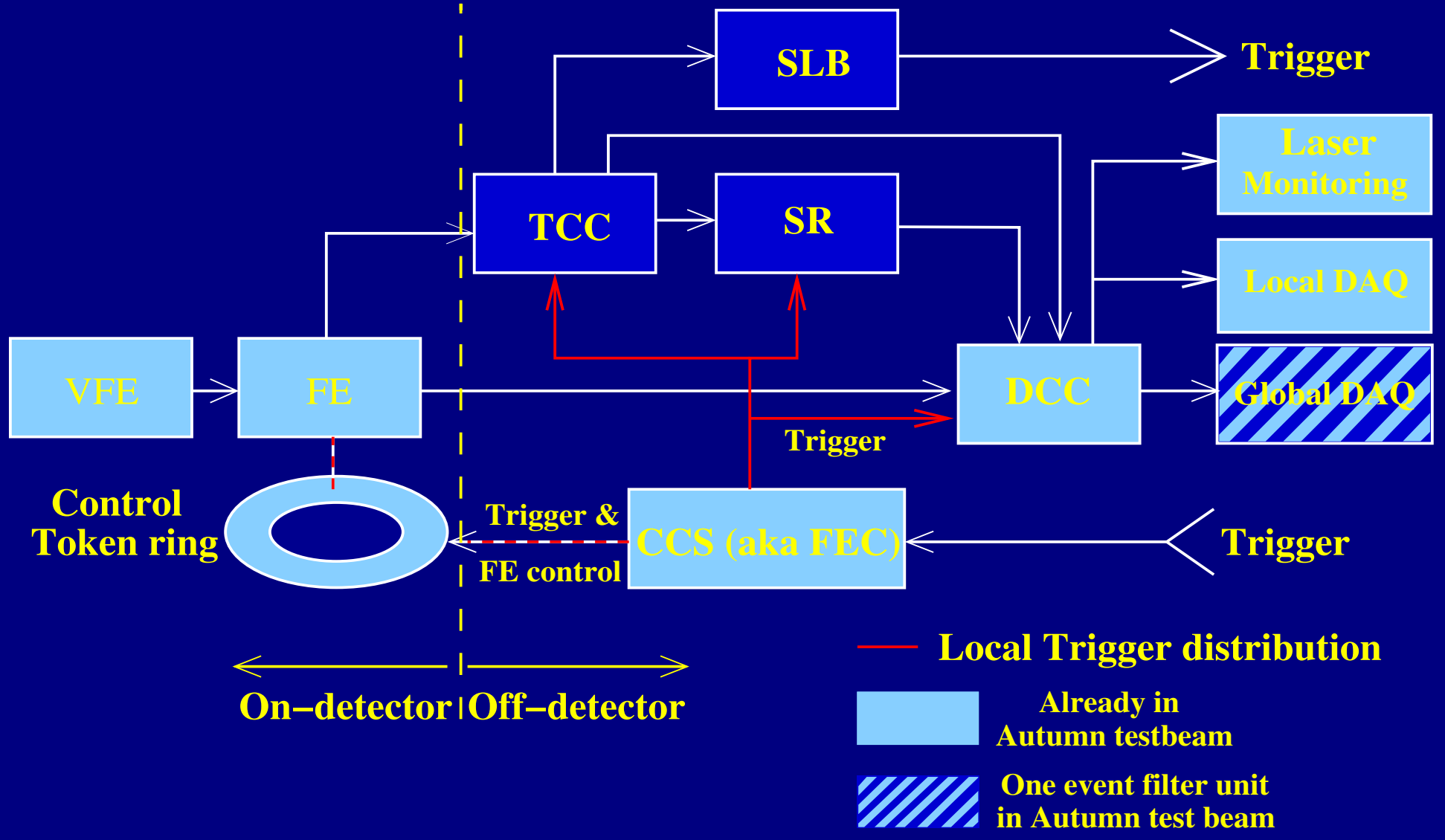
- Three steps:
  - Data acquisition
  - Analysis of each run and production reduced data
  - Monitoring, validation and computation of correction factor from reduced data of several runs taken inside a time window
- At Cessy, this will be done during 3µs gaps (every 1 out 125)
- In test beam, it's done during some n consecutive inter-burst periods.
- See CMS 2002/012

Laser monitoring data of precalibration test beam

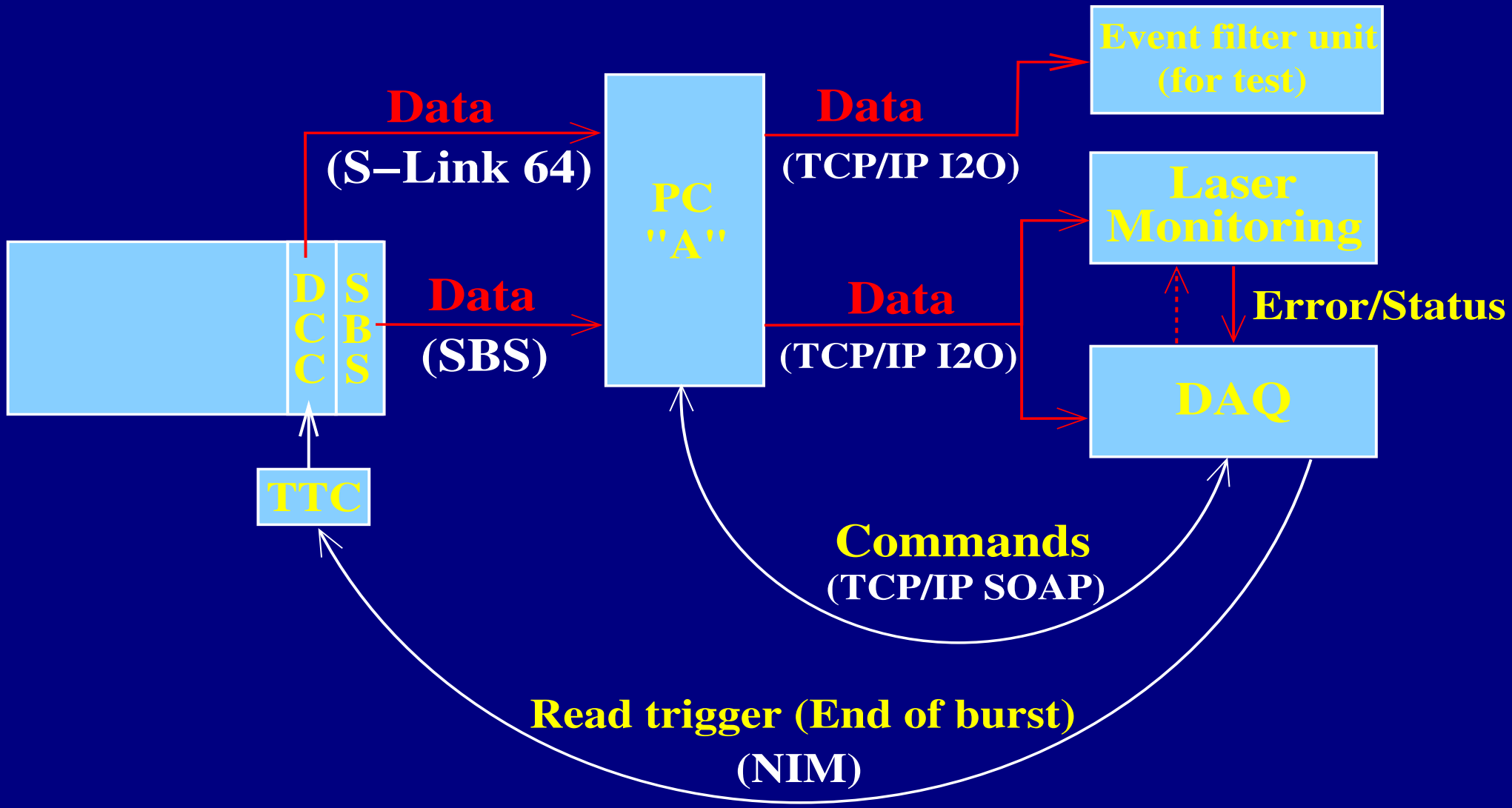
- 2 or 3 laser wavelengths
- 1500 events are taken for a laser run: 500 events taken during 3*Nlaser consecutive inter-burst.
- The supermodule will be read per half
- A laser event represents about 21.5kB (for half a supermodule)
- In addition to laser run, 500 pedestal events are taken and 1 event for temperature and dark current

The test beam DAQ system

ECAL DAQ system overview



From DCC to DAQ and laser monitoring "farm"



DAQ mechanism

- Data are acquired by DCC during the burst
- At end of the burst DAQ sends a read command to DCC through TTC
- PC “A” reads DCC buffer and sends the data to the DAQ. In case of monitoring runs, data are also sent to the Monitoring.
- During laser run, data are taken between the bursts: 500 events by inter-burst. A typical laser run is made of 1500 events per laser wavelength (2 or 3)

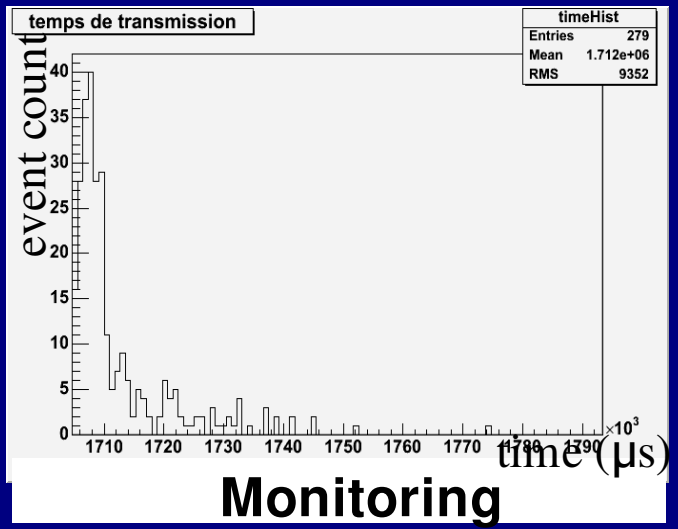
Communication and validation of data transmission

Communication protocols

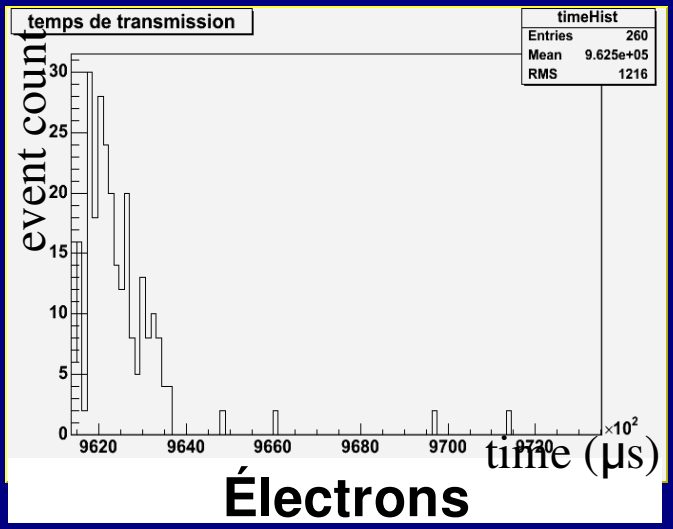
- SOAP and I2O are used for "configuration/control commands" and "data transmission"(CMS IN 2003/048). Those protocols are used within the XDAQ framework.
- Data will be transferred by I2O over TCP/IP
- Control Commands between DAQ and PC “A” will be transferred by SOAP

Validation of data transmission

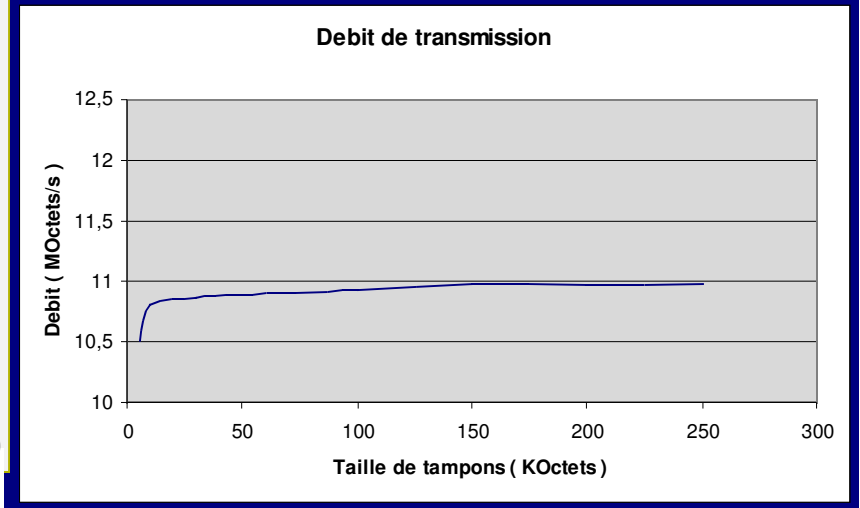
- SPS structure: burst of 5s every 17s
- Time to send 500 “laser events” to two sources (monitoring farm + DAQ): 1.7s
- Time to send electron data (four barrel trigger towers) to one source: 0.96s



Monitoring



Électrons



(from Luc Durand – CEA/Saclay)

Communication with event filter unit

- A test of the event filter unit is foreseen for this Autumn precalibration test beam
  - will test the full reconstruction chain and the persistent data storage
- It will use one PC running XDAQ and ORCA
- It will use the S-link 64
  - Closer to final system
  - Uncorrelated from the main test beam DAQ
- For more details see the slides N. Marinelli presented at e/γ meeting of March'04 CMS week

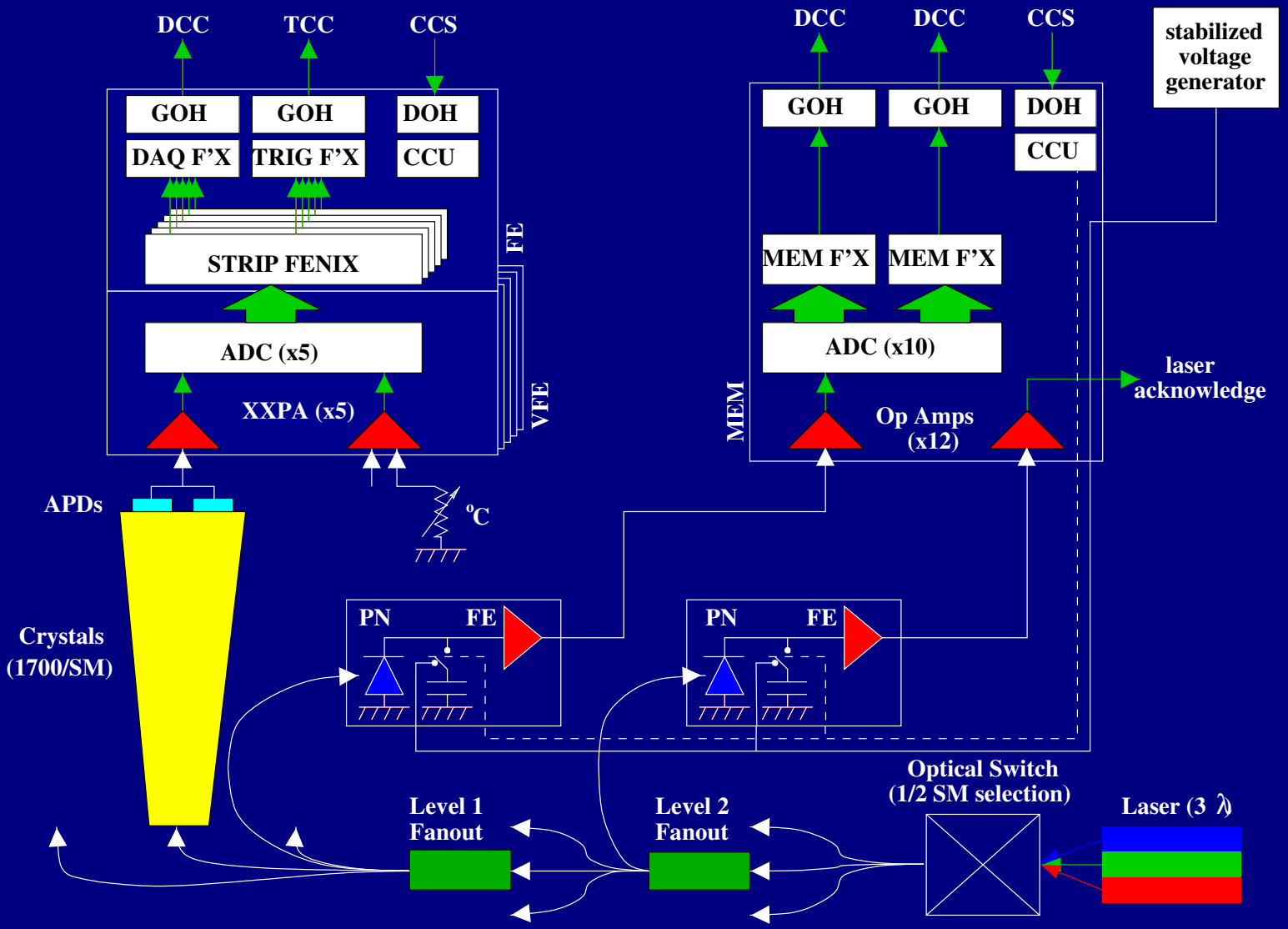
XDAQ based DCC configuration

Conclusions

- This autumn precalibration beam test will be the first time DAQ will be done with a DCC
- Communication based on the standard protocols of XDAQ framework, I2O and SOAP.
- Application for DCC configuration based on XDAQ framework
- Data transfer duration has been validated

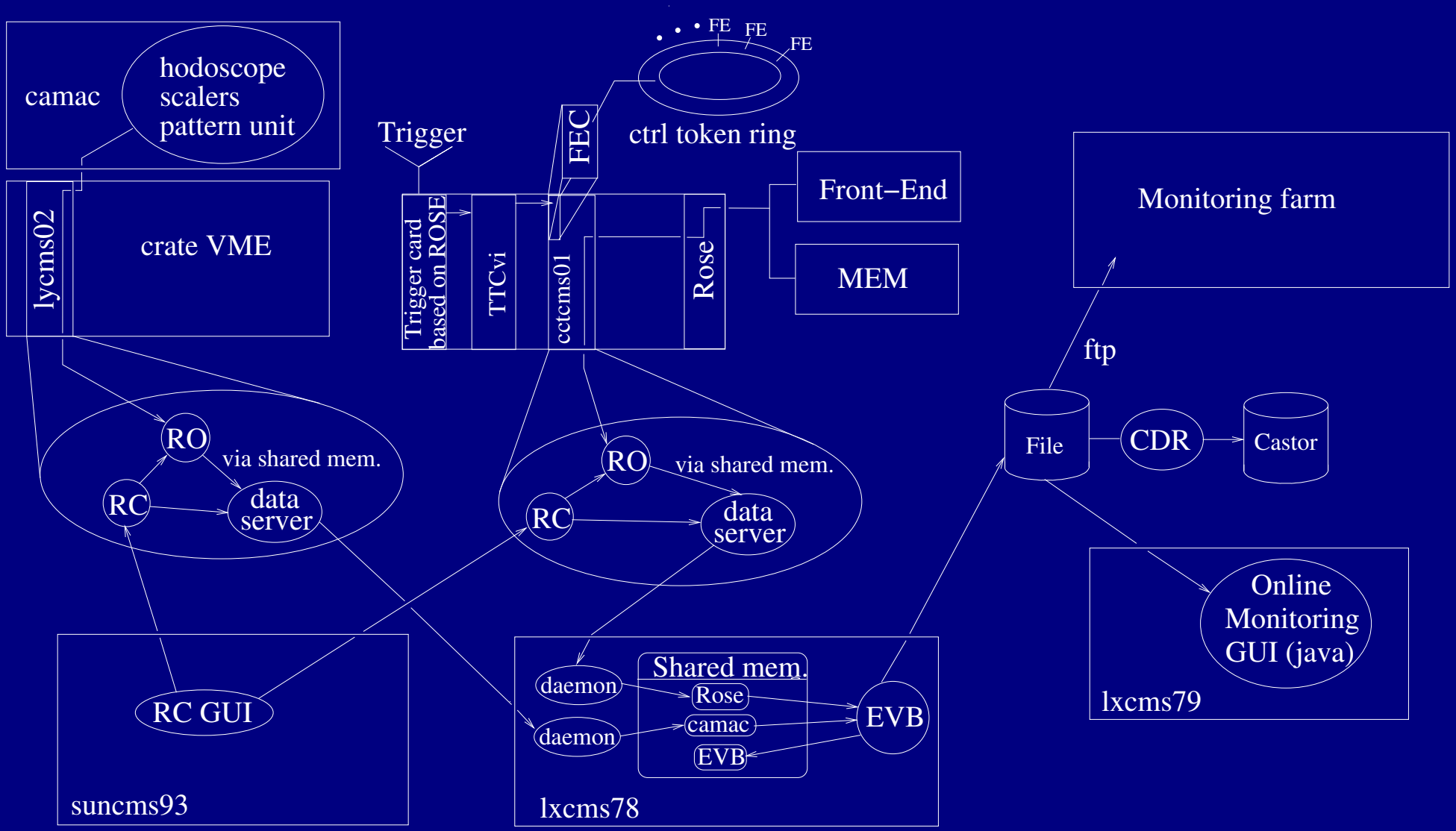
Backup slides

Laser monitoring light distribution and electronics system



(see http://www.cern.ch/cms-ecal-monitoring/)

Current test beam DAQ system (with ROSE card)



Autumn DAQ system (with DCC)