

DEPFET status and plans



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Outline

- Status of DEPFET DAQ
- DEPFET ILC software efforts
- Plans for DEPFET and EUDET integration

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Common DAQ efforts 2007

Windows based DEPFET DAQ has a lot of features in part of testing and debugging of DEPFET. As a result - it is relatively complicated system for unexperienced user. Current version is most suitable for standalone running on the single PC - it is more complicated if PC in test beam area. It makes additional problems in case of participating in the Test Beam with other detectors, if combined data are needed.

Last test beam was successful
→ trigger level synchronization

BUT:

Minimal overlap between
DEPFET and MAPS sensor

→ no common DAQ

→ no common DQM

→ no alignment check



Optimal use of EUDET
telescope for DUT:
Combined data stream

In 2007 almost done with
windows 2 Linux TCP/IP
→ running out of beam
time

To improve the functionality during the test beam measurements, and make easier integration with other detectors a new Linux based version of DEPFET DAQ software was developed.

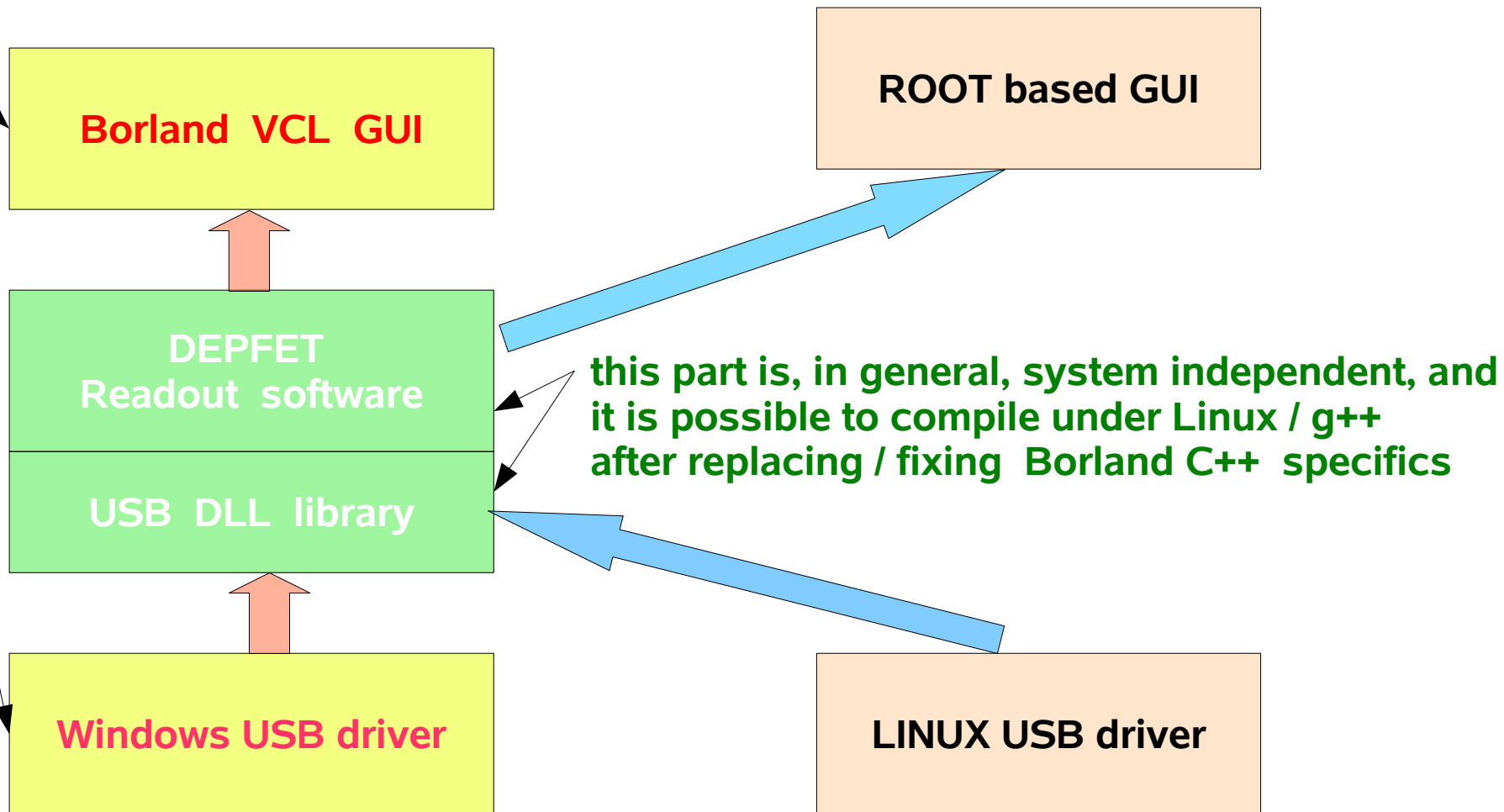
Linux DAQ features

- Network distributed system allows:
 - share resources and tasks
 - remote control and monitoring
 - run many monitoring programs on the remote computers without affecting resources of DAQ computers
 - easy connection to Common DAQ
- user interface is much easier due to lack of a number of function, which is mainly related to tests and special configurations.
- use only open source software

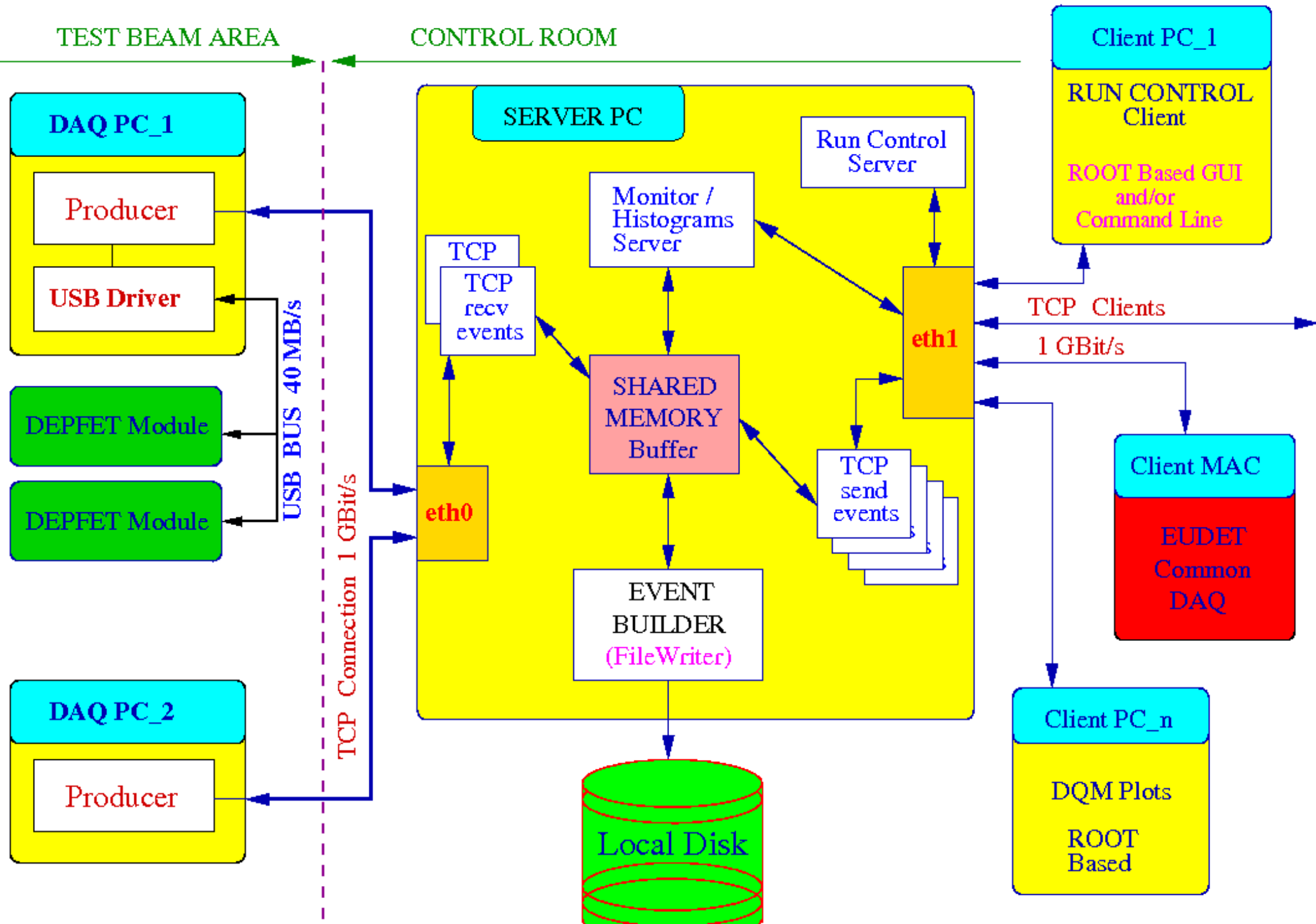
DEPFET DAQ structure

strong SYSTEM (Windows) dependence

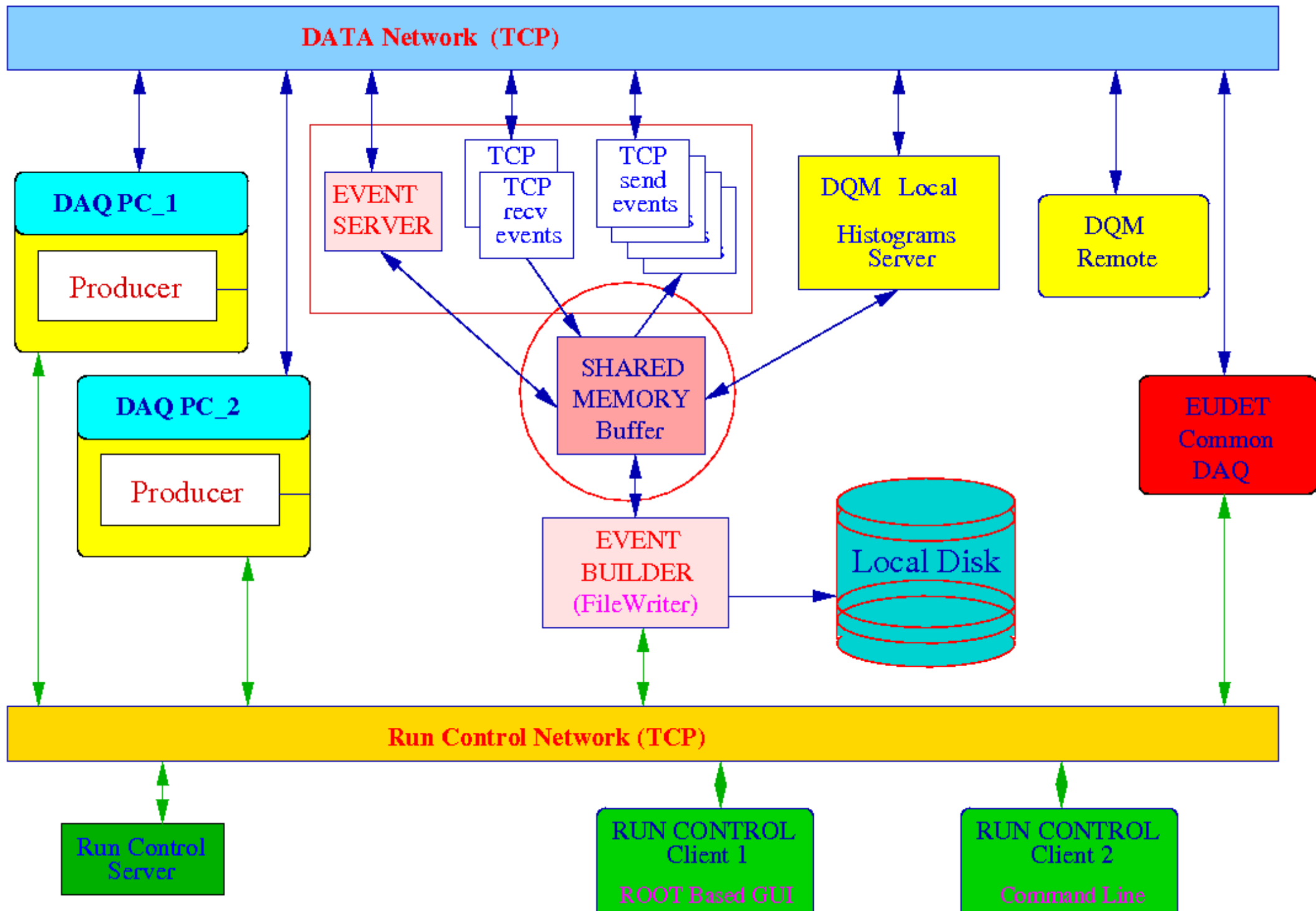
new software for LINUX



DEPFET DAQ, LINUX version.



DEPFET DAQ, LINUX version (Network layer)



ROOT based DQM

Mode of operating:

1. from File
2. from Shmem
3. via TCP/IP
4. without graphics, as ROOT TCP/IP histogram server

via TCP/IP:

- plot all events
- adjustable rate

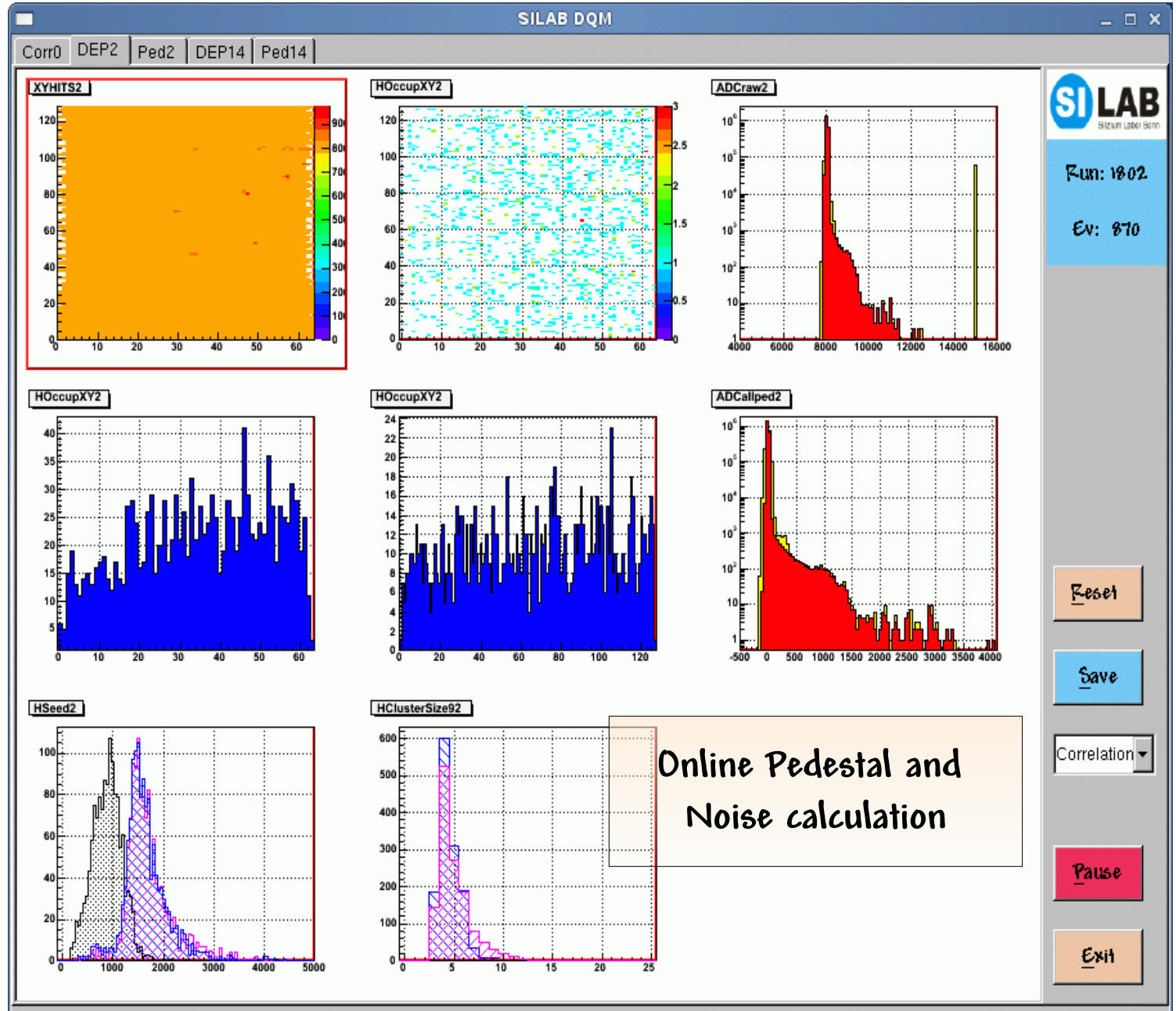
Histogram server:

- Fill histograms
- Send (via TCP) hists on request

Histogram client:

- ROOT script (C++)

Easy to integrate into common DQM



Online Pedestal and Noise calculation

Prototype of Run Control

ROOT GUI

TCL

Command line

SILAB RunControl

!END_STATUS
!DeviceClass=0xff
!ProductID=0x200
!VendorID=0x5312
!FW_Version=5
!BoardName=SILAB_USB_2.0_Contro

ID	FW	Vend_ID	Prod_ID
2	5	5312	200

Run Control Client

Status Init USB Write to File Start Stop Exit PROD RCM Status EVB stat. HELP

Hist PLOT Hist RESET Hist EVB Hist RECV Hist SEND

Command: Server: silab11 Port: 32767 (Re)Connect Exit

Number_of_Boards	1
BoardID	5
RUN_Flag	2
RUN_Time	198 sec
N_Events_Tot	49873
N_timed_out	0
N_extra_mod	0
shmem_error	0
FILE_Flag	0 Format=0
File_Name	
N_Events_File	0
IN_Buffer	9 (0.450000 %)
EVB_Buffer	16 (4.000000 %)
EVB_busy	4166 msec
N_Producers	2
Mod_tot	2 (max=5)
N_Musers	1
N_Clients	3
N_BOR	2 of tot=2
N_EOR	0
TTL	100000
Rate	2(2) REQ=0x05 Rate=

```

cmd status
cmd status
!BEGIN_STATUS
!Number_of_Boards=1
!BoardID=2
!BoardName=SILAB_USB_2.0 Contro
!FW_Version=5
!VendorID=0x5312
!ProductID=0x200
!DeviceClass=0xff
!END_STATUS
EVB:: FILE_Flag=0
EVB:: N_Events_Tot=1796352
EVB:: N_timed_out=0
EVB:: N_Events_File=117
EVB:: File_Name=DATA/run1014.dat

*** Run is Stopped for 2 sec. !!!
*** Run is Stopped for 2 sec. !!!
    
```


First analysis of DEPFET data using ILC software

DepfetReader Convert DEPFET Native RAW data to LCIO format

EUTelPedestalNoiseProcessor

EUTelCalibrateEventProcessor

ClusterFinder

EtaCorrection

HitMaker

Trackfit

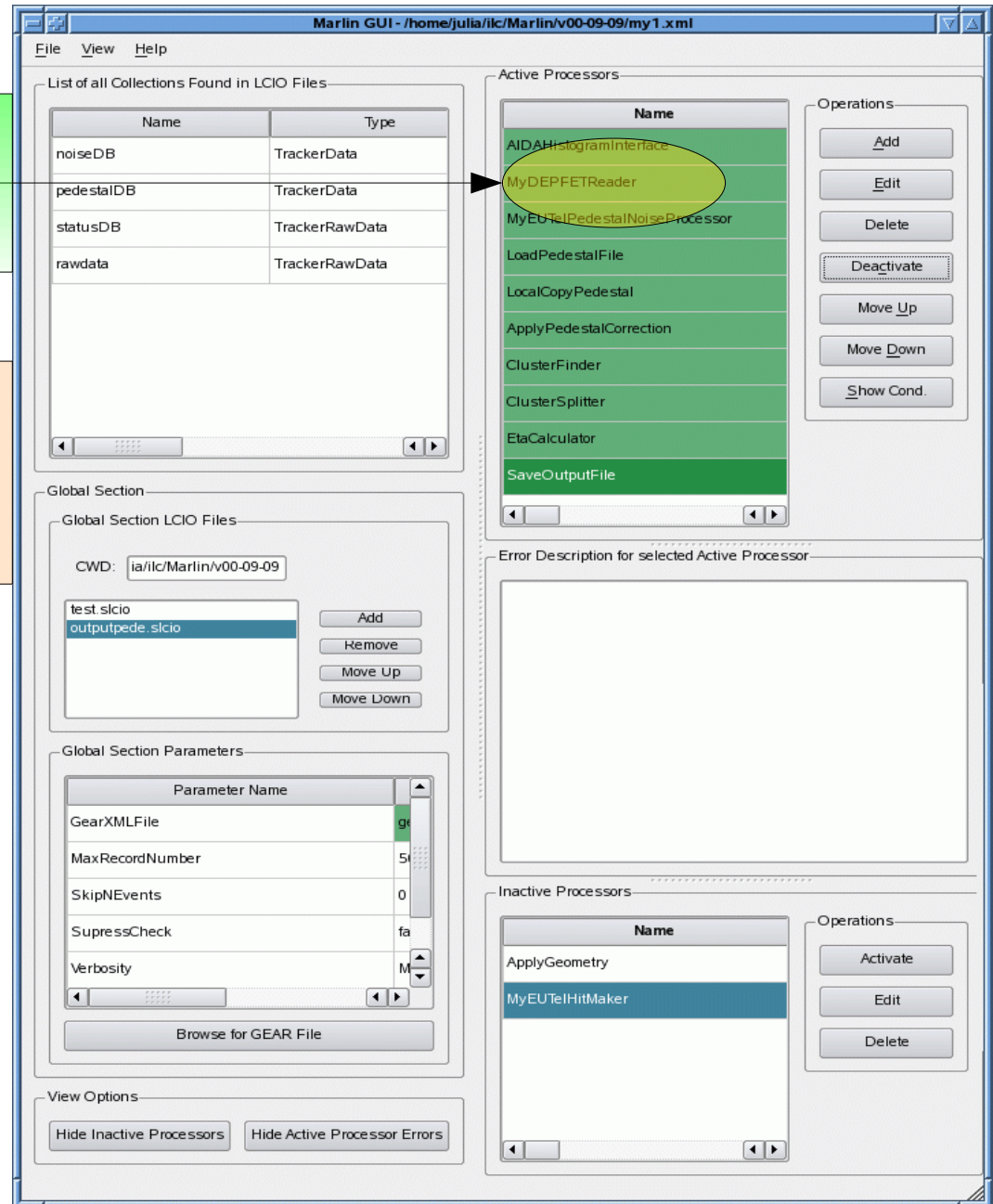
Alignment

PhysicsAnalysis

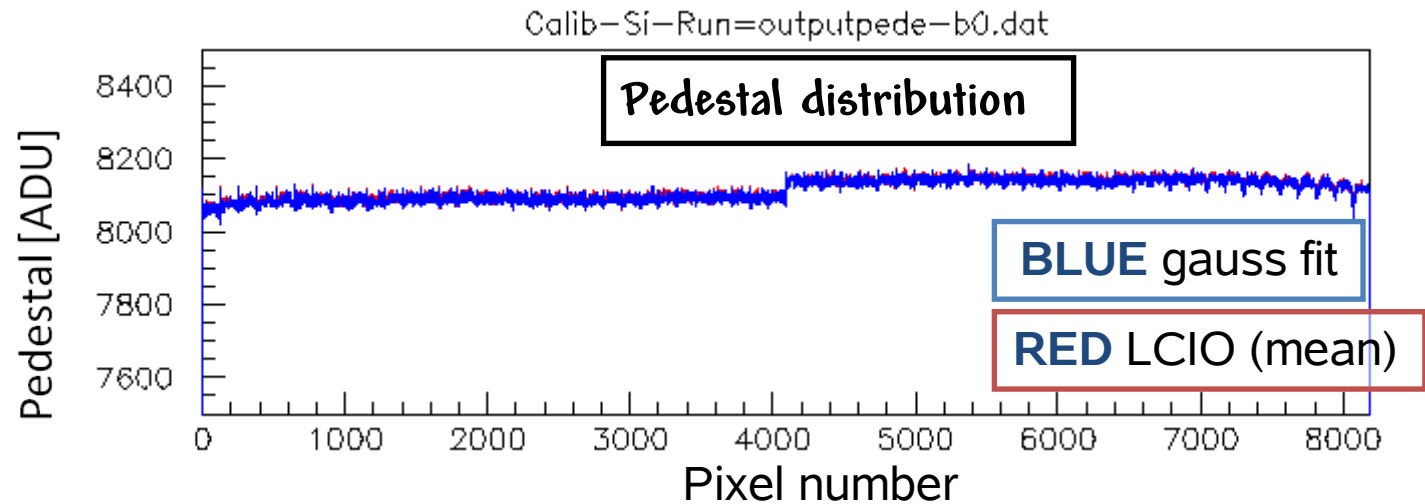
~650events:
RAW: ~100Mbyte
LCIO: ~30Mbyte

MILPEDE

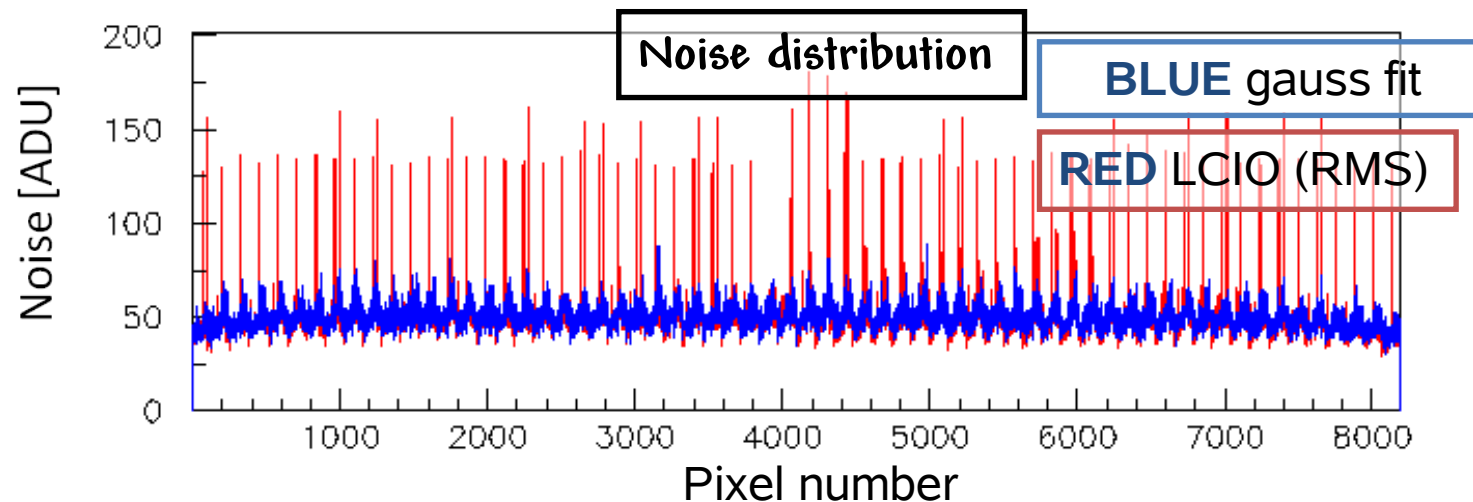
Higgs/SUSY?



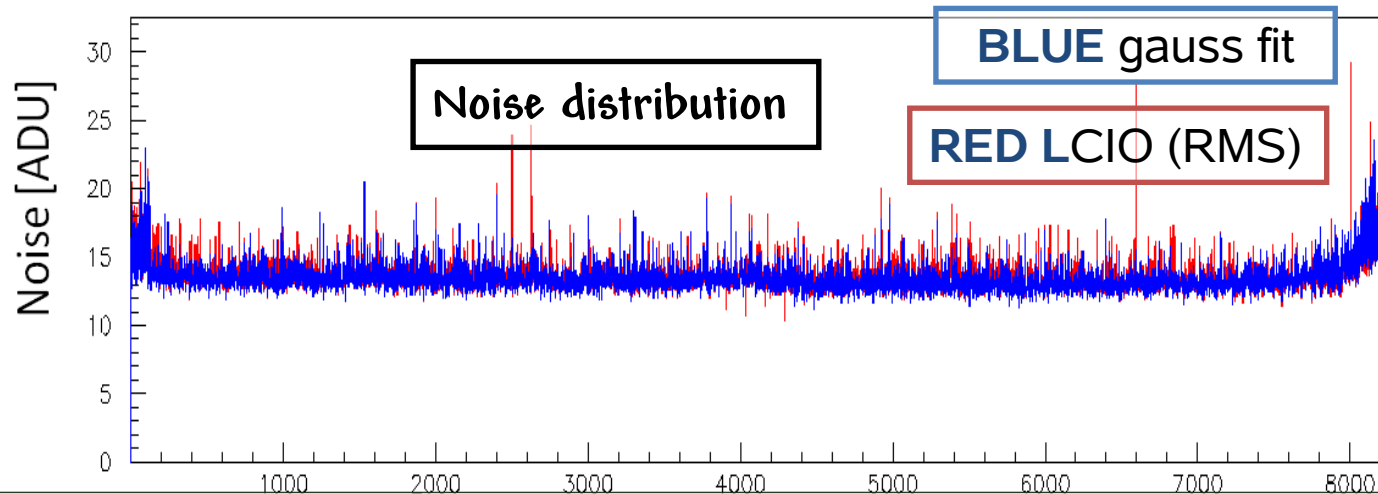
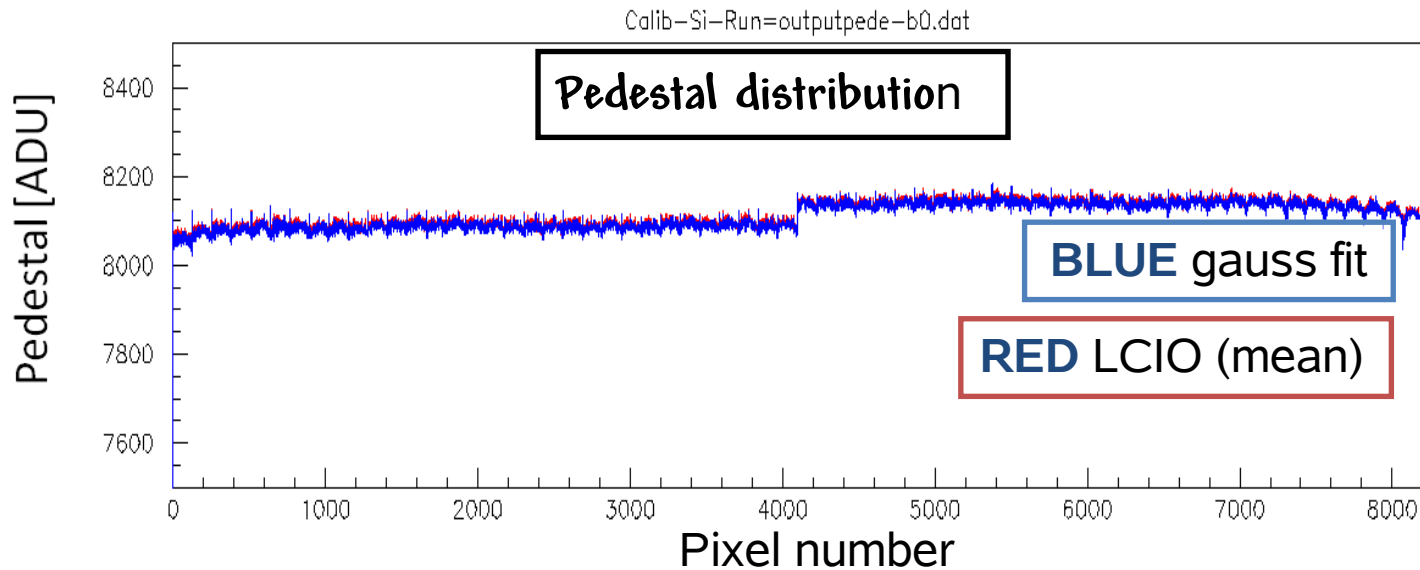
EUTelPedestalNoiseProcessor-1



No hit rejection and no row wise common mode correction

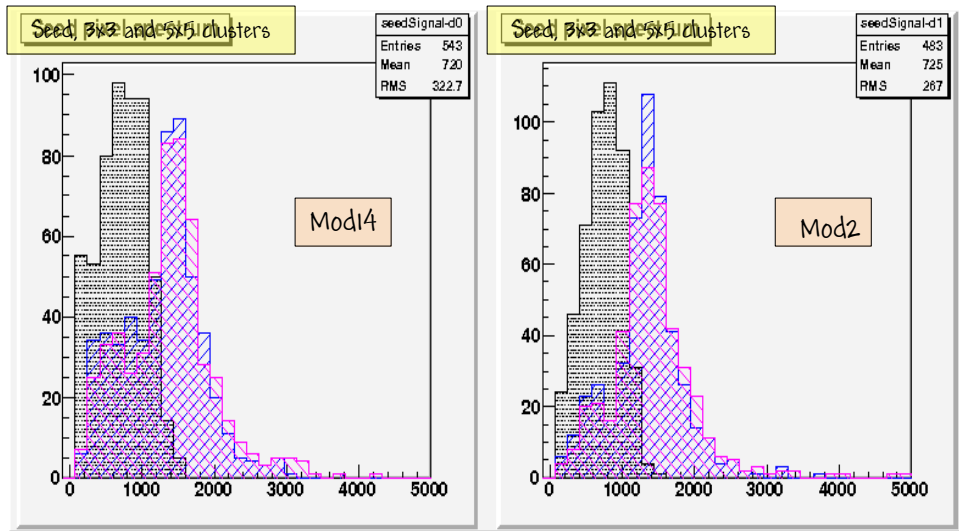


EUTelPedestalNoiseProcessor-II

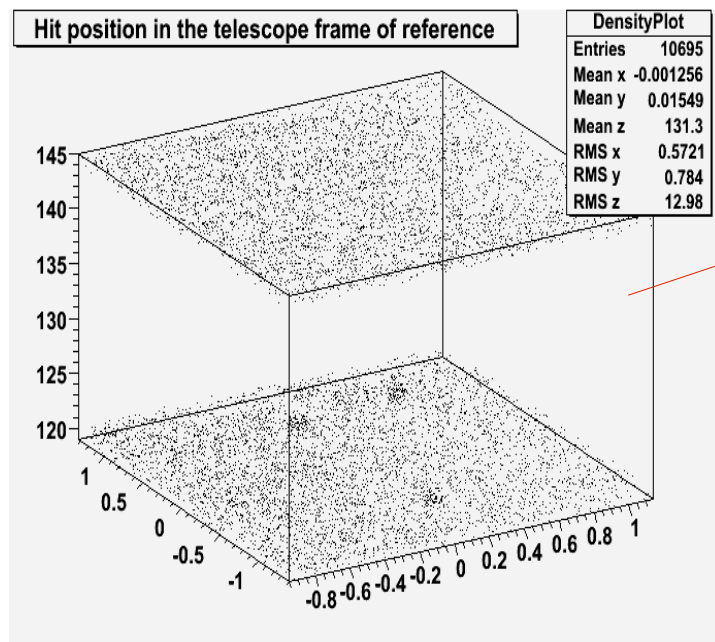
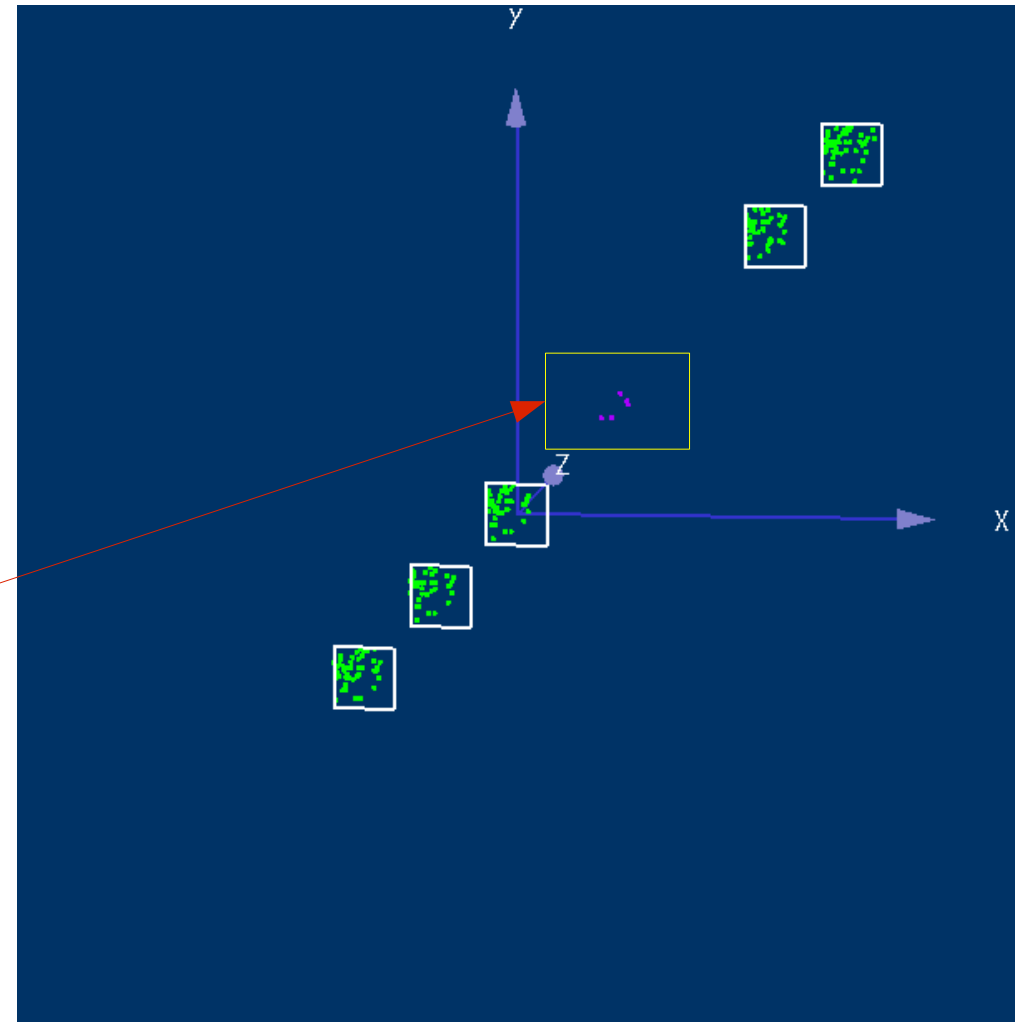


With hit rejection and row wise common mode correction

EUTelHitMaker & merged DATA



Many Thanks to Antonio for help!



Status of software development

DepfetReadout Processor developed:

- convert native RAW data to LCIO format

Depfet specifics were added to EUTelPedestalNoiseProcessor:

- hit rejection is implemented
- row wise common mode is implemented

DEPFET and EUDET Telescope data are merged.

To Do:

No GEAR geometry file for DEPFET (Pitch Y1, Pitch Y2)

Tracking and Alignment



Conclusion & plans

- Basic functions of Linux DAQ is working:
 - new Linux USB Driver for DEPFET running stable – about 1 month non stop data taking.
 - USB library and Readout software are successfully cleaned from Windows/Borland C++ specifics and compiled on Linux g++.
 - Event server, Event Builder and Run Control Server showed a good performance
 - DQM software (histogram server and presenter) is working, but is require optimization.
- There a lot of space for optimization and improving.
- First analysis of DEPFET data using EUTelescope software is performed:
 - DEPFET raw data are converted to LCIO, processed and then merged with EUDET telescope data into one stream.

Plans for CERN Test Beam

- During PS time
 - Test Linux version of DEPFET DAQ.
 - DAQ integration to EUDET Telescope system via RunControl, TCP/IP data stream and DQM.
 - Alignment using EUDET Telescope?
- During SPS time
 - Test of a communication between DEPFET and EUDET Telescope.
 - Data tacking with high statistic to study in-pixel charge collection.
 - Study of the performance of a new generation of DEPFET sensors