

TESTBEAM 2009: First Results



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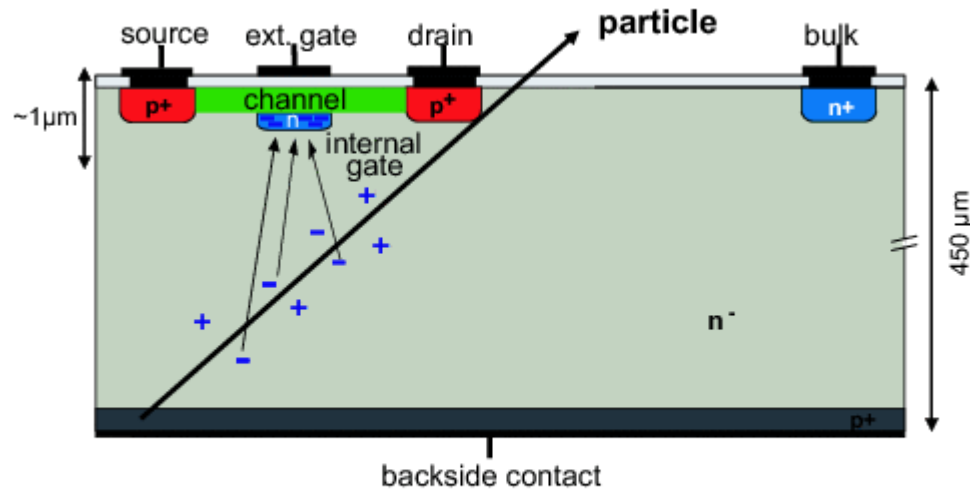
Outline



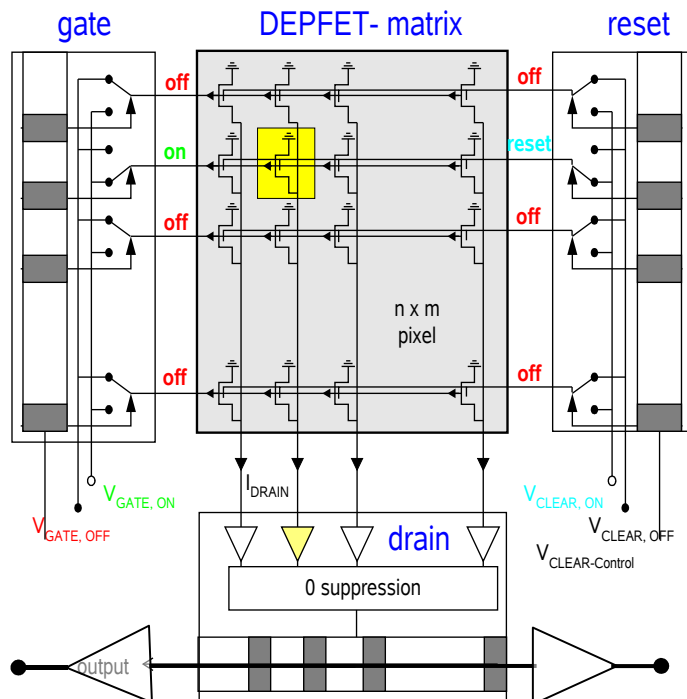
- new DEPFET system
- Depfet DAQ (preparation to the TestBeam)
- Test beam setup
- DEPFET and EUDET integration
- Measurement Program and First Results

EUDET Meeting, Geneva, 19-21 Oct. 2009

Operation principle of a DEPFET



fully depleted sensitive volume, charge collection by drift
require a ~20 different voltages

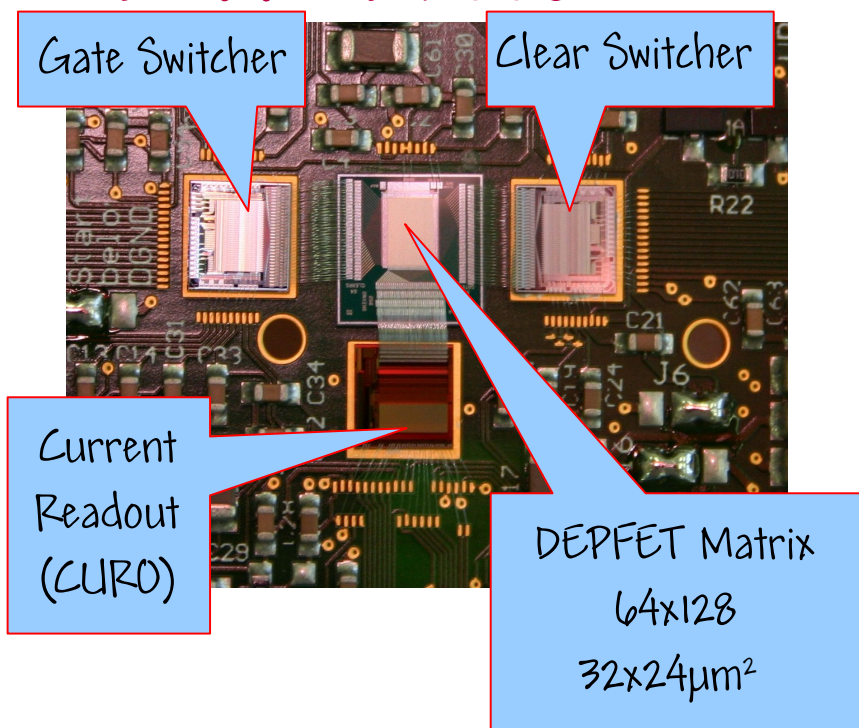


Row wise read-out ("rolling shutter")

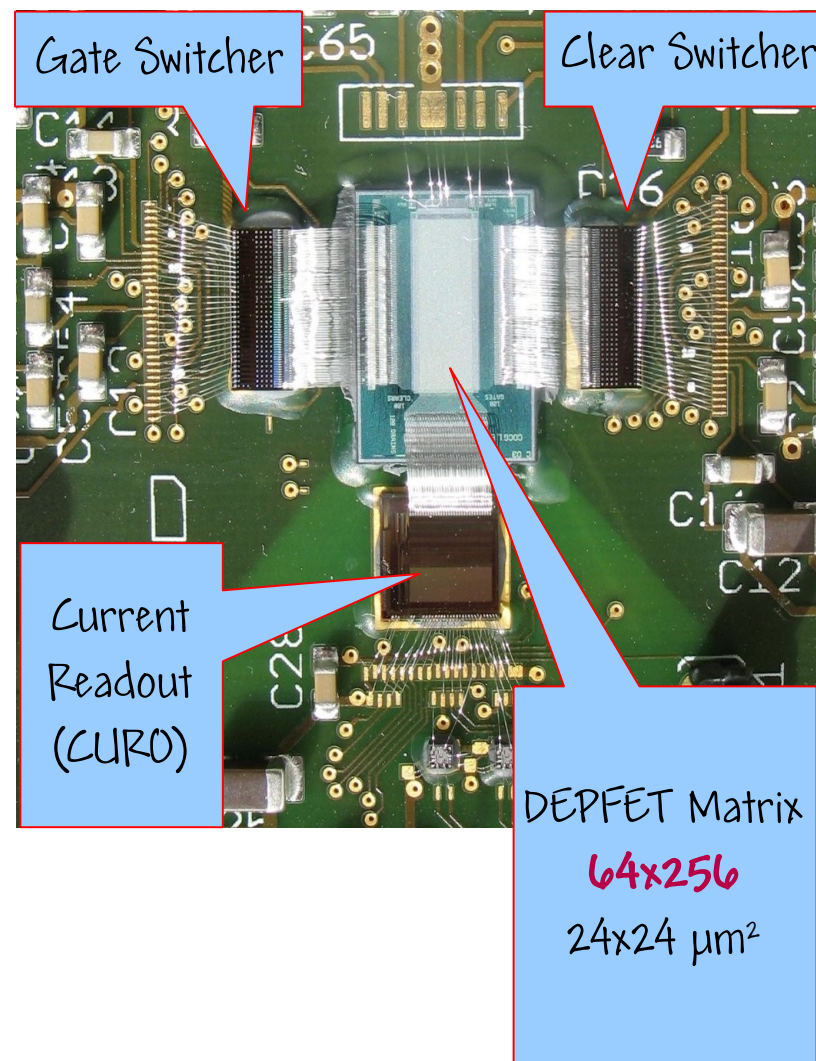
select row with external gate, read current, clear DEPFET, read current again \rightarrow the difference is the signal

DEPFET Matrix

DEPFET 2008

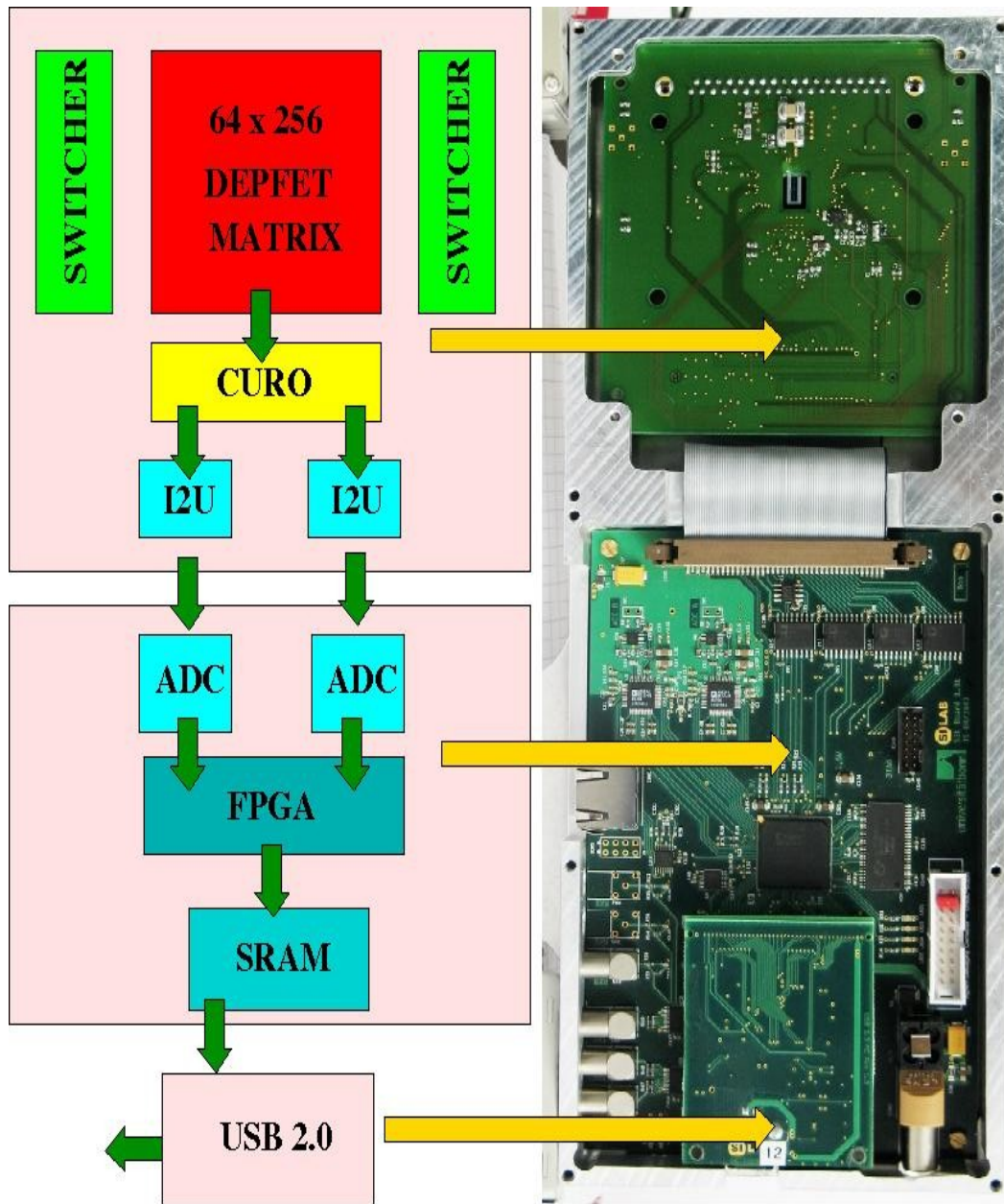


DEPFET 2009



- * New generation of DEPFET sensors (PXD5) with bigger matrices (64x256 pixels).
- * New Switcher 3 (350 nm CMOS)
- * New readout system S3B

DEPFET Readout board (S3B)



New Power Supply

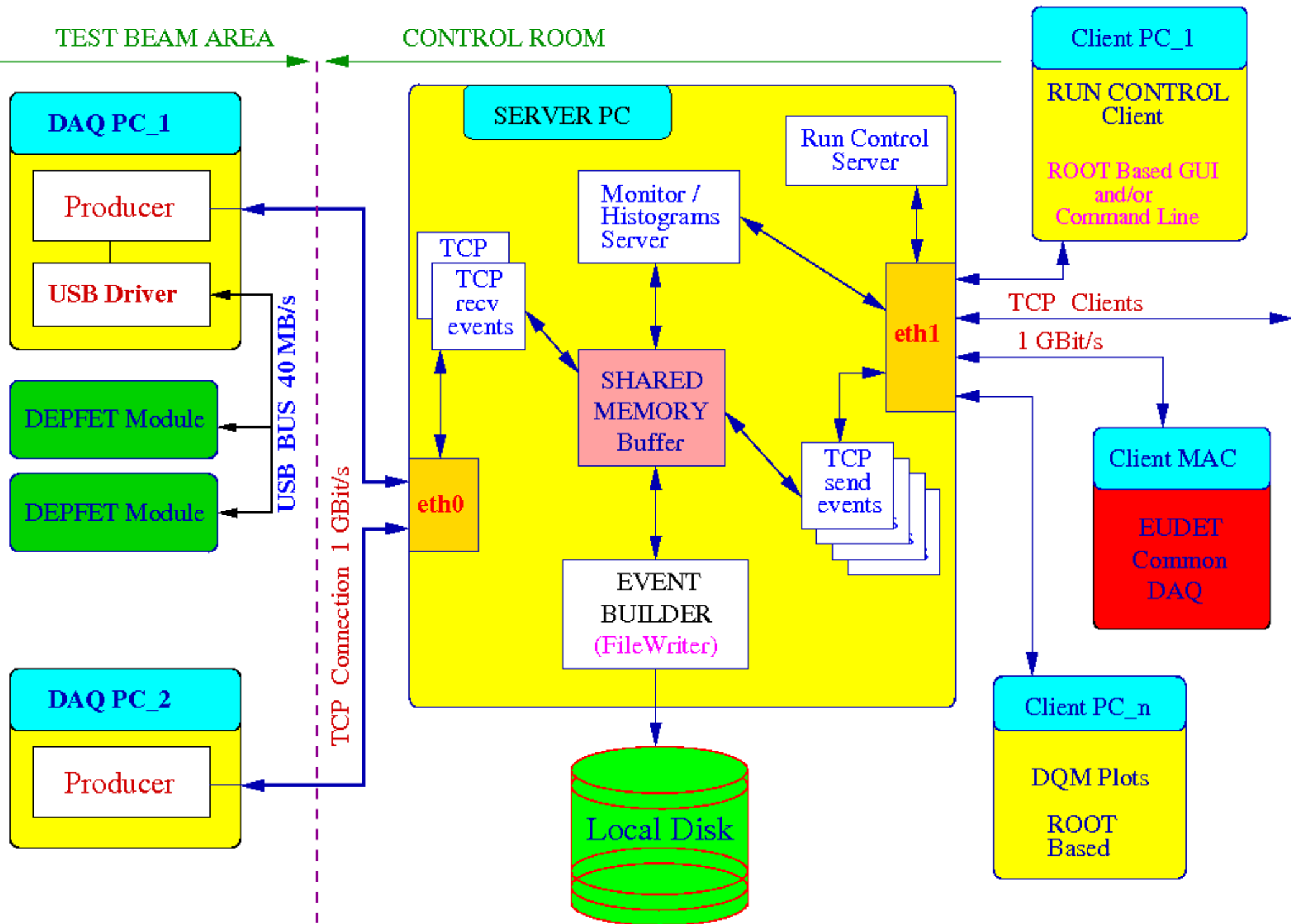
Power supplies for one module during the test beam 2008



Power supplies for one module during the test beam 2009



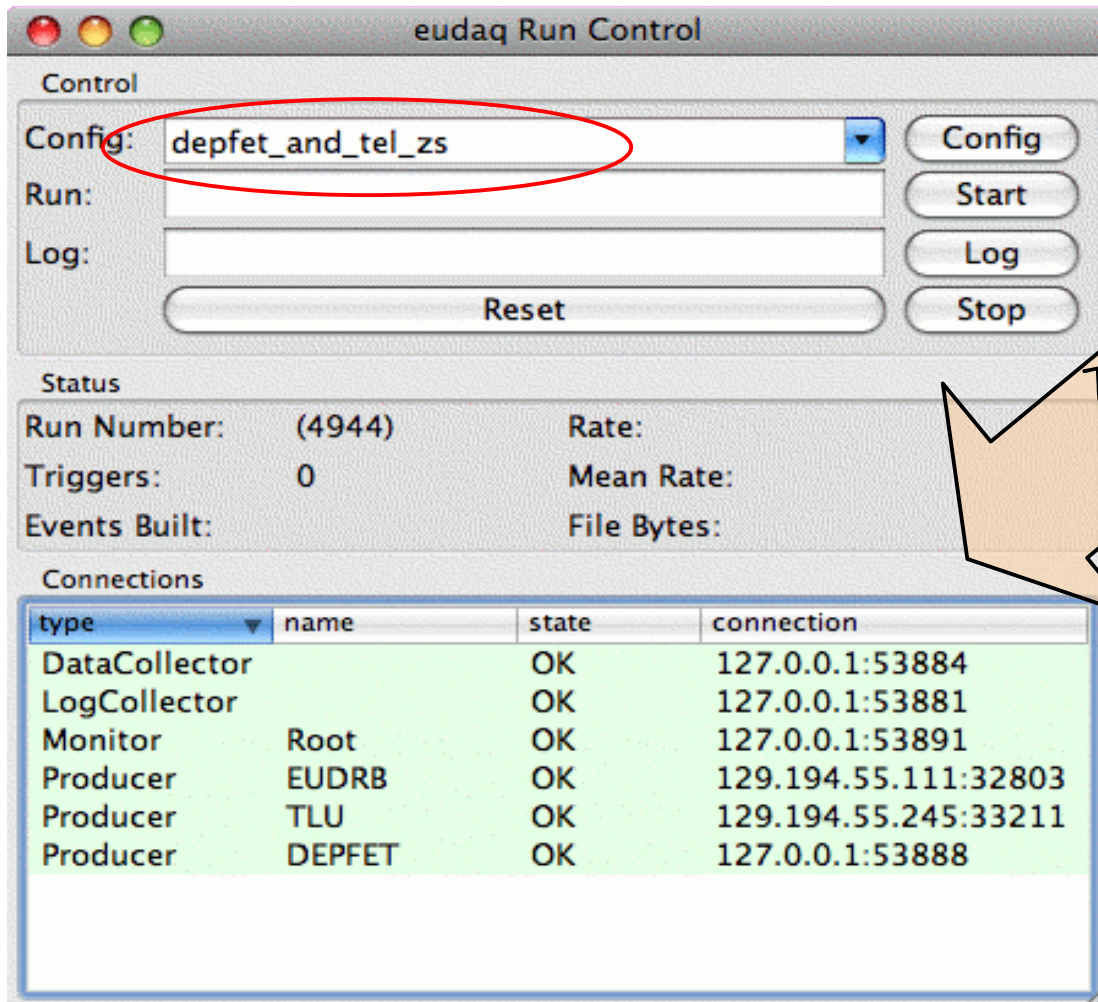
DEPFET DAQ, LINUX version.



DEPFET & EUDET: Run Control

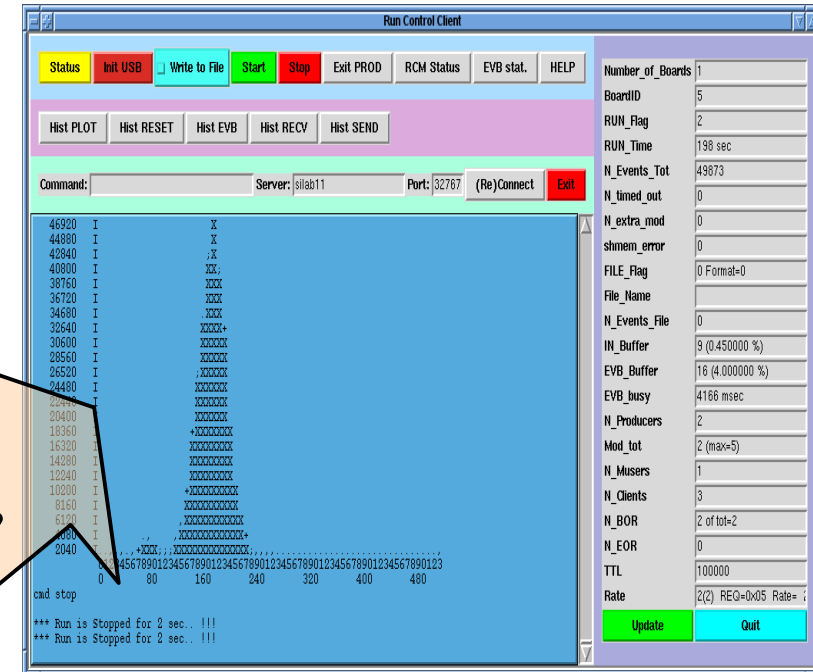
EUDET Run Control

DEPFET Run Control



The screenshot shows the 'eudaq Run Control' window. The 'Control' section has a 'Config' dropdown menu with 'depfet_and_tel_zs' selected, circled in red. Other buttons include 'Config', 'Start', 'Log', 'Reset', and 'Stop'. The 'Status' section displays 'Run Number: (4944)', 'Rate:', 'Triggers: 0', 'Mean Rate:', 'Events Built:', and 'File Bytes:'. The 'Connections' section contains a table with columns 'type', 'name', 'state', and 'connection'.

type	name	state	connection
DataCollector		OK	127.0.0.1:53884
LogCollector		OK	127.0.0.1:53881
Monitor	Root	OK	127.0.0.1:53891
Producer	EUDB	OK	129.194.55.111:32803
Producer	TLU	OK	129.194.55.245:33211
Producer	DEPFET	OK	127.0.0.1:53888

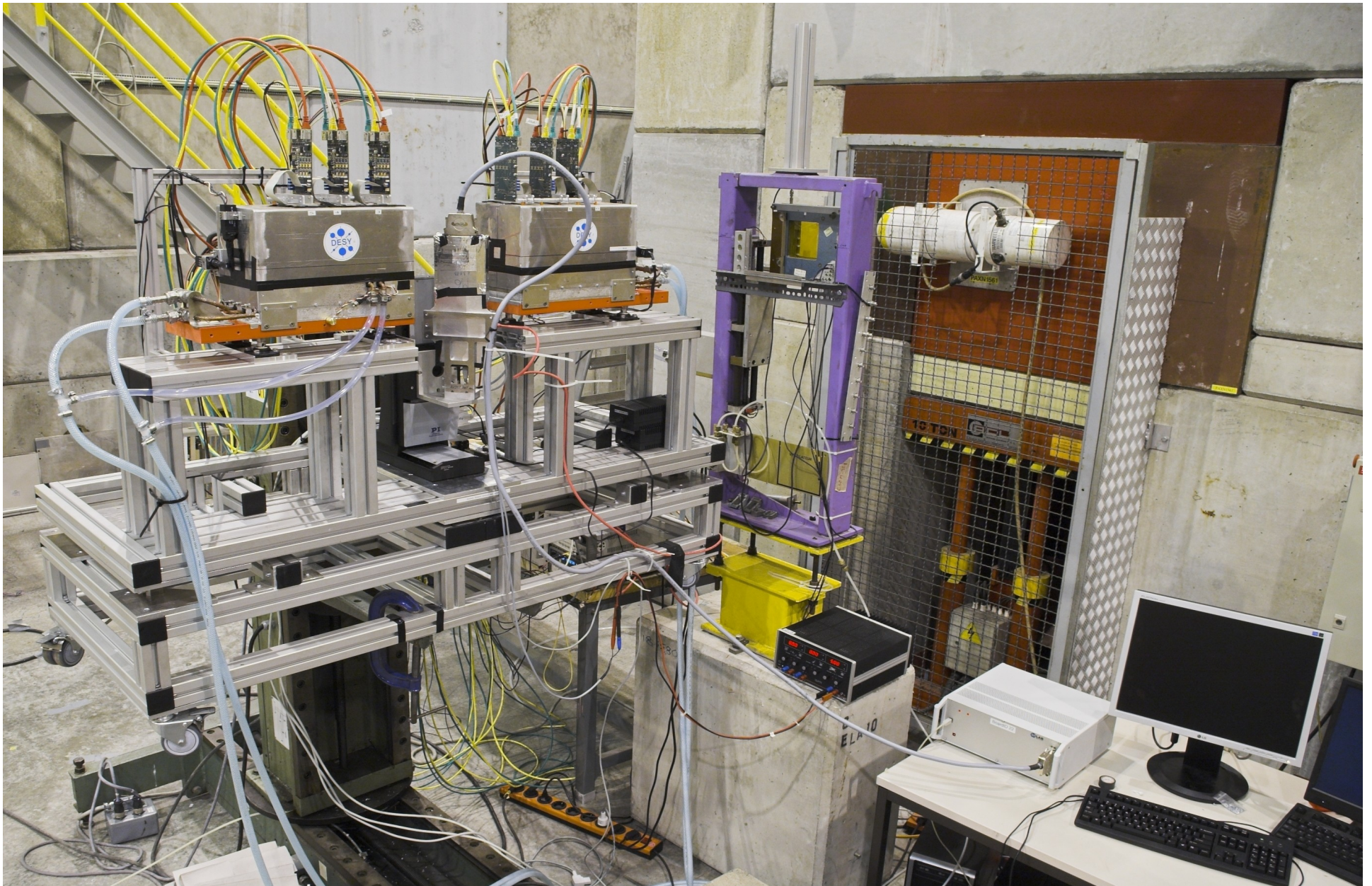


The screenshot shows the 'Run Control Client' window. It features a toolbar with buttons for 'Status', 'Init USB', 'Write to File', 'Start', 'Stop', 'Exit PROD', 'RCM Status', 'EVB stat.', and 'HELP'. Below the toolbar are 'Hist PLOT', 'Hist RESET', 'Hist EVB', 'Hist RECV', and 'Hist SEND' buttons. The 'Command:' field is empty, and the 'Server:' field is 'silab11'. The 'Port:' field is '32767'. The main area displays a list of data points with columns for time and status. The right sidebar shows various statistics like 'Number_of_Boards', 'BoardID', 'RUN_Flag', 'RUN_Time', 'N_Events_Tot', etc.

TCP/IP

cmd init
cmd start
cmd stop

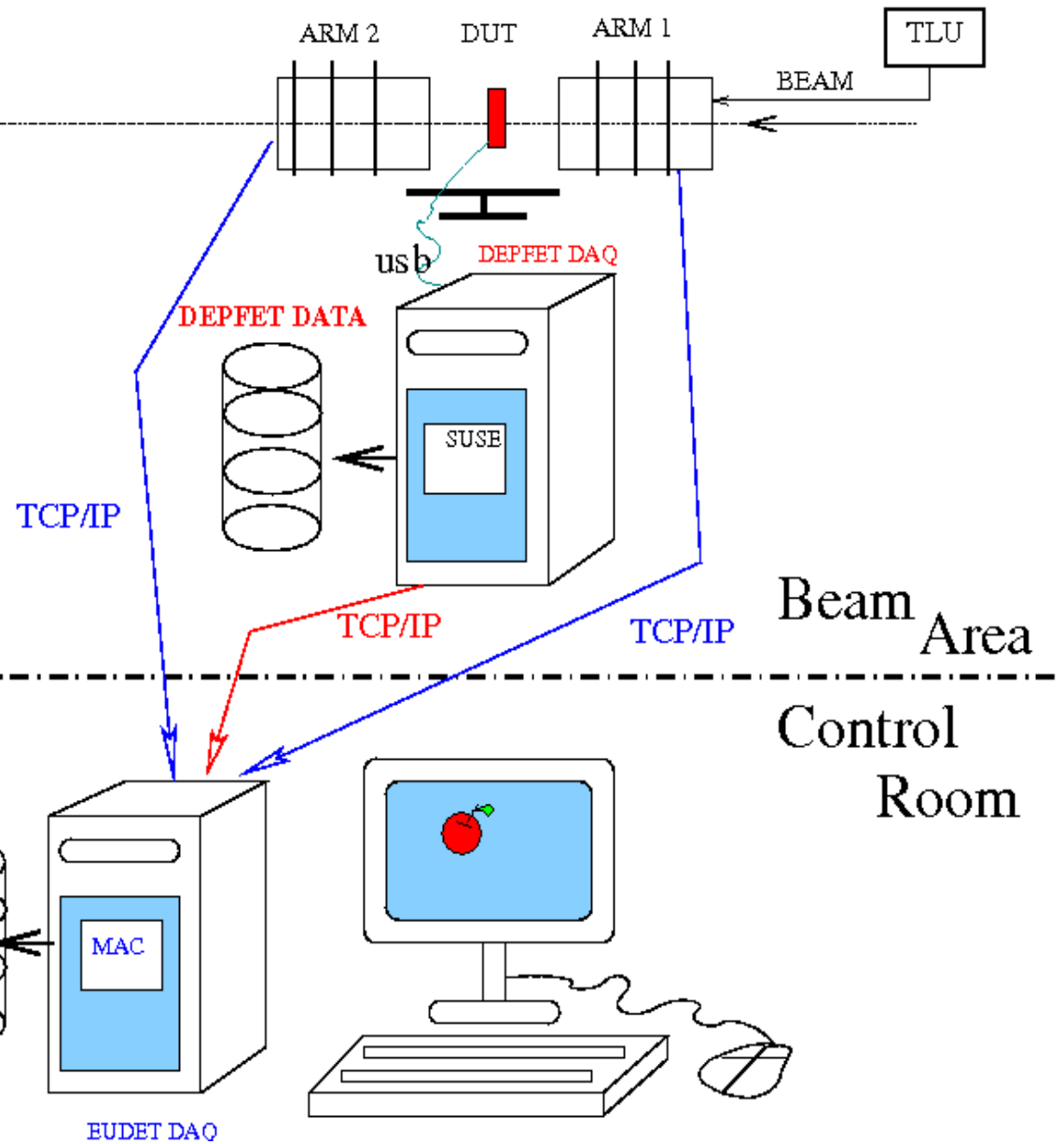
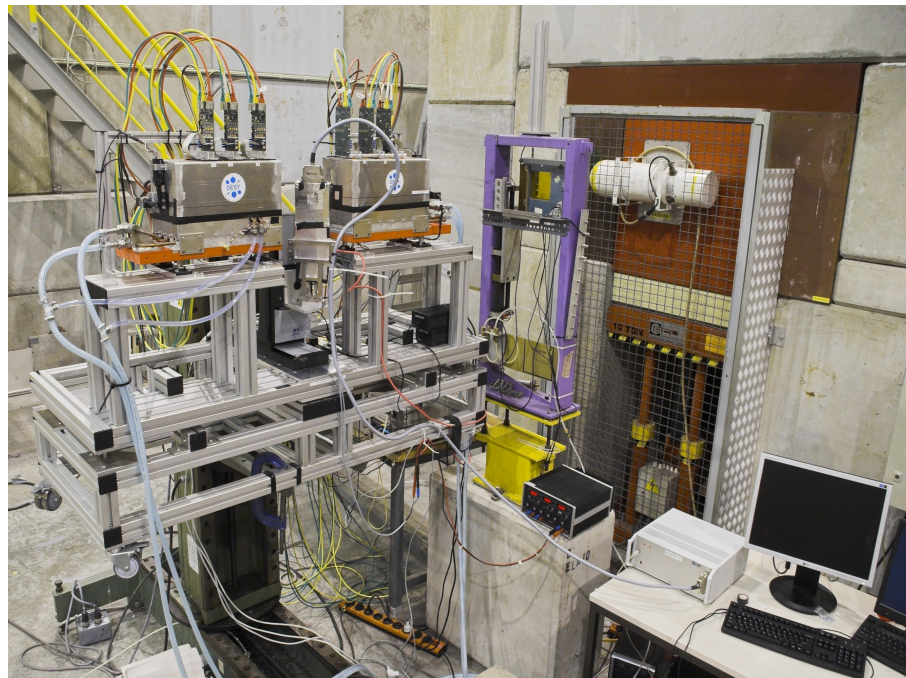
DEPFET & EUDET: Test beam Setup



19-21 Oct 2009, Julia Furltova

EUDET Meeting, Geneva

DEPFET & EUDET: Test beam Setup



Test beam 2009

6 Aug. - 12 Aug. SPS - H6 B EUDET/DEPFET (extended: 3-12 Aug - Many Thanks!!!)

1	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu
7	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13
d	Jul	Jul	Wk29	Jul	Jul	Jul	Jul	Jul	Jul	Wk30	Jul	Jul	Jul	Jul	Aug	Aug	Wk31	Aug	Aug	Aug	Aug	Aug	Aug	Wk32	Aug	Aug	Aug
																							8			8	
																							BIG MD				
CMS-HCAL								8h Z Fodor				NA61															
								proton																			
L		8h R Wigmans				DREAM				8h I Laktineh				CALICE-RPC				COMPASS-CALC									
AS-MMEGAS						8h I Gregor				EUDET				8h M Vos				DEPFET									
kens														LCFI													
STRAW						TOTEM		8h W Scandale				UA9		ATLAS-RP													
												proton		H Wilkens													

* Test of the complete new system

* Angular scan (0, 26, 36, 41)

* Energy scan (100,80,60,40 GeV electron and 120,100,80 GeV pion beams)

Problems:

*Due to luck of the mechanics we had a possibility to move only X direction of the X-Y table and also no rotation stage.

*Problem with running TLU-2:

Trigger number was always 0. Back to "our" TLU-1 fpga version.

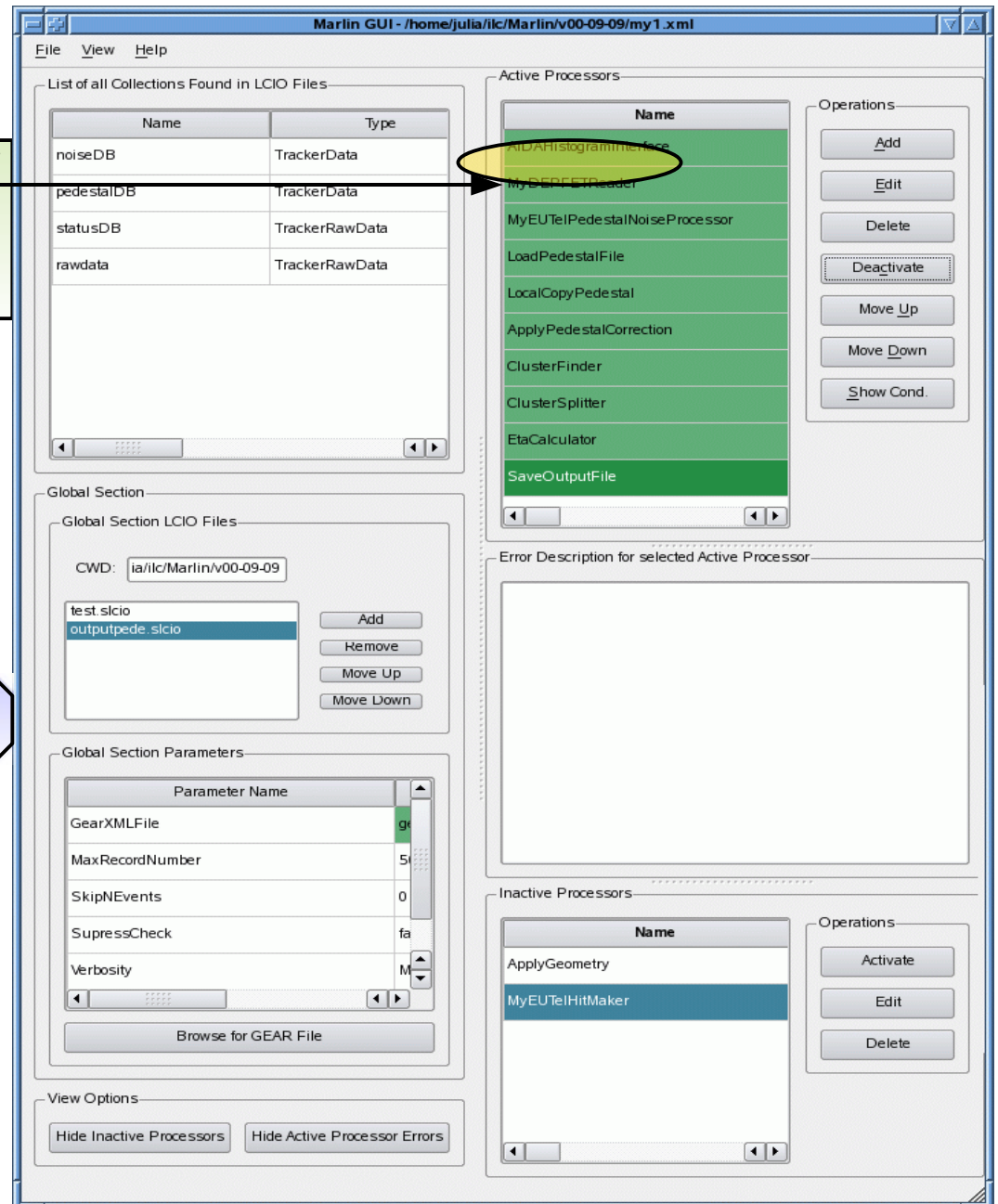
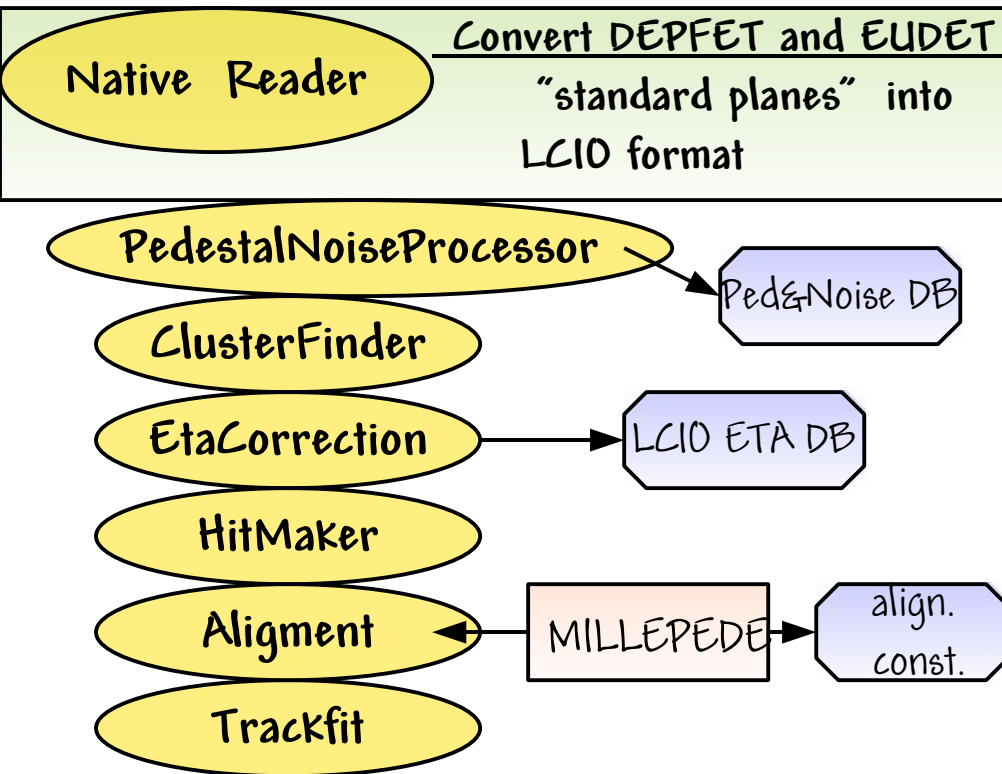
*TOO MANY changes in DAQ at the beginning of testbeam (standard planes and plugins). We have to be informed BEFORE the test beam about changes in DAQ and analysis software!

fortunately we had a 2 weeks before DEPFET/EUDET beam time!

Preparation:

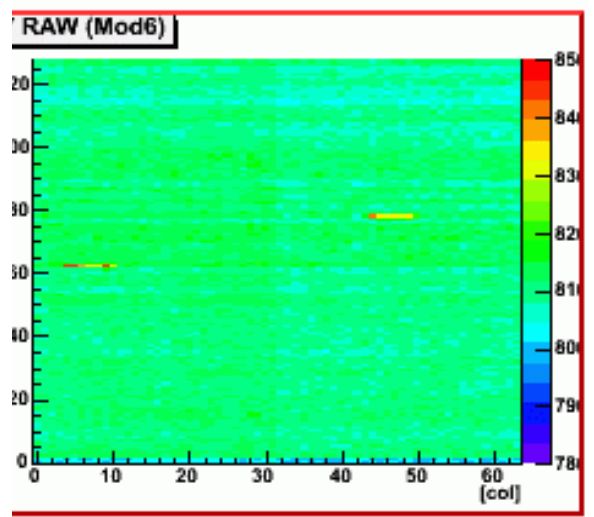
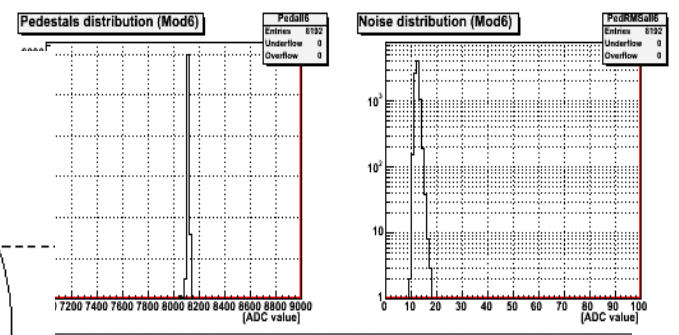
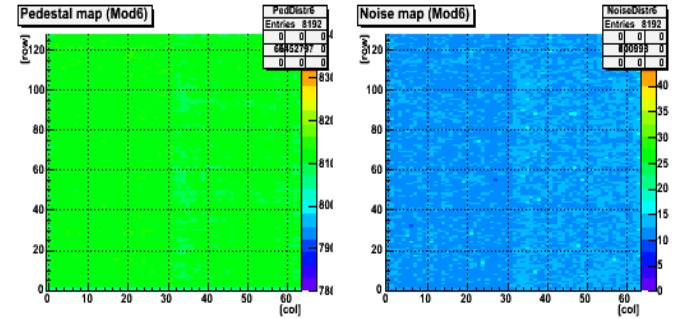
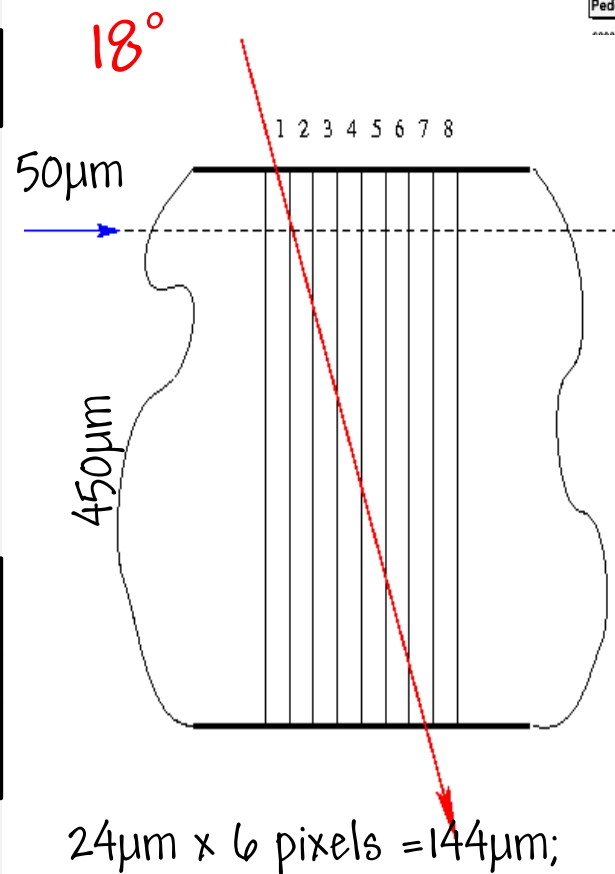
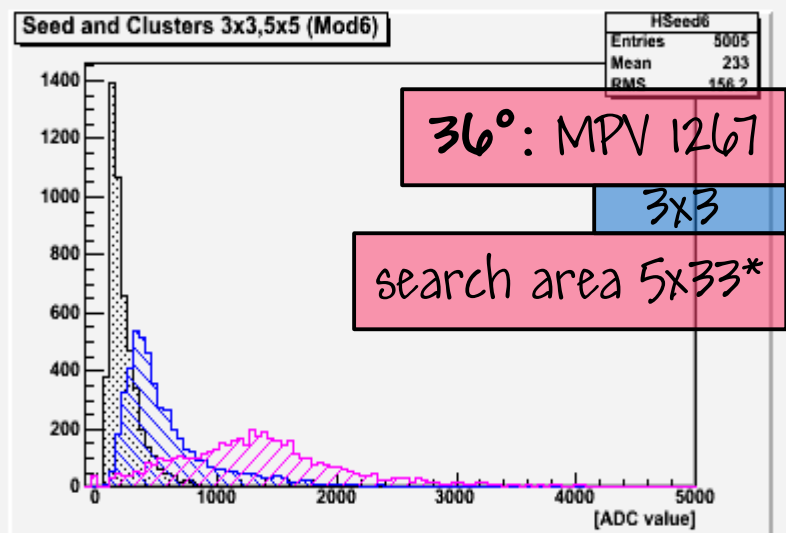
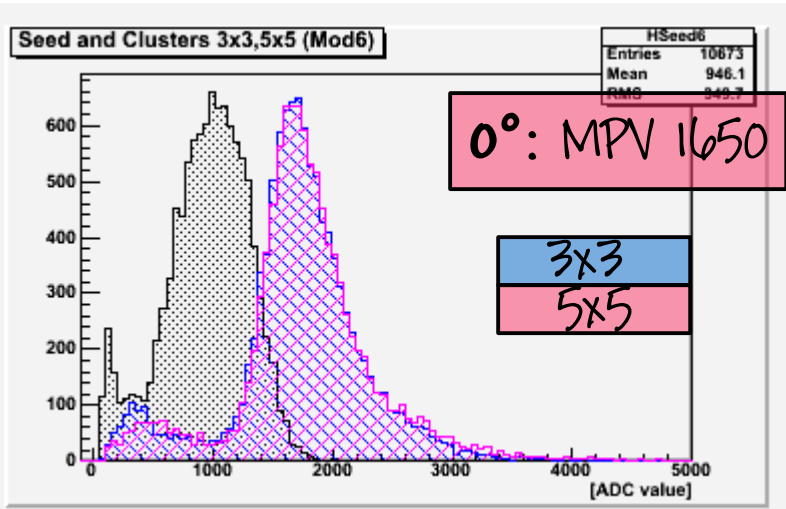
- * change of the **data format** (TCP/IP) due to larger DEPFET sensor
- * **DEPFETConverterPlugin.cc** :
 - > decode RAW DEPFET data
 - > convert DEPFET into the "standard plane"
 - > convert DEPFET data to LCIO format
- * **online Monitor** has been upgraded for the use of larger DEPFET sensor
(many thanks to Emlyn and Joerg for help!!!)

ILC software for DEPFET analysis

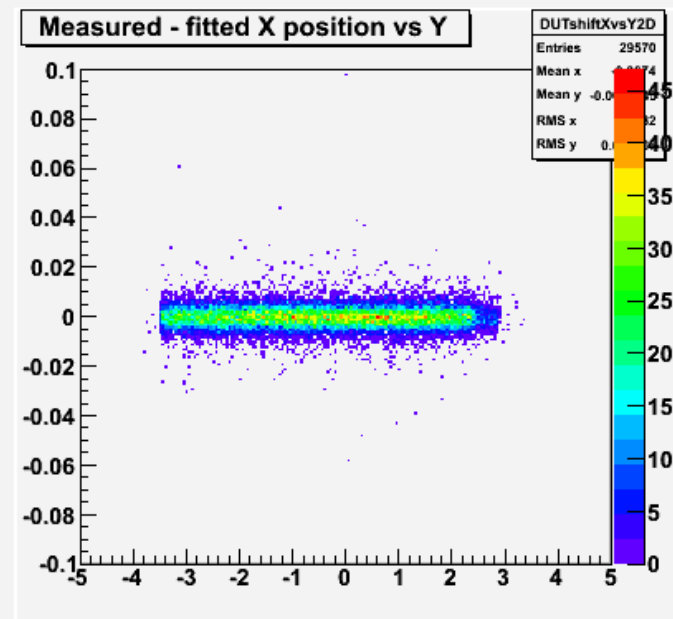
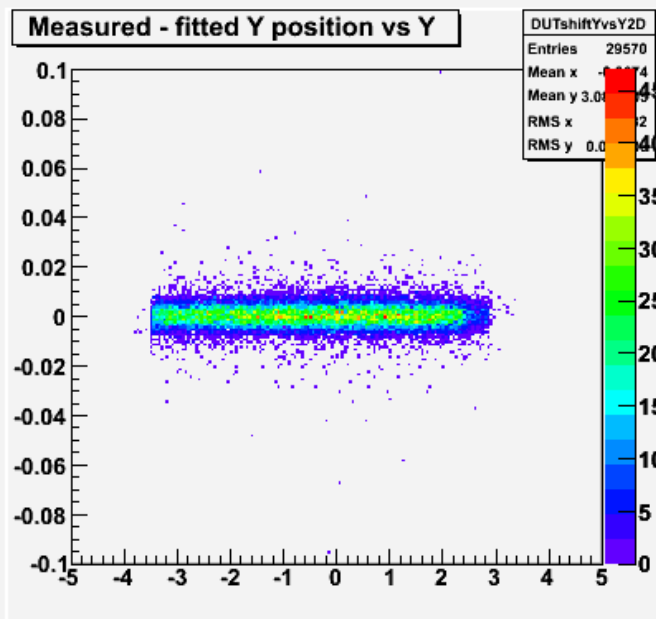
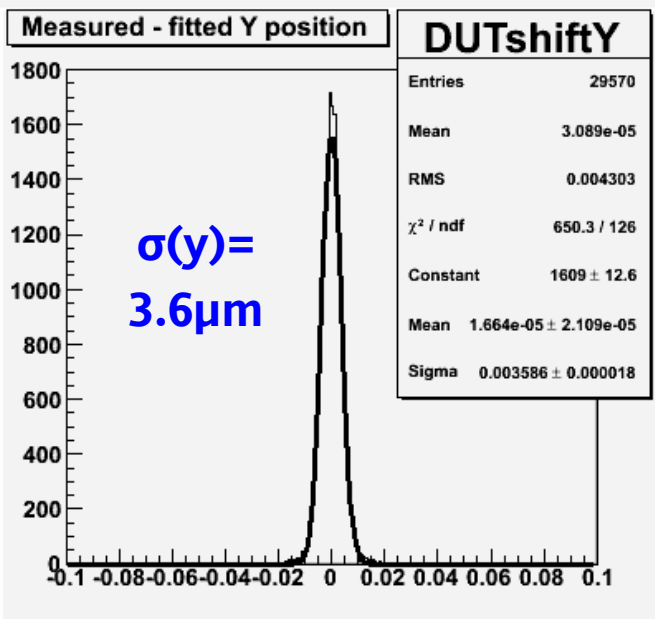
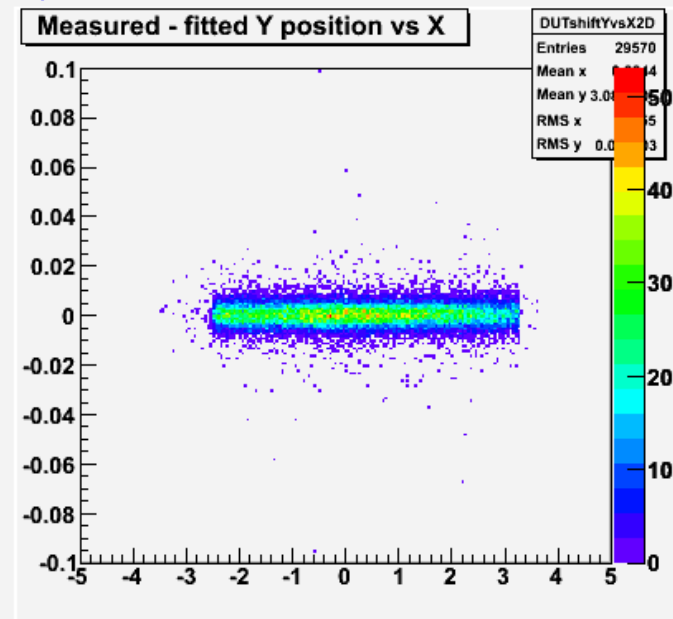
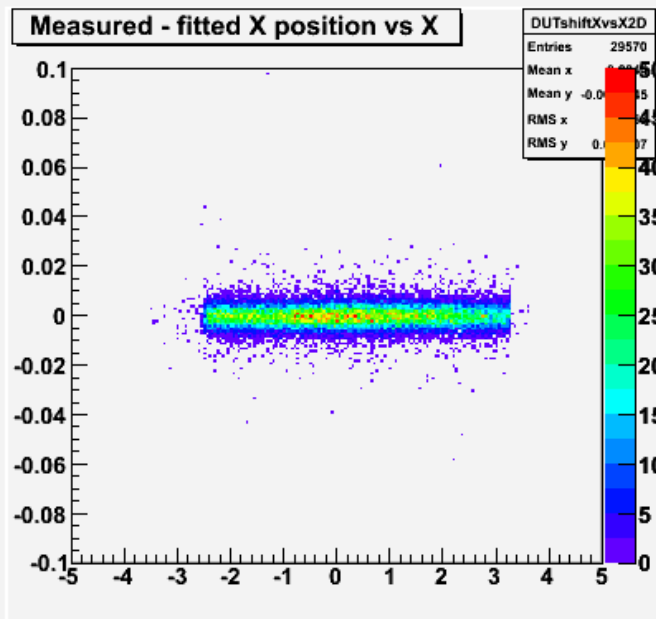
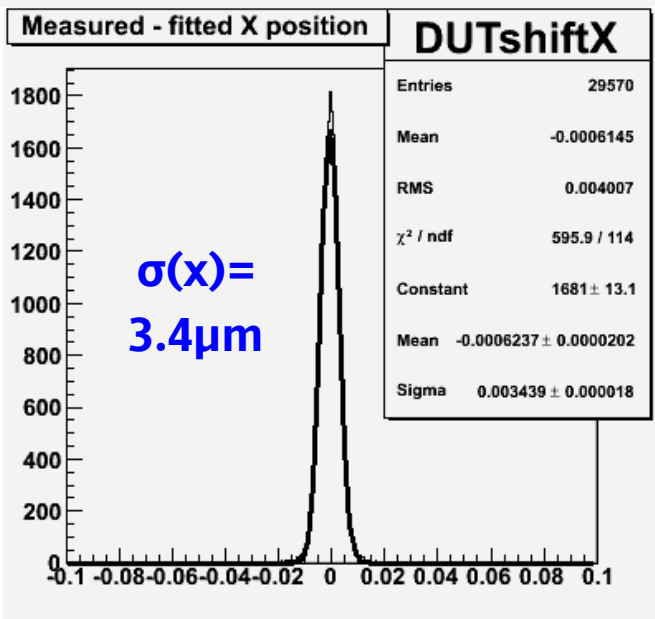


DEPFET DUT (preliminary results)

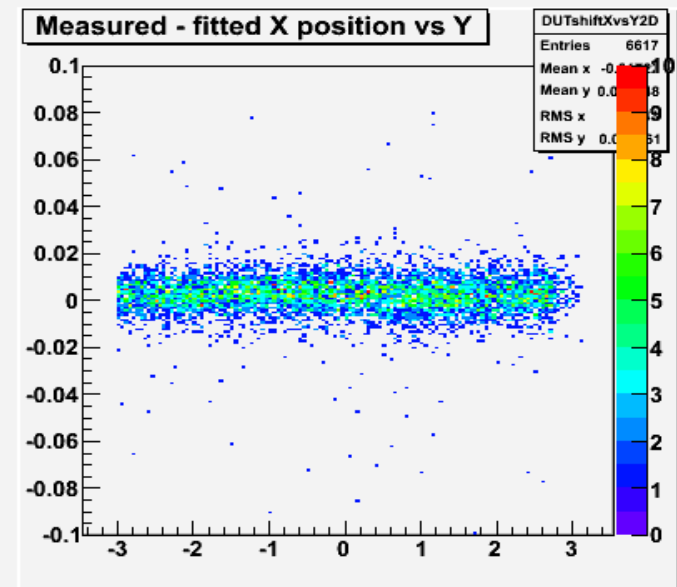
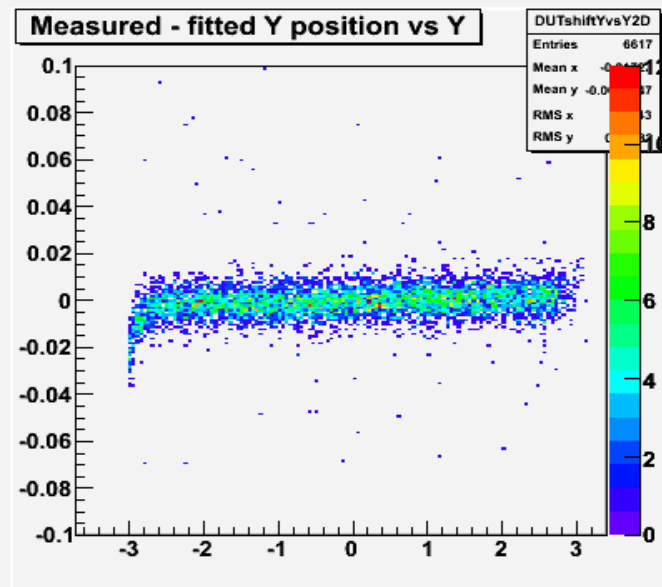
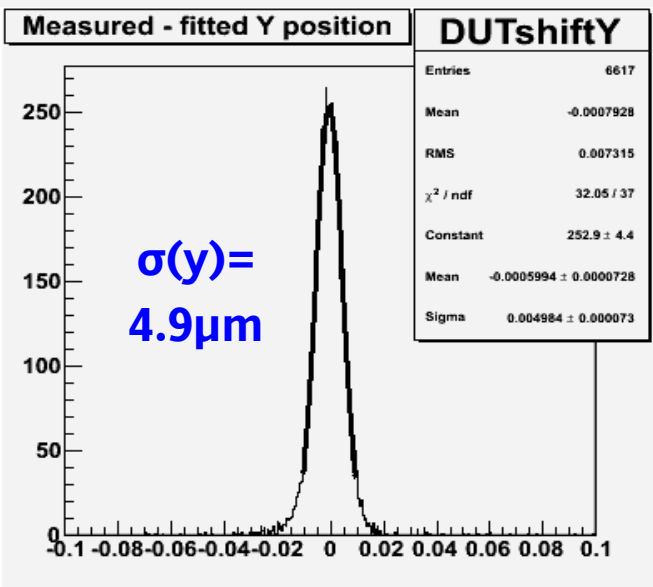
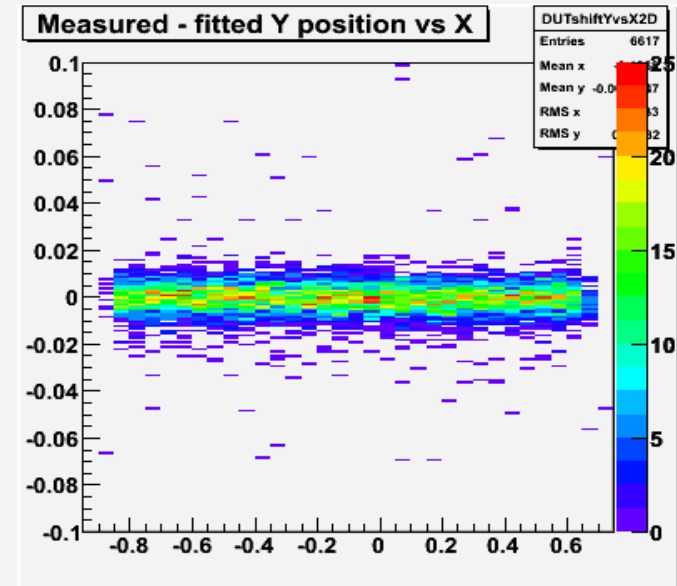
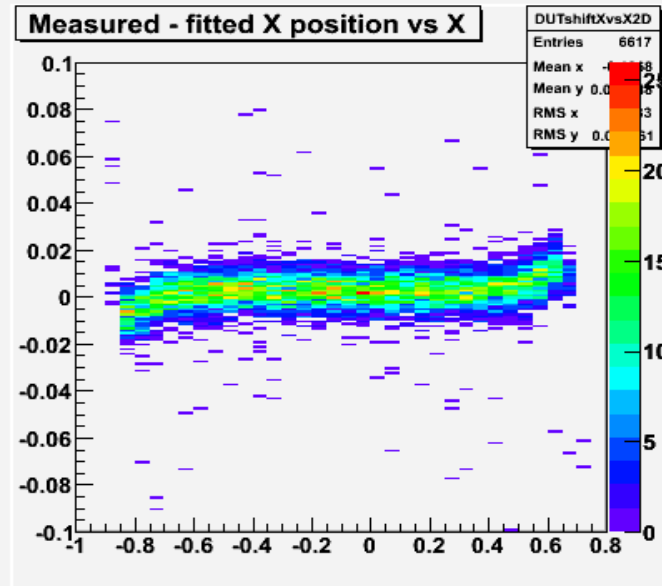
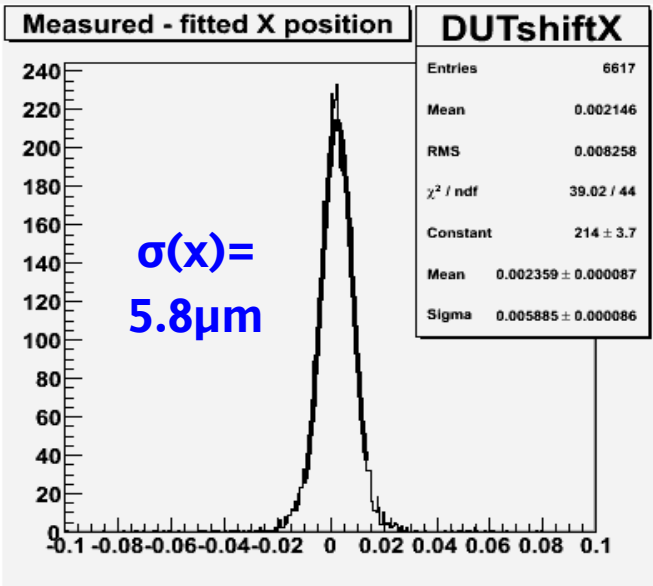
- DEPFET Matrix **64x256** (pitch $24 \times 24 \mu\text{m}^2$)
- Noise ~ 14.5 ADC units. Cluster signal ~ 1800 ADC units.
- S/N ~ 120



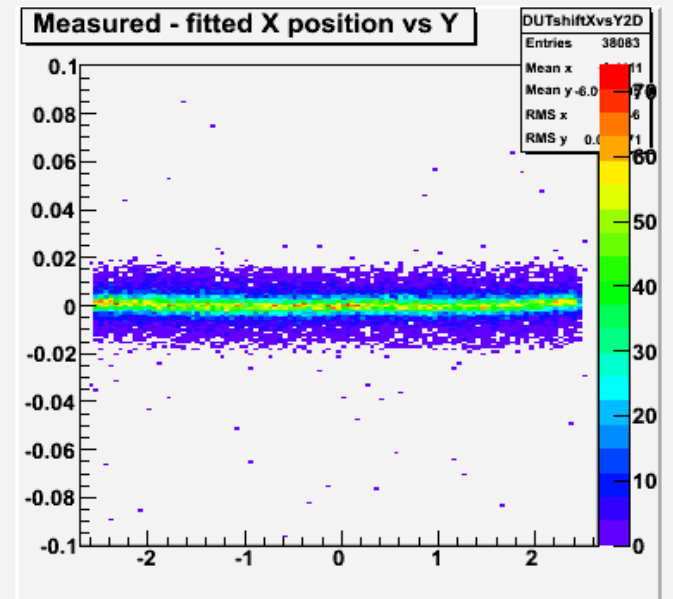
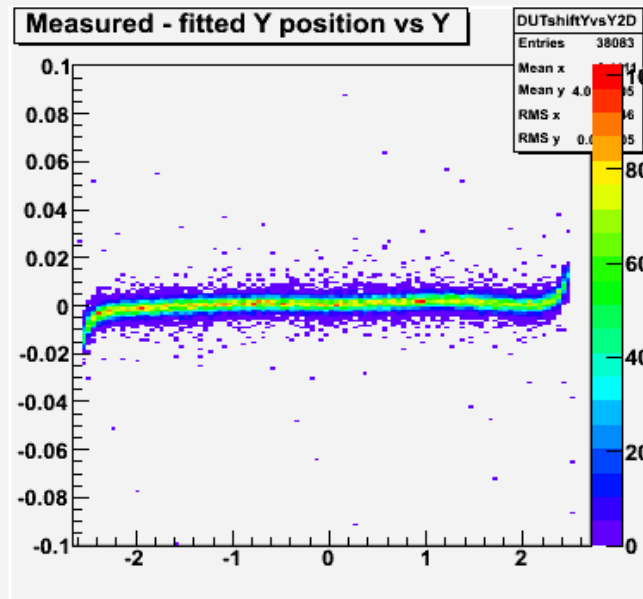
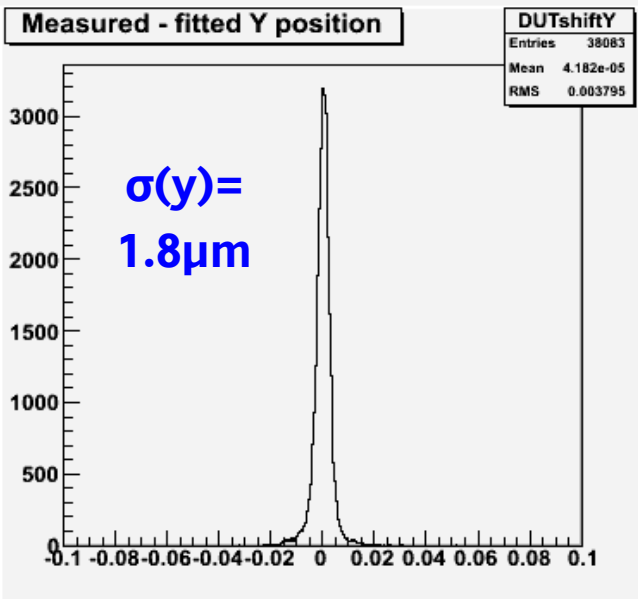
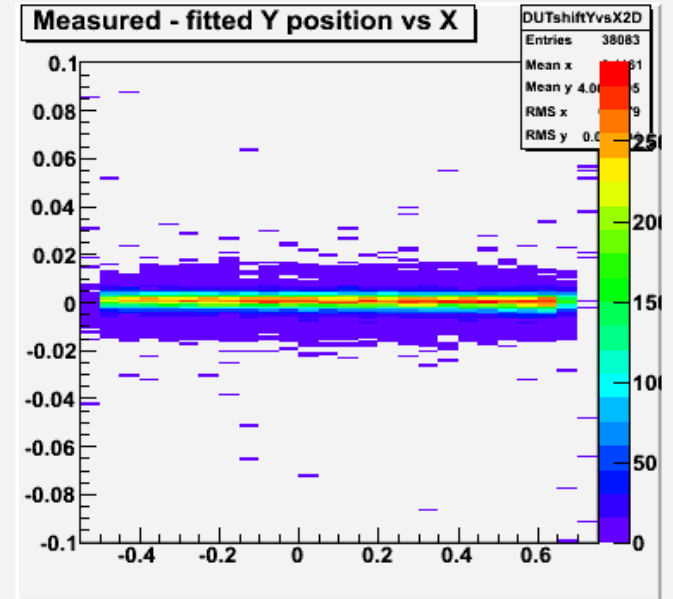
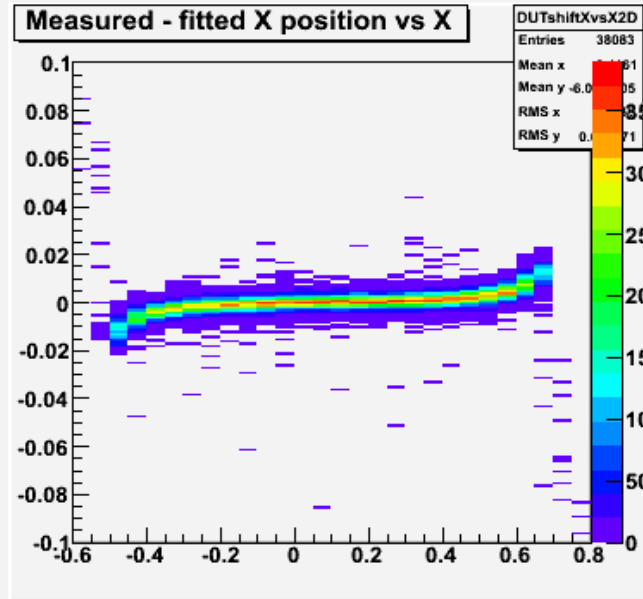
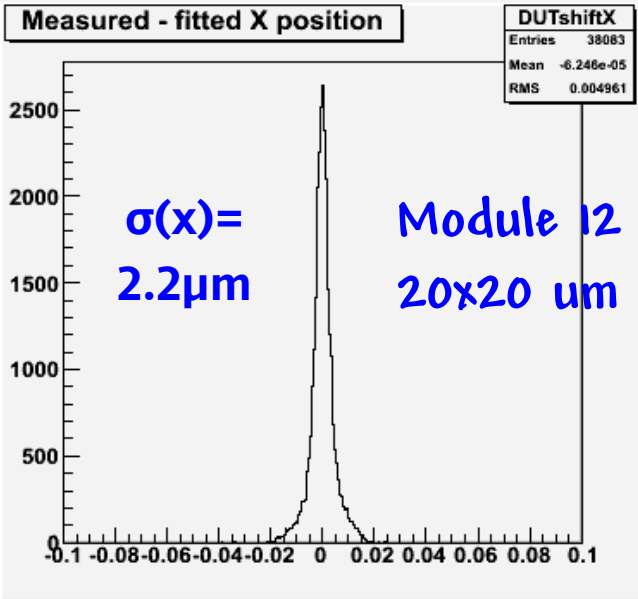
EUDET plane #3 as a DUT (Residual) in EUDET Telescope



DEPFET DUT Residual(24x24 um) using EUDET telescope



DEPFET Telescope standalone



Conclusions

- DAQ integration to EUDET Telescope system (via RunControl, DQM, DATA merging on a DAQ and offline level) for the S3B are **done**.
- Eutelescope software has been upgraded for the use of S3B system
- Analysis are ongoing...

Thanks to everybody
who took part in this test beam!