

Development of a System for Characterisation for a new DEPFET Device

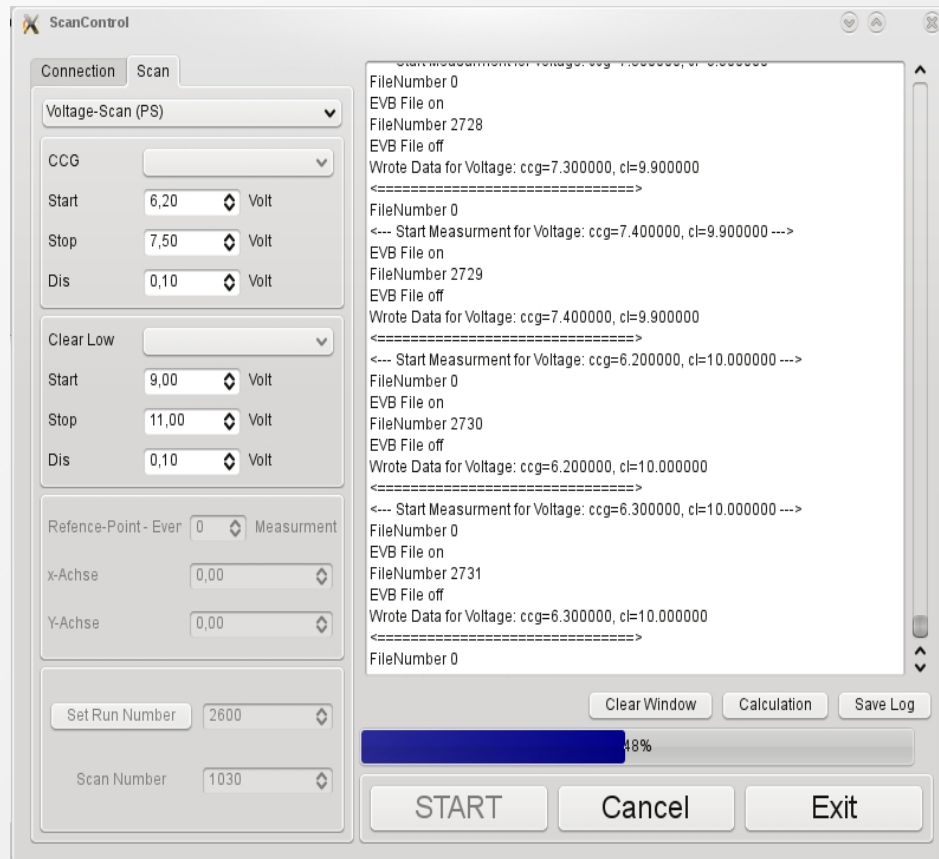
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Barcelona, 7/8 October 2009

Motivation

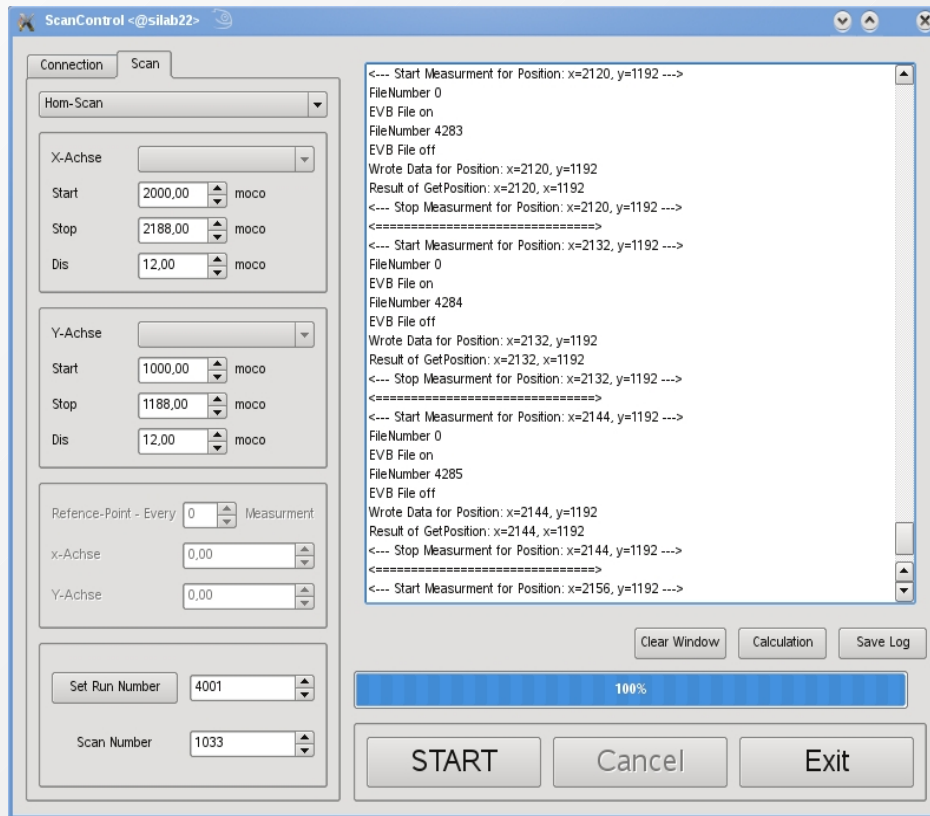
- Repeated characterisation of DEPFET devices requires a system for automatic control and data processing :
 - Voltage control for parameter optimisation (mainly Clear_Low/High, CCG) with ^{241}Am -source.
 - Position control for laser measurements, homogeneity scan of whole matrix (gain variations)
 - DAQ control for synchronous data taking

Parameter-Scan



Voltage-Scan:
Clear_Low and CCG
4V range
at a precision of 0.25 V
~ 256 Runs needed
at a precision of 0.1 V
more than 1000 Runs
needed

Homogeneity-Scan



- Area-Scan:
at a precision of 72 μm a
scan of whole matrix
would need ~ 2000 Runs
(~1500 Events/Run)

The screenshot shows the 'DPS/Lab Supply' software interface. At the top, there are menu options: 'File', 'ReadLog', and 'Help'. Below the menu, there are fields for 'Host' (localhost), 'Port' (32766), 'Linux ID:', 'Supply ID:' (18), and 'Status PowerSupply:' (On). A 'Loaded File' field shows a path: '/home/simone/3B_config_base...'. The main area displays a list of power supply channels, each with a name, a voltage value, a current value, and a status indicator (a red or blue circle). The channels are numbered 1 through 23. An inset image in the bottom left corner shows a physical power supply unit with a probe connected to it.

Channel	Source	Voltage (V)	Current (mA)	Status
(1) Source	7.00	07.00 V	013.9 mA	Red
(1) Bulk	16.00	16.01 V	000.1 mA	Blue
(1) CCO	7.30	07.20 V	000.0 mA	Red
(8) Gate_on GS_GND	1.90	01.90 V	000.1 mA	Red
(7) Gate_off GSw 9	9.60	09.60 V	-000.5 mA	Blue
(9) Clear_low CS_GND	9.90	09.90 V	000.0 mA	Blue
(3) Clear_high CSw 9	10.20	10.20 V	-000.1 mA	Blue
(12) CURO A	2.50	02.52 V	082.0 mA	Red
(14) TIA-	0.80	-00.79 V	-043.6 mA	Blue
(1) CSw DVDD	3.30	03.31 V	016.3 mA	Blue
(1) CSw 3	3.40	03.40 V	000.1 mA	Blue
(2) CSw 6	6.80	06.81 V	000.0 mA	Blue
(4) GSW DVDD	3.30	03.29 V	015.4 mA	Blue
(5) GSw 3	3.20	03.20 V	-000.0 mA	Blue
(6) GSw 6	6.40	06.39 V	-000.0 mA	Blue
(7) GSW 9	5.50	05.50 V	-000.4 mA	Blue
(17) +5V	5.00	05.00 V	-001.3 mA	Blue
(23) HV	180.0	180.0 V	-003.9 mA	Blue

TCP

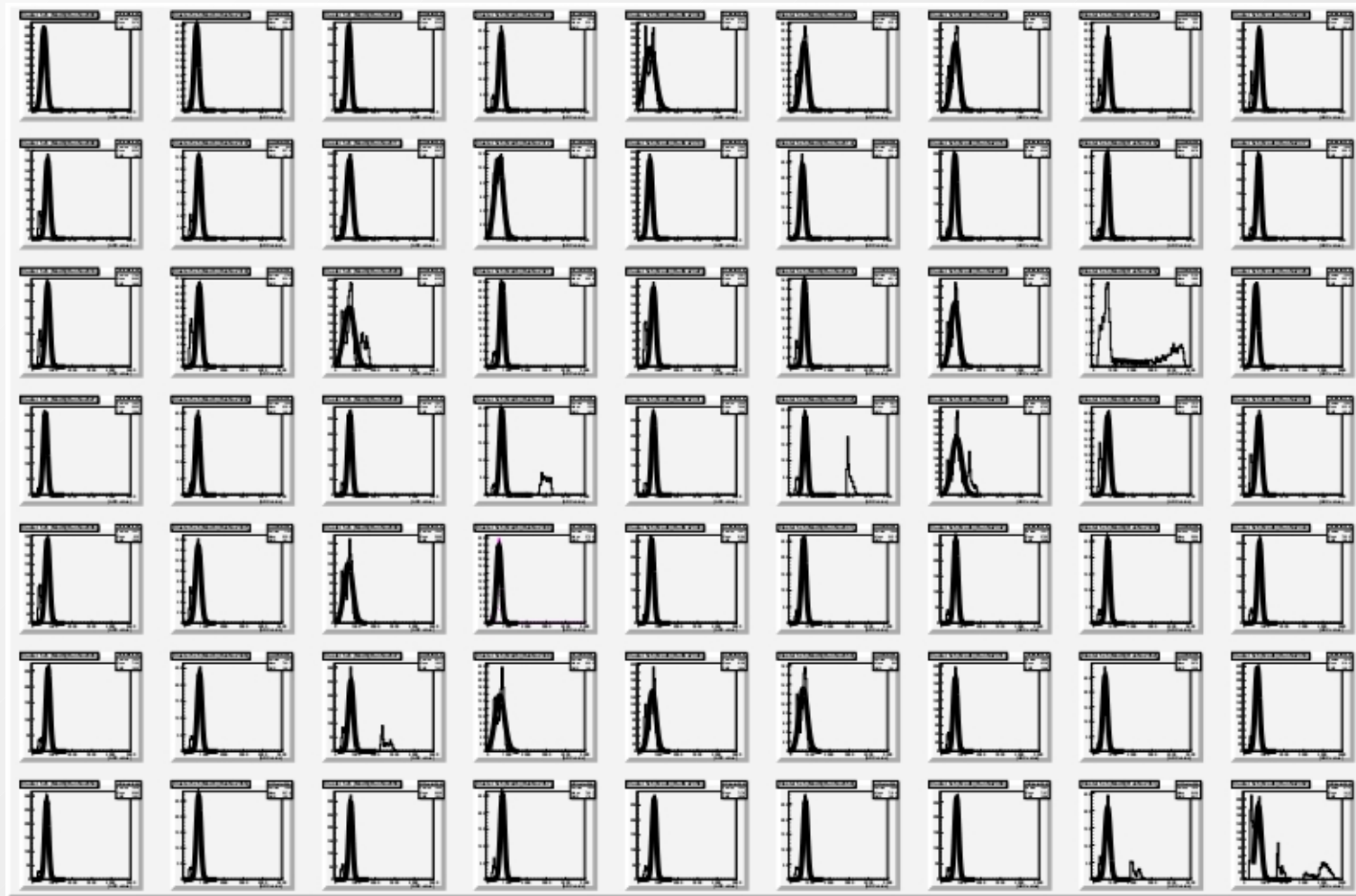
Com-Port



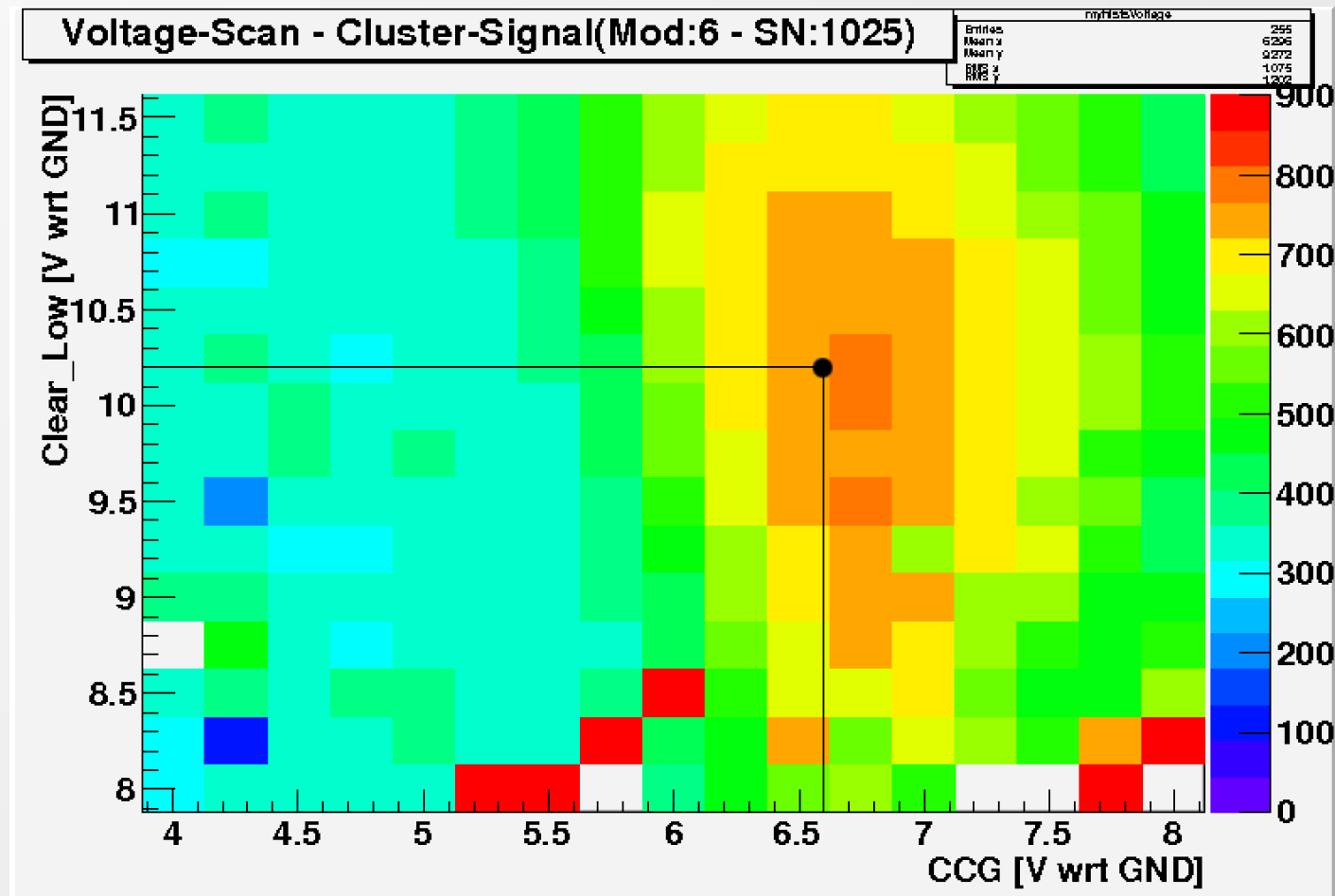
Setup for parameter-Scans



Sample of histograms for voltage-scan (^{241}Am)

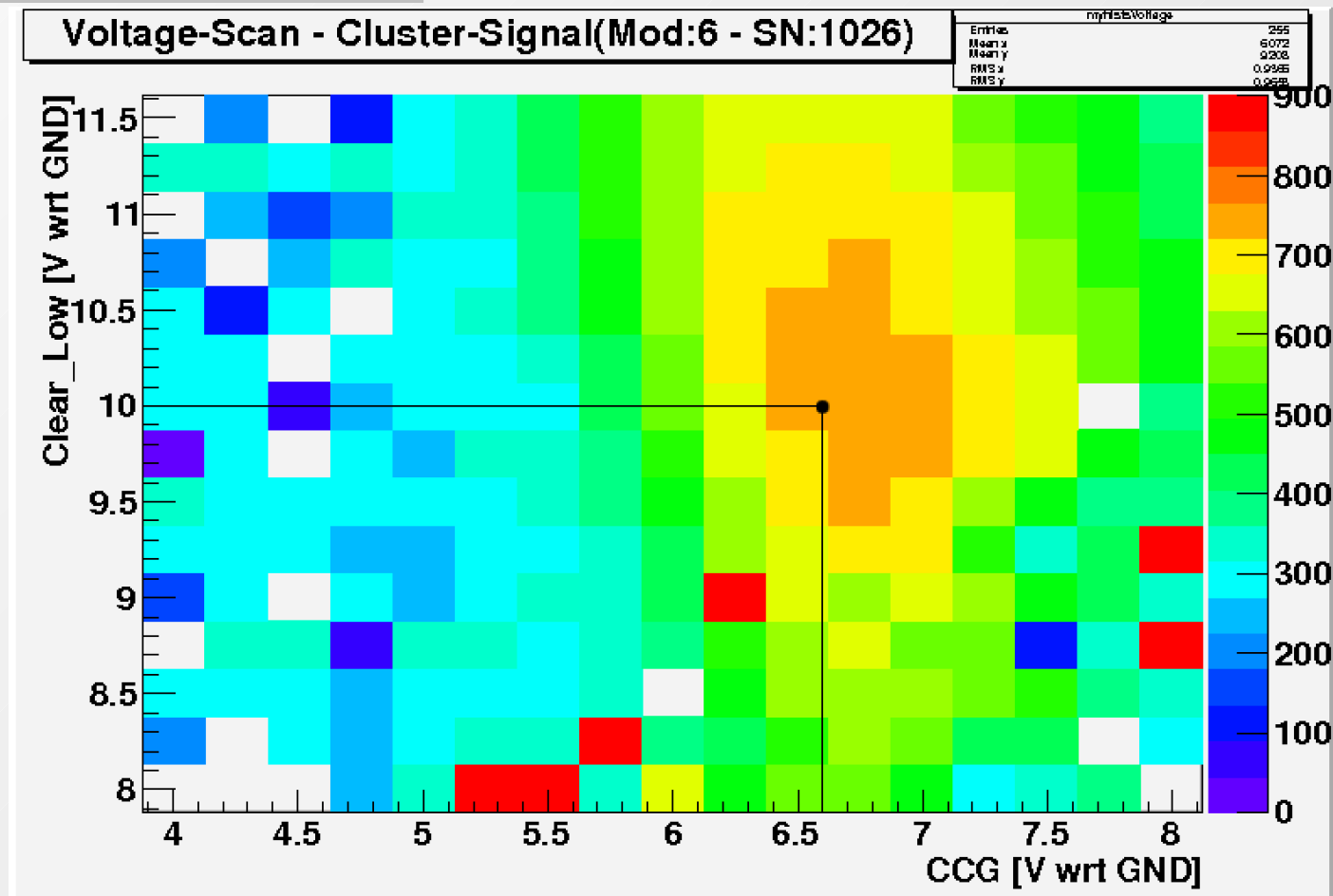


H 3.0.12 (COCG L B) - Telescope Module Parameter-Scan



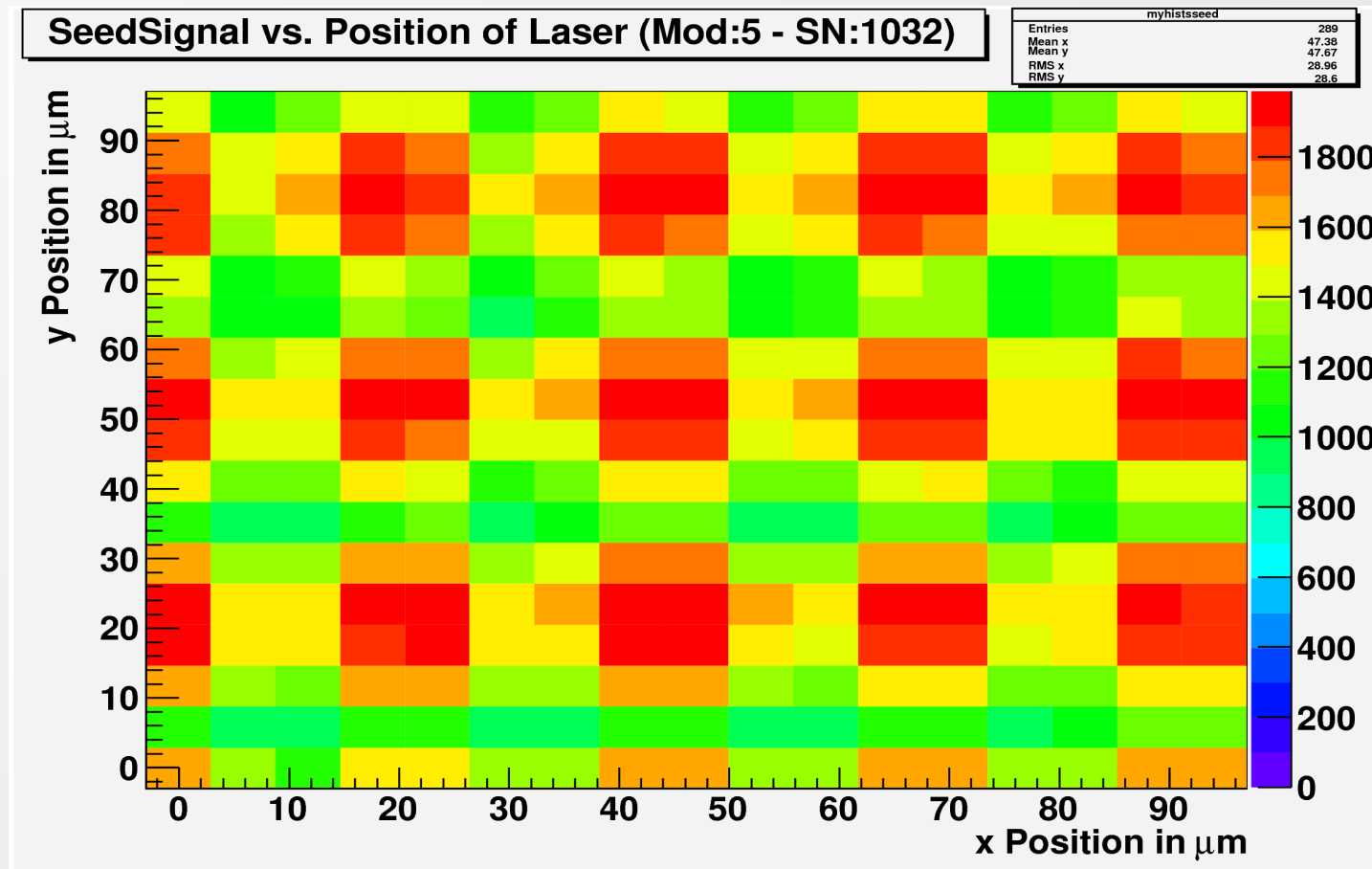
black point: Characterisation results from munich

H 3.0.11 (COCG L B) - Telescope Module Parameter-Scan



black point: Characterisation results from munich

H 3.0.12 (COCG L B) - Telescope Module Homogeneity-Scan



(Pixelsize: $24\mu\text{m} \times 32\mu\text{m}$)

Summary

- fast and automatic scans of parameters and homogeneity of the DEPFET matrices are possible now
- within 3 hours one can have optimised voltages of a matrix (depending on computer power and precision)