Status of the CERN ALIBAVA System

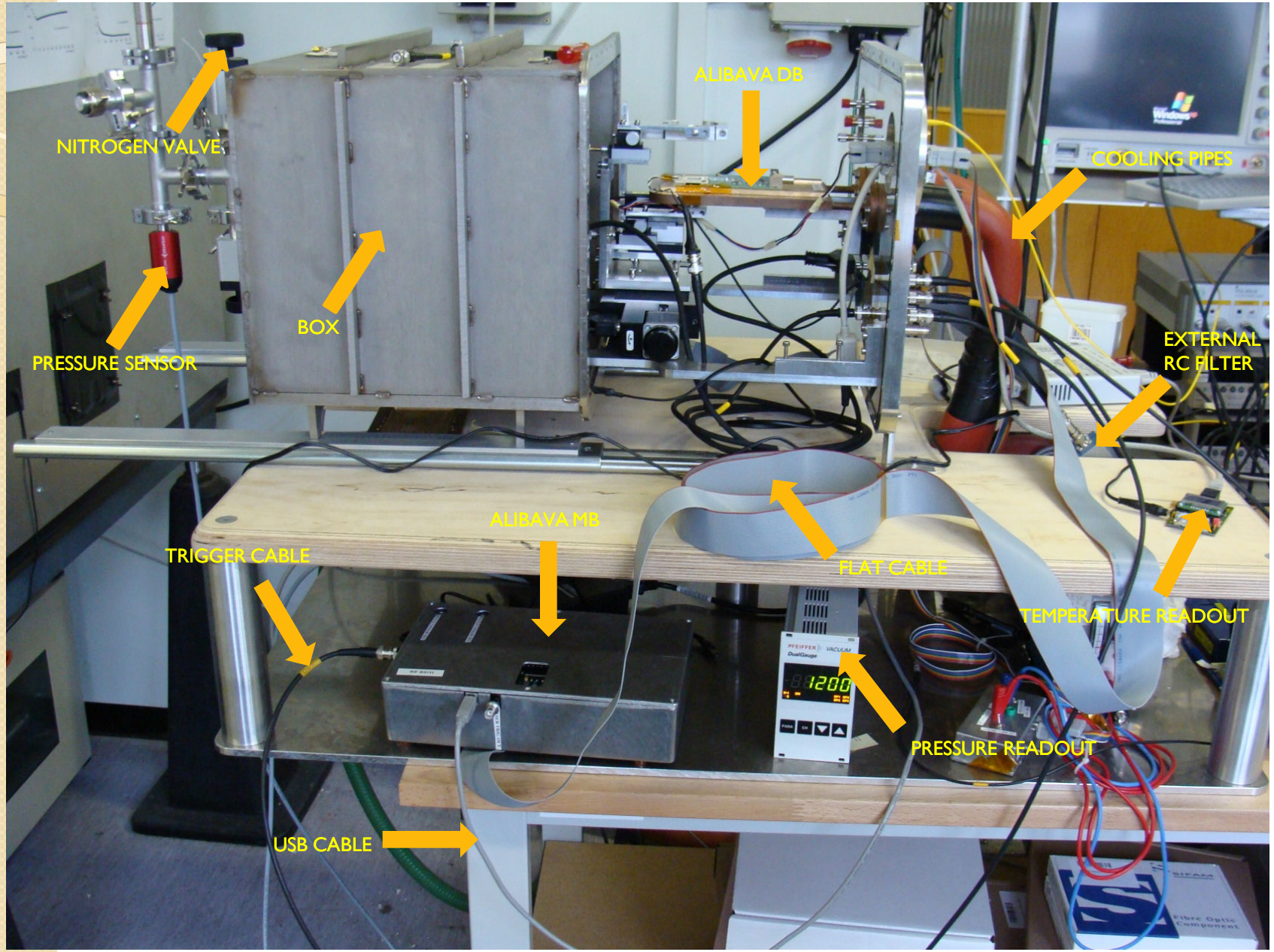
Alibava – Discussion Session
15th RD50 Workshop – Cern, 16-18 November 2009

Eduardo del Castillo Sanchez, Manuel Fahrer, Michaell Moll, Nicola Pacifico

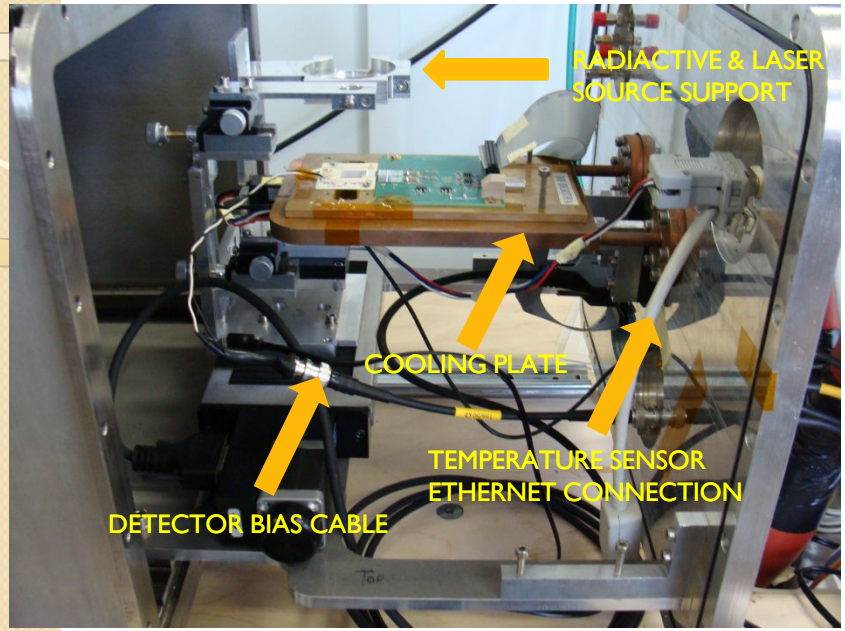
Outline

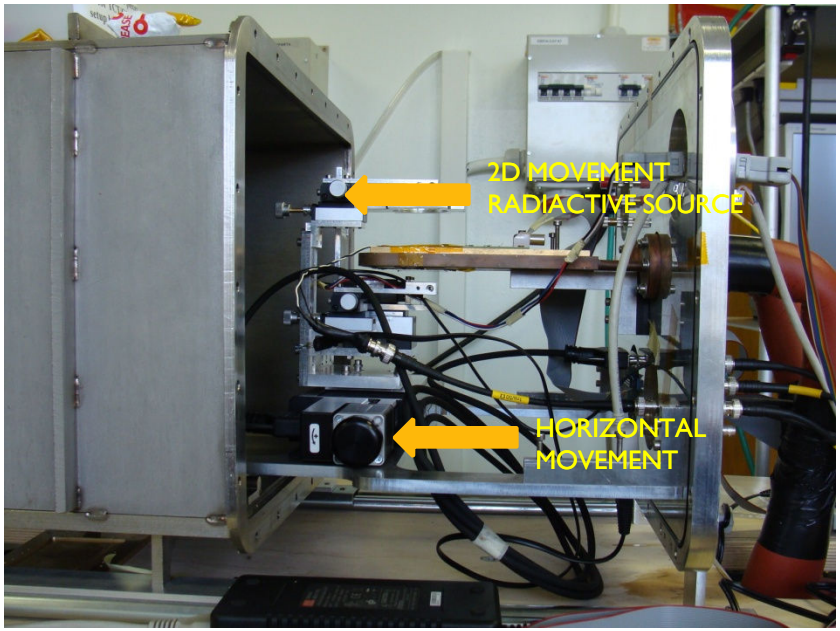
- Setup that makes use of Alibava
- Software configuration of Alibava
- Modification for bias Voltage setting
- Daughterboard failure: baseline shift
- Discussion

Setup that makes use of Alibava



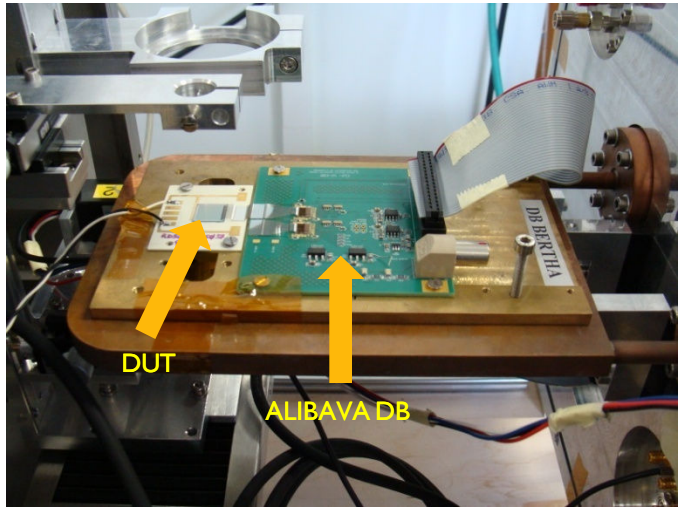
Setup that makes use of Alibava





- Laser wavelengths : 660 and 1055 nm
- Radiactive source Sr 90
- Cooling down to -20°C
- Vacuum down to 0.06 mbar

- Closed box constructed in collaboration with Universite Catholique de Louvain

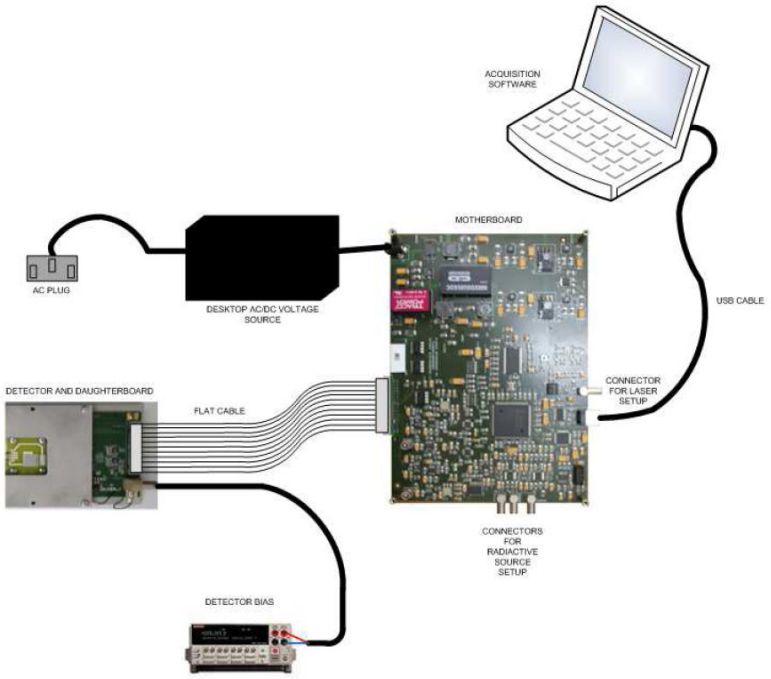


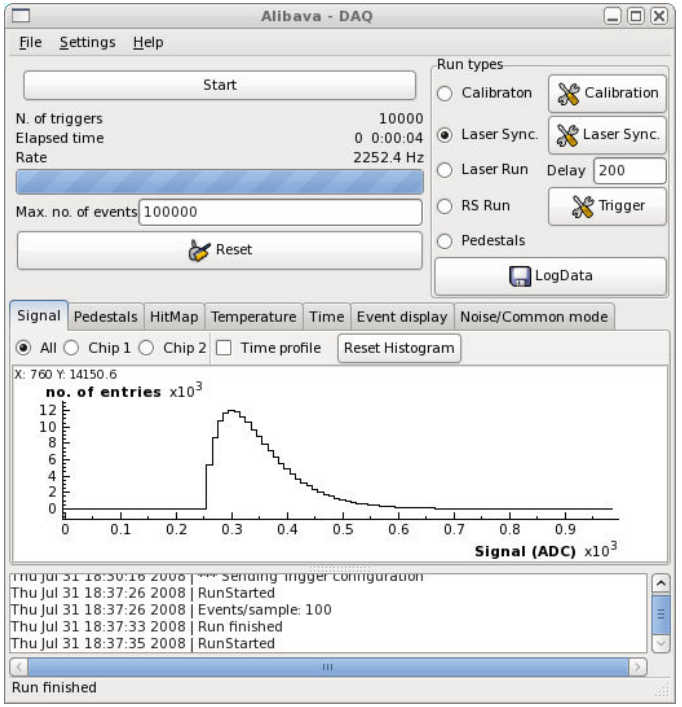
Software configuration of Alibava

- Alibava system was received at CERN ~ May
- First runs of the Alibava system were performed on a machine with SLC 5 installed.
- Stability problems were encountered i.e. communication lost between PC and Motherboard, restart required.
- The situation was improved by installing Ubuntu 9.04.
- Problems are still present: after resetting the motherboard (for daugherboard exchange) a restart of the PC is required most of the times.

Modification for bias voltage setting

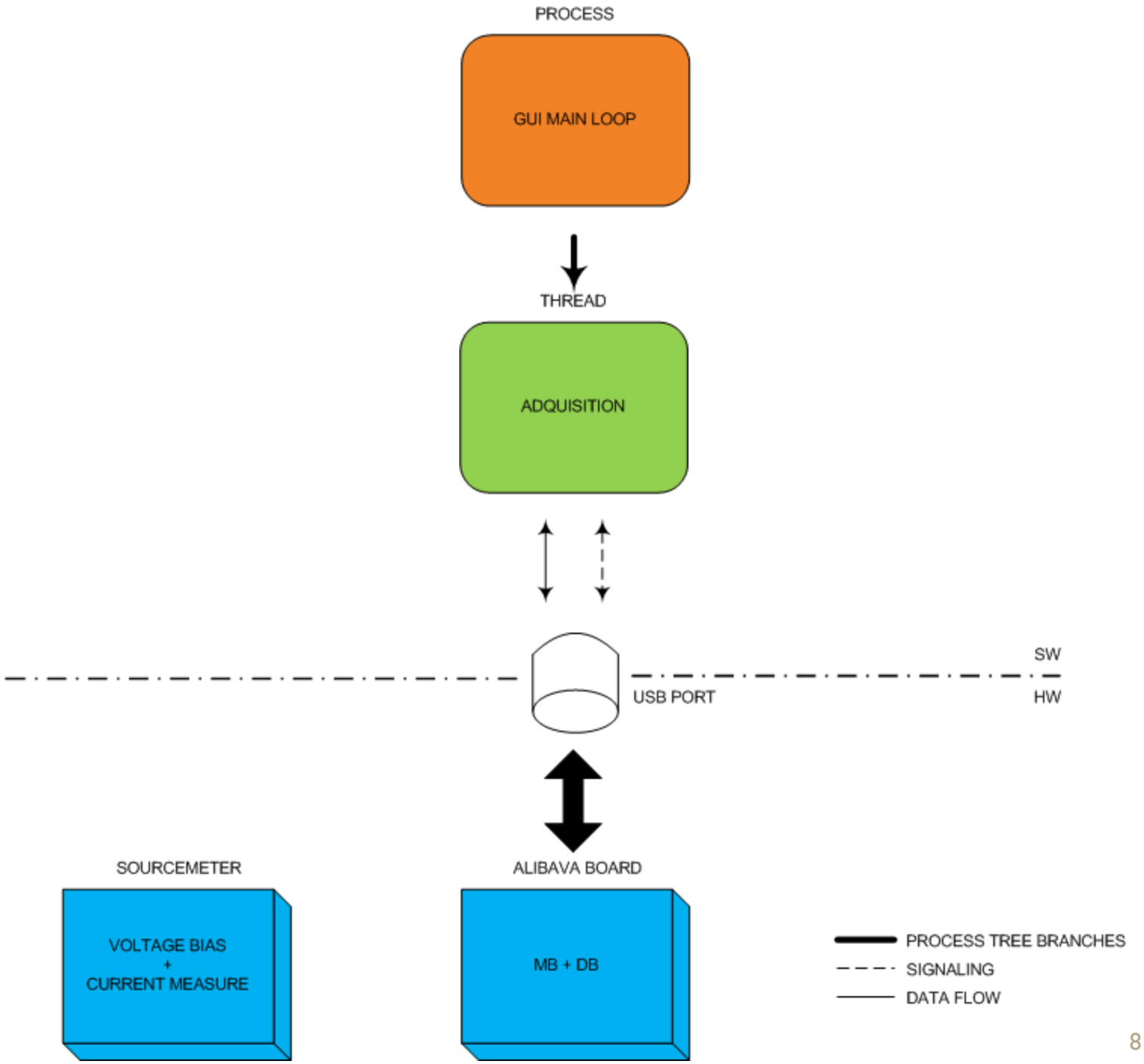
Alibava system



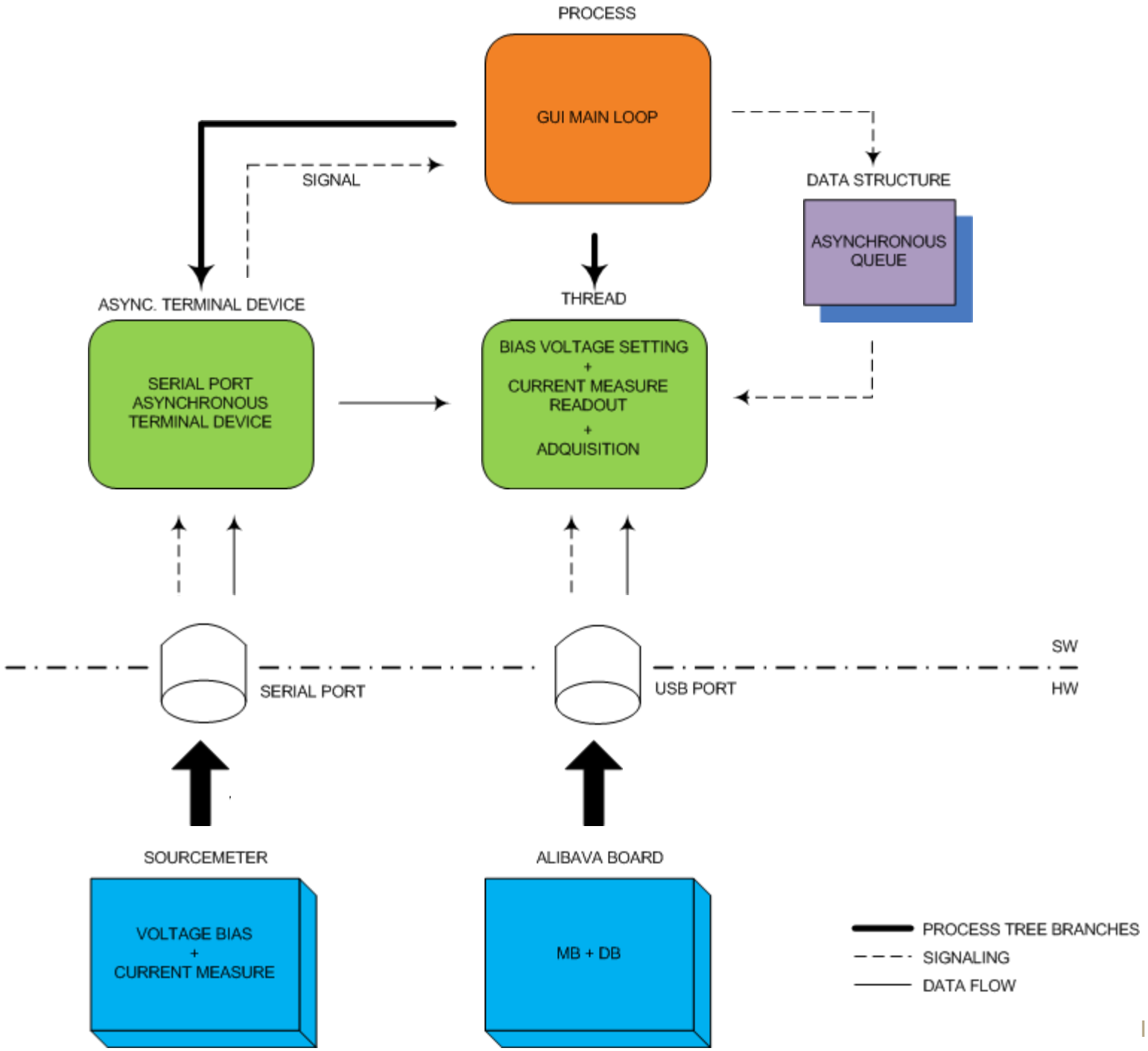


- Every acquisition implies setting manually DC voltage
- Sourcemeter controller via RS232 port

In the software as we received it …

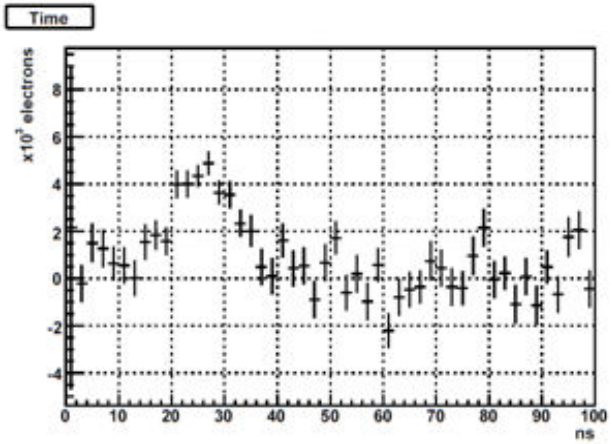

PROCESS
GUI MAIN LOOP
THREAD
ADQUISITION
SW
USB PORT
HW
SOURCEMETER
ALIBAVA BOARD
VOLTAGE BIAS
+
CURRENT MEASURE
MB + DB
PROCESS TREE BRANCHES
SIGNALING
DATA FLOW

After including sourcemeter control via RS232 port …


PROCESS
GUI MAIN LOOP
SIGNAL
DATA STRUCTURE
ASYNCHRONOUS QUEUE
ASYNC. TERMINAL DEVICE
THREAD
SERIAL PORT ASYNCHRONOUS TERMINAL DEVICE
BIAS VOLTAGE SETTING + CURRENT MEASURE READOUT + ADQUISITION
SW
SERIAL PORT
USB PORT
HW
SOURCEMETER
ALIBAVA BOARD
VOLTAGE BIAS + CURRENT MEASURE
MB + DB
PROCESS TREE BRANCHES
SIGNALING
DATA FLOW

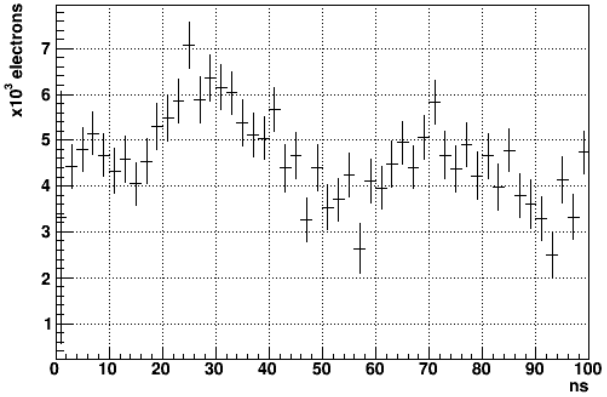
Daughterboard failure: baseline shift

1e15 n irradiated MCz detector. (300 V)



3e15 n irradiated MCz detector. (1000 V)

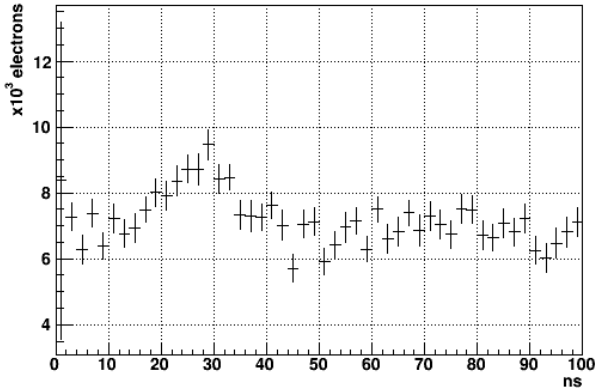
Time No annealing: signal visible (@ ~25 ns)



And, in the next slide, an interesting consideration…

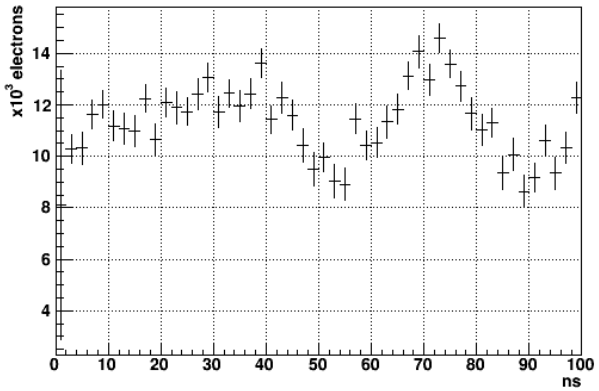
3e15 n irradiated MCz detector (1000 V)

Time 80mins @ 60°C. The signal goes up



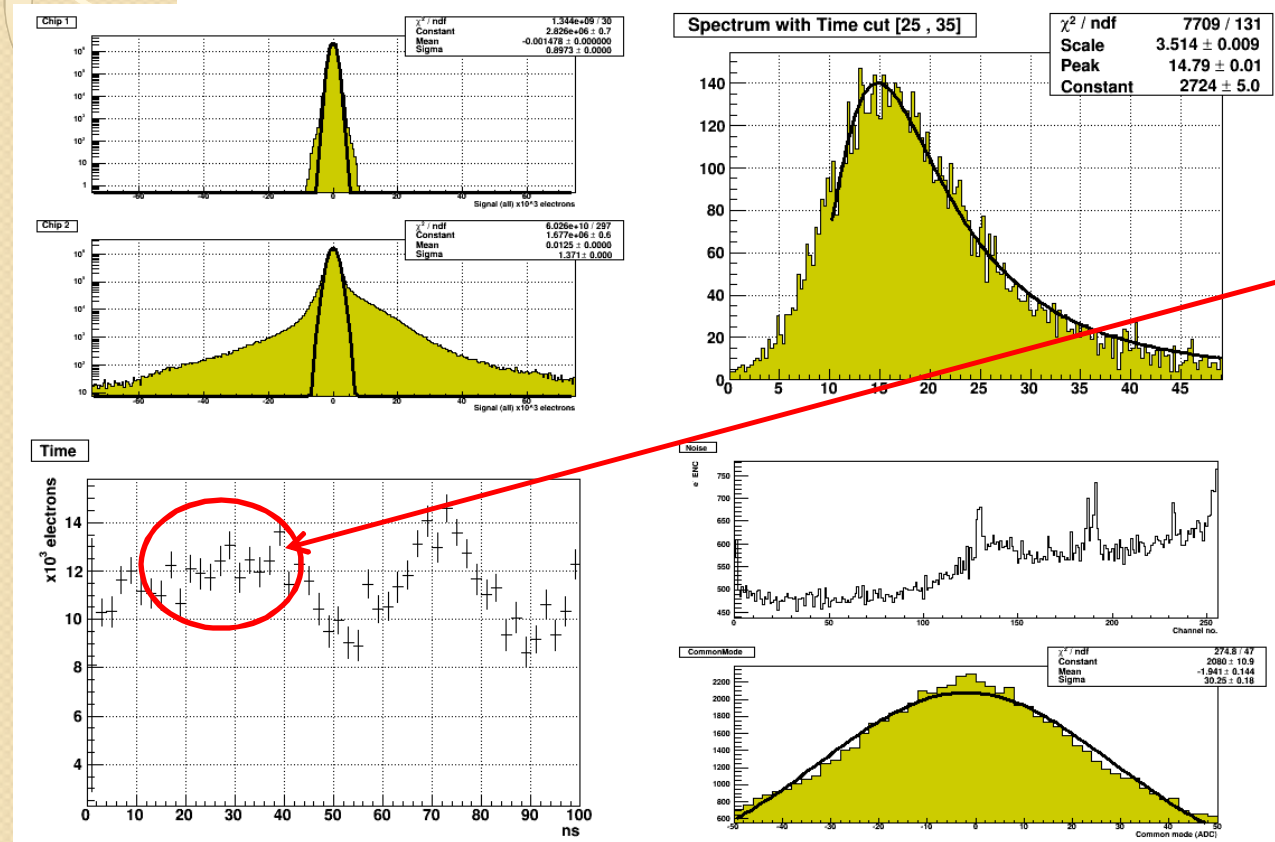
3e15 n irradiated MCz detector (1000 V)

Time 1000 mins @ 60°C. No signal?



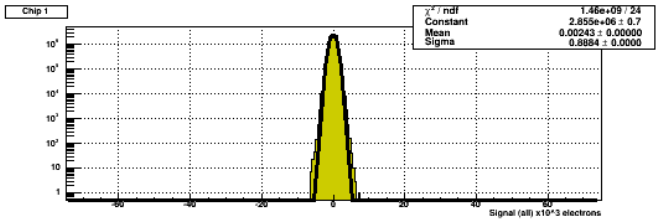
Baseline increases with irradiation fluence, bias voltage and annealing, and can completely overlap the signal

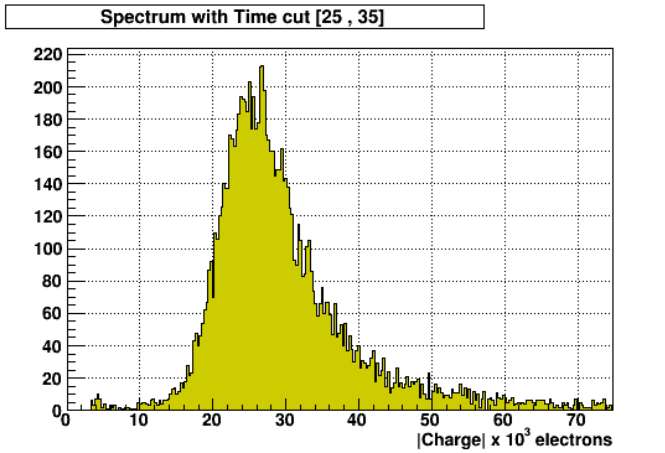
Charge collection efficiency and baseline shifts…

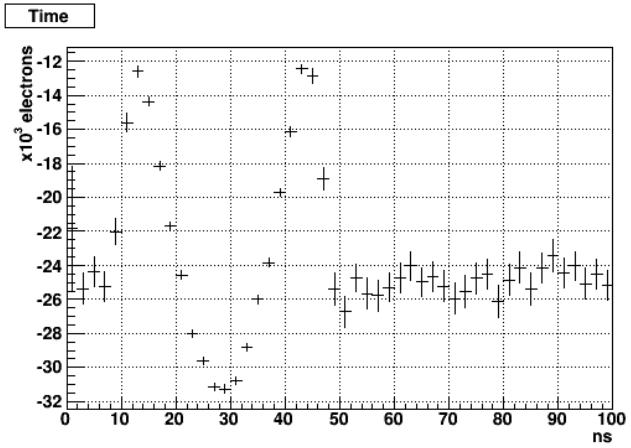


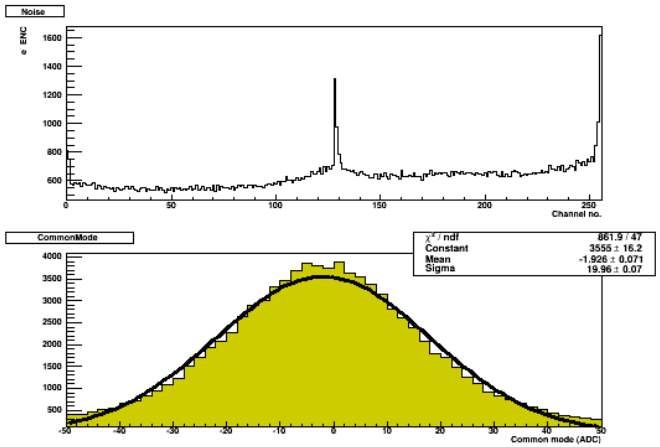
There is clearly *no visible signal*, but the baseline shift "fakes" a nice Landau with a collected charge of 15ke!

Measurements on unirradiated p-type Float Zone









Discussion

- RC bias filter cannot withstand more than 1000 V (no tollerance at all!)

- Gaussian + Landau fit: is the gaussian convolution just for taking care of the noise? A few objections:
  - The noise subtraction should take away all the noise, tails included
  - We're talking about a convolution, not a SUM(!!!) – Manuel pointed out that in CMS the gaussian convolution is used to account for the jitter in the signal sampling – In this case we should check whether with Alibava we need it or not

- Here at CERN a Daughterboard suddenly died after 3 annealing steps showing quite a weird behaviour in the baseline of the signal… any clue?

- If the sampling of the Alibava happens at 25 ns steps, where is generated the nice 2 ns – resoluted plot shown in the main output of the root macros? Is there a 500 MHz ADC somewhere?

- By using more times the pitch adapters, the bond wires will get longer, thus changing the capacitance seen by the beetle. Is there any parameter to adjust to compensate for this?