PXD Cosmic Test Status at Tabuk

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1 Introduction and Objectives

2 Slow Control Tests

3 DHH tests

4 Alibava Trackers

5 Trigger and Trigger Logic Unit (TLU)

6 Starting simulation of KEK setup in basf2

7 Conclusion and Outlook

Objectives of PXD Tabuk Cosmic Test

1 Determine the pedestals and noise characteristics (individual pixel noise and common mode) of the PXD modules.

2 Study the detection properties of the PXD modules using real tracks such as: efficiency, cluster size and shape, signal height, and gain.

3 Study the uniformity of those properties across the module.

4 Study stability of those properties as function of time.

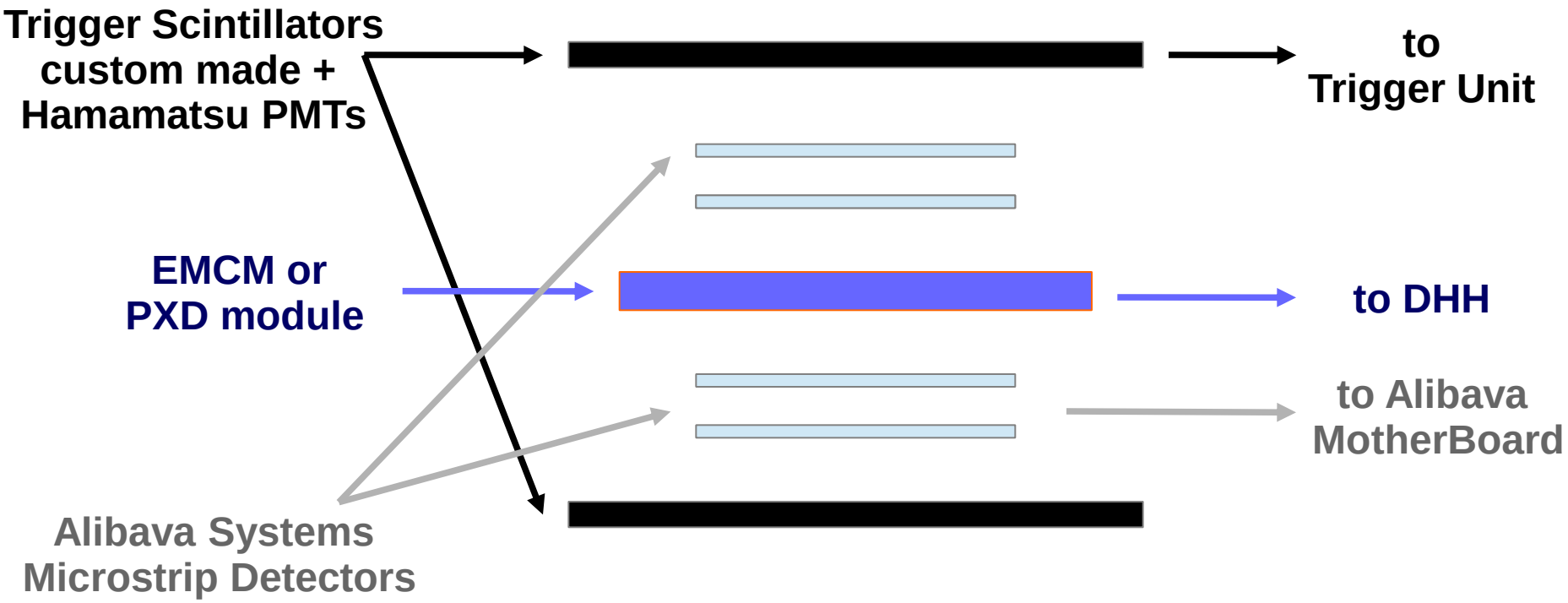
5 Study the dependence on environmental parameter (temperature, humidity).

6 Optimize the operation parameters to obtain the best overall performance.

2 is the main objective:

- 1 is needed by 2 for a good operation
- 3 to 5 need time to achieve them. As planned we will run for a good period of one year before we will be busy with KEK installation and commissioning including KEK cosmic test
- 6 needs all issues 1-5 and it will be to conclude of the cosmic test.

Basic layout



Frame(5 shelves: EMCM, Trackers, and Trigger)

Slow Control Rack

Shelves for readout electronics

SETUP

Chiller for EMCM

1 Right: PC monitors on table for Slow Control and PXD DAQ
2 Left: Big screen with wireless Keyboard and mouse

Scintillator (Top)

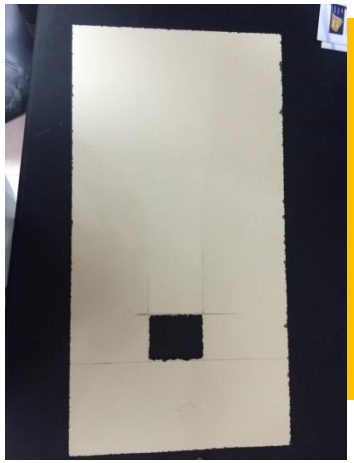
Alibava Tracker 1

EMCM now, PXD module later

Alibava Tracker 2

Scintillator (Bottom)

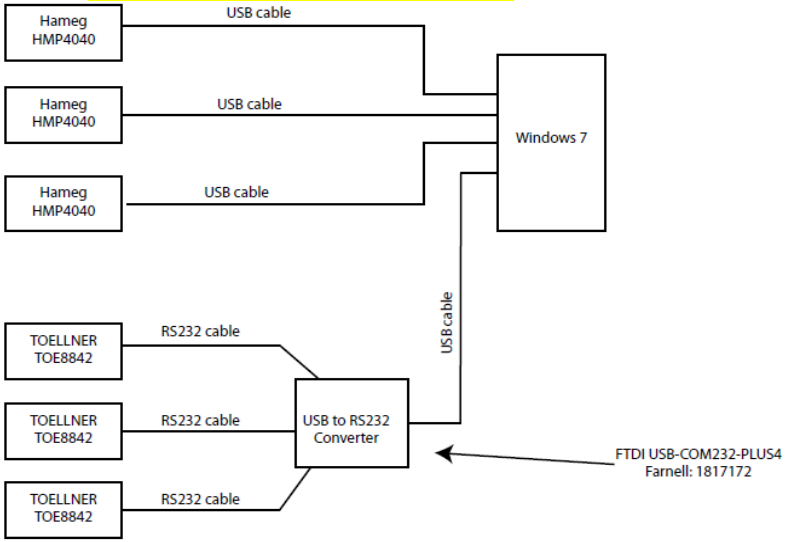
FRAME



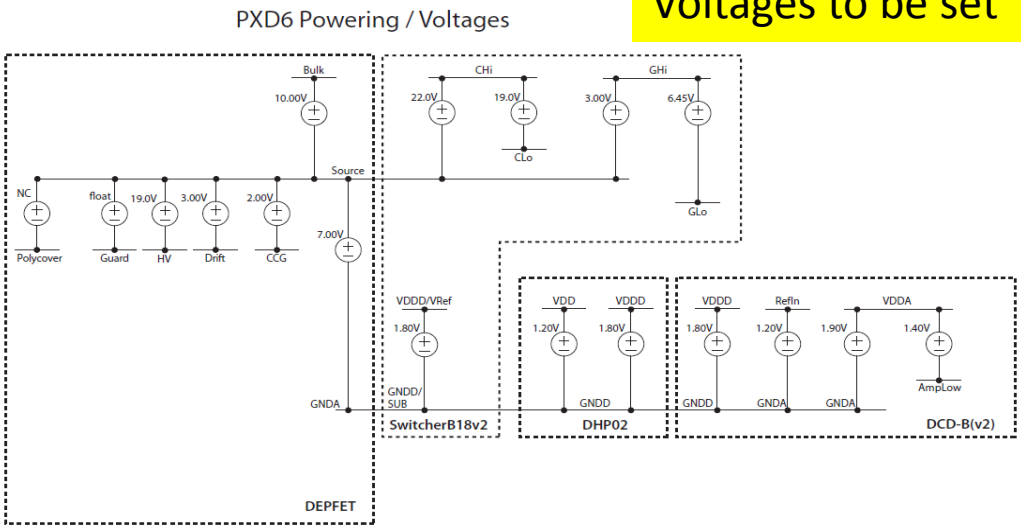
The frame is made of Aluminum and hold inside a wood box with door against dust. A removable fiberglass Plate (here left) can be machined to hold detectors. An opening is drilled for muon track or other sources tests.

Slow Control (Tabuk): Voltages setting

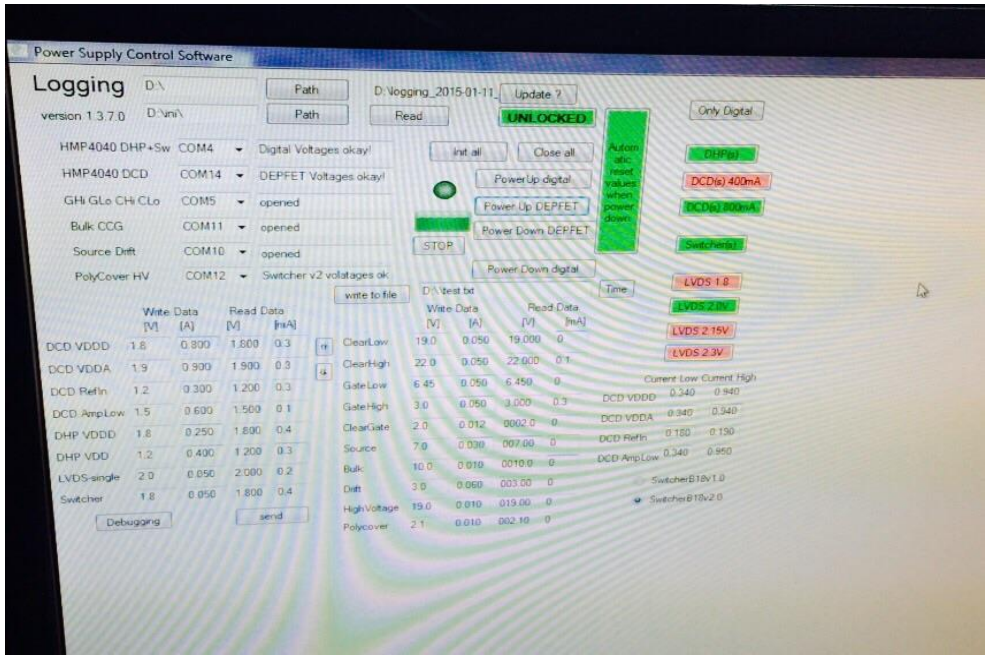
Slow Control SETUP



Voltages to be set

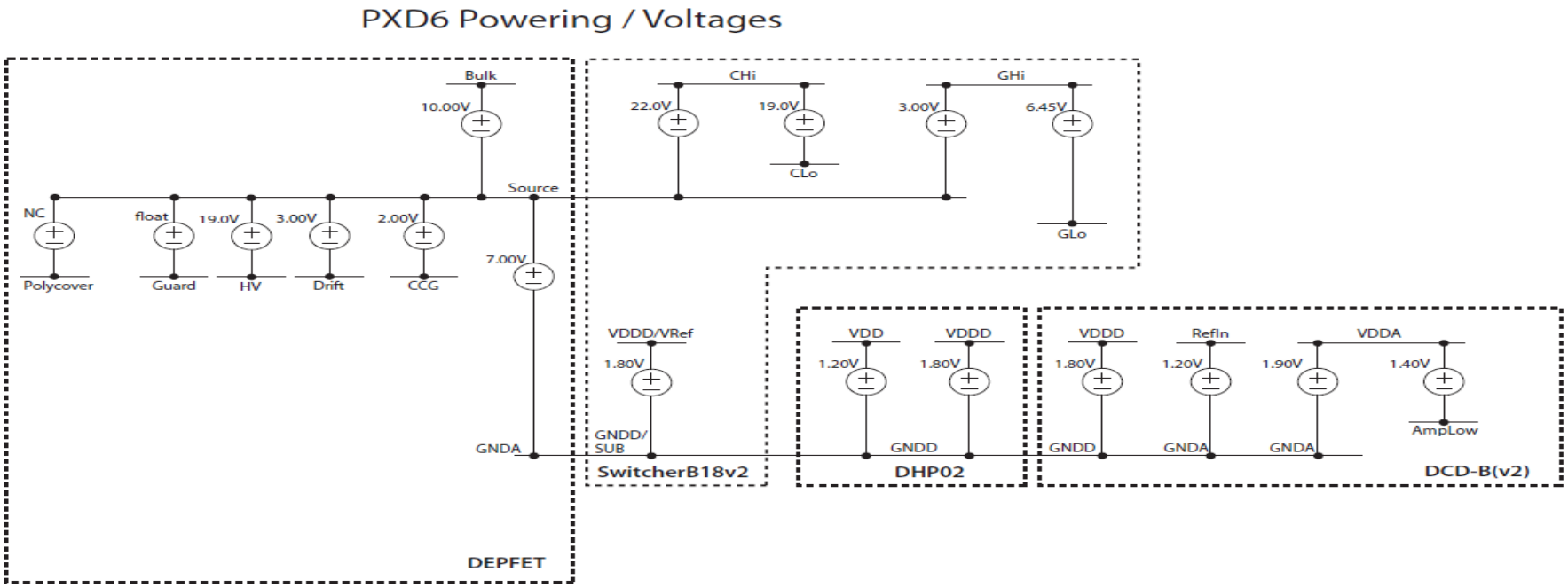


All items in the Rack including the PC



SC program works fine and stable

Testing Voltages
Tested at the Patch Panel connector
and also at the Capacitors



Name	V(Set) in V	V(Read on the detector) in V
VDDD-SW-PLUS	1.8	1.8
VDDD-SW-MINUS/GNDD	0.9	0.5
VDDD-DCD-PLUS	1.8	1.8
VDDA-PLUS	1.9	1.9
REFIN-PLUS	1.2	1.2
AMPLOW-MINUS	1.5	1.5
MPLOW-PLUS	1.4	1.4
VDDD-DHP-PLUS	1.8	1.8
VDD-PLUS	1.2	1.2
VDD-MINUSGNDD	0.7	0.6
DRIFT-MINUS	3	3
SOURCE-PLUS	1.7	1.7
POLLGOVER-MINUS	2.1	2.1
HV/DEPFET	19	19
CLEARHI-PLUS	22	22
CLEARLO-MINUS	19	19
GATELO-PLUS/GATEHI	6.45	6.45
GATEHI-PLUS	3	3

Testing the DHH

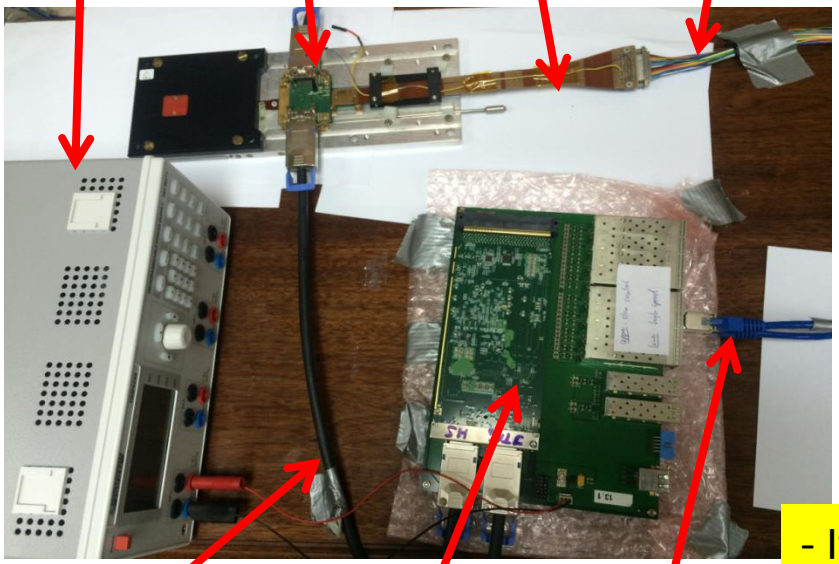
Access to Dima to Check DHH software

Power Cable from Breakotu Board

Patch Panel Cable

EMCM piece

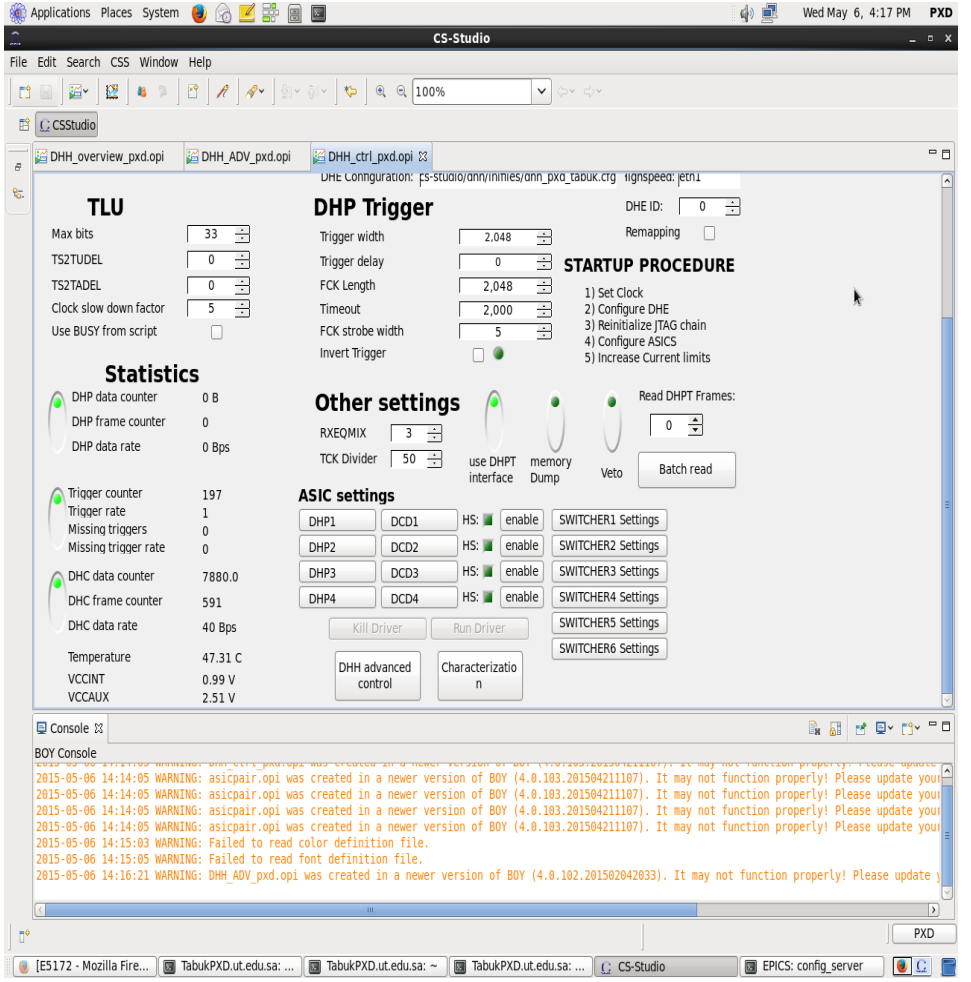
PS to power DHH



Infiniband cable

DHH and it carrier board

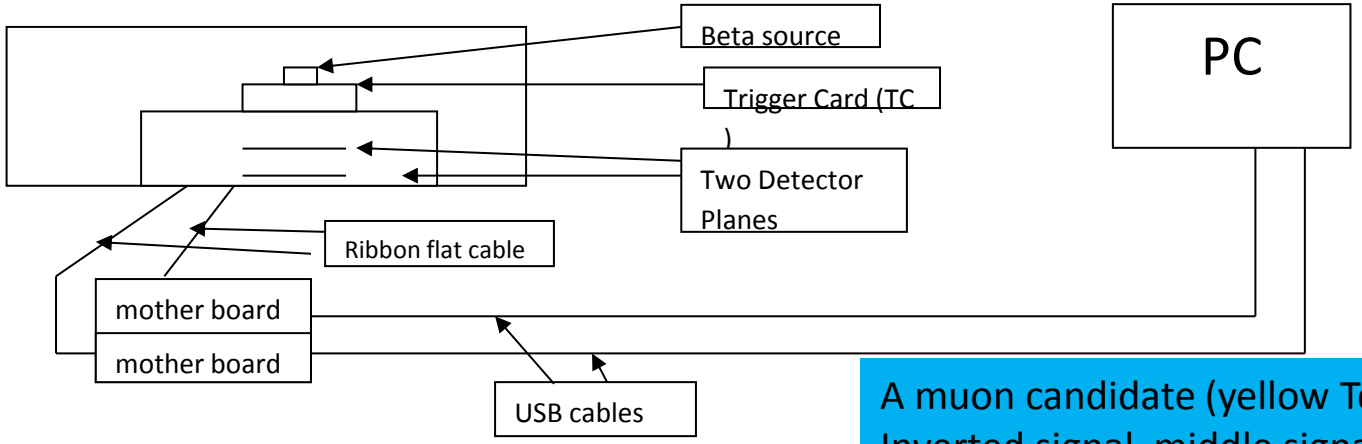
SC and HS Ethernet Cables to computer



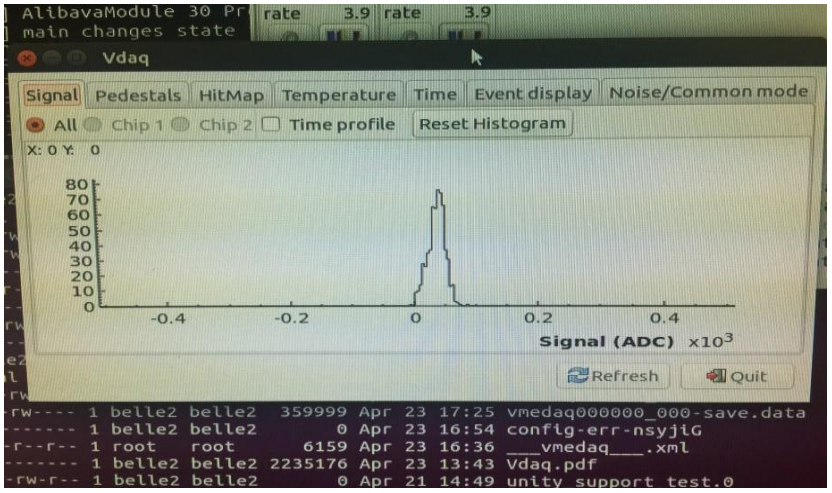
- It happened that a wrong IP was programmed in the FPGA
- Setting the clock works, the epics GUI CSS works
- Even we can set software trigger (See above)
- Now configuring the ASICS. Look at scripts

Alibava Tracker:

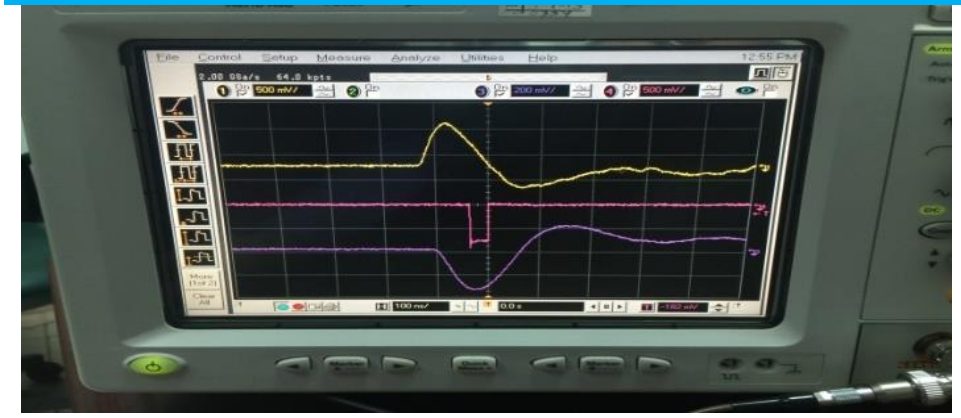
Status: Standalone test with a multiboard control/readout program. Two silicon 1x1cm2 Detector plane and a silicon Trigger Card (TC) all from Alibava. Just work at timing between Trigger Card and detectors.



Good communication With Carlos Lacasta. Even he visited Tabuk To attend a workshop.



A muon candidate (yellow Tc signal, bottom signal Inverted signal, middle signal discriminated output NIM signal to Mother Boards.) Rate is concordant with 2x2cm^2 TC sensitive area .



Trigger system with scintillator

Scintillator (Top)

Alibava Tracker 1

EMCM now, PXD module later

Alibava Tracker 2

Scintillator (Bottom)

A pair of scintillators made at MPP 1cmx10cmx0.4cm. Light guide with Diameter 8mm to match PM window

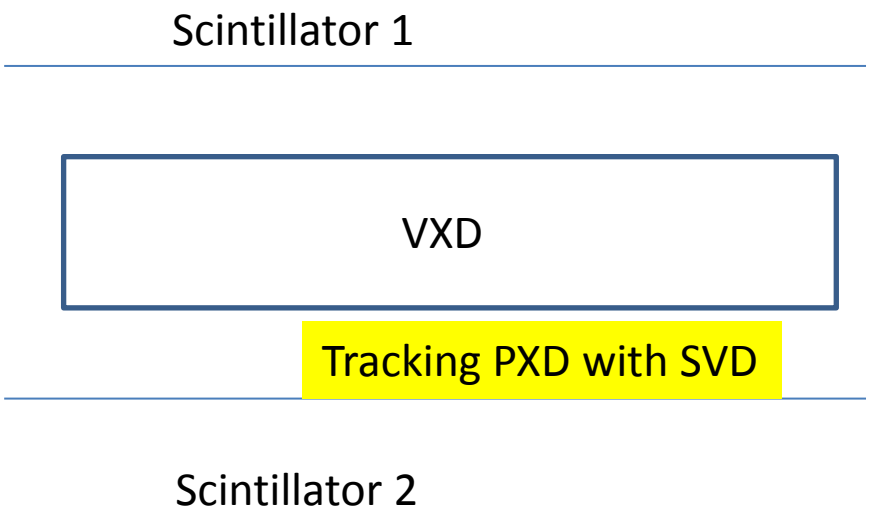
PMTs fromHAMAMATSU ordered with 8mm diameter window.

TLU: Many contacted but No success. Now looking To have one from testing Groups in Europe.

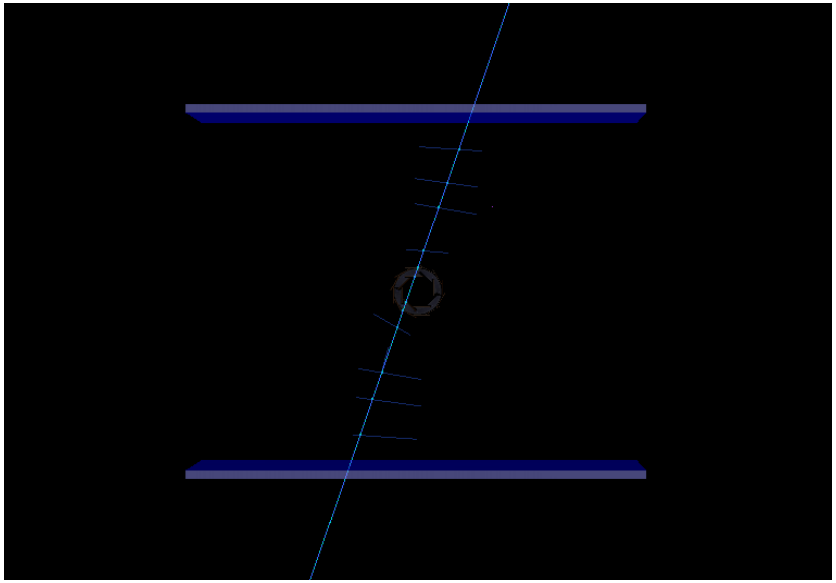
Now working on a frame (temporary done) to hold scintillator to fit in the PM window and also wait This week for the optical grease.

KEK Cosmic Test with Full VXD

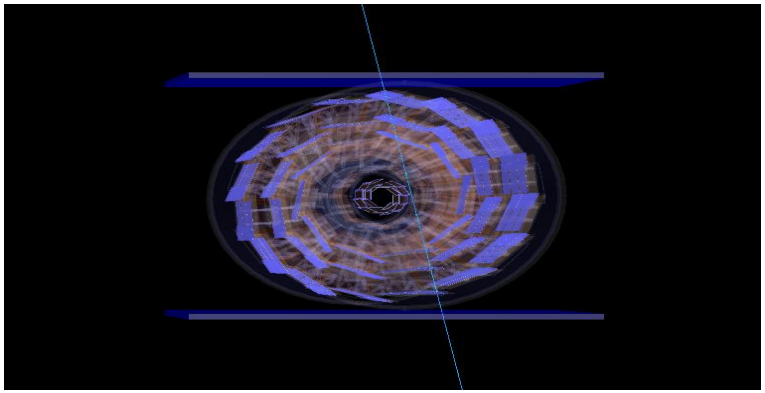
1. Build a frame to hold upstream and downstream scintillators. It should be made to be easily mounted and unplugged on the VXD.



Starting now with basf2: geometry and Material stuff entered. Pictures below



2. Now as shown here right we started implementing the two scintillators geometry. Later work on optimizing The scintillators size to maximize rate on VXD.
Also we will work on a VXD cosmic track finder.



Conclusion and Outlook

1 Setup fully done except PMTs and TLU

2 All software run well

3 We operated most of the components,, but as new DHH and EPICS software had been installed we will be working on having it fully working. Now at the ASICS configuration.

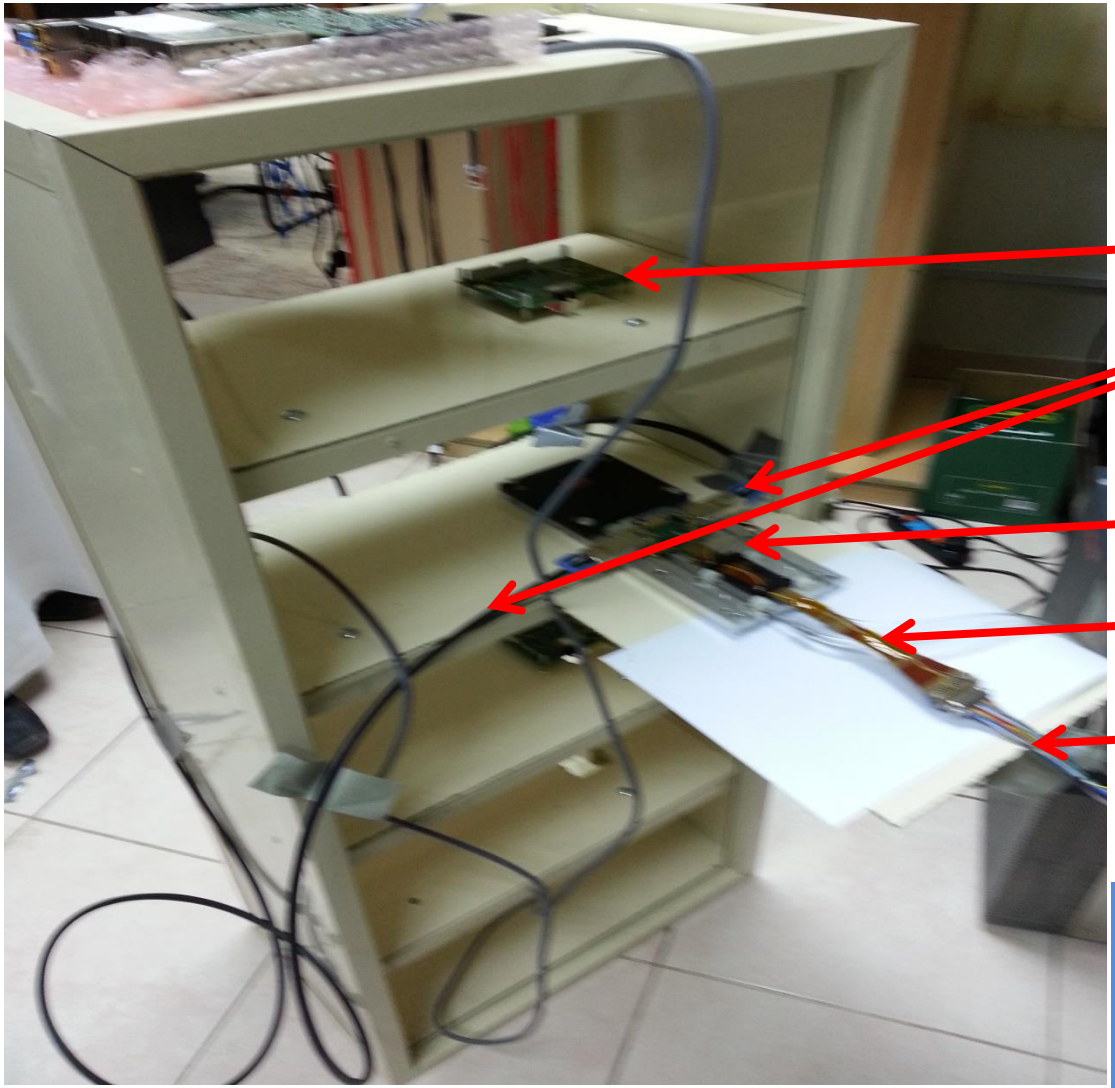
4 Alibava tracker with full testing system. Working well.

5 Use TLU or FTSW Frontend Timing Switch (Nakao at KEK, ready to be shipped) or other system: Discussing it with Carlos Lacasta is a system can implemented with Alibava.

6 Start simulating final VXD cosmic test in basf2. Geometry in, will work on analysis to Optimize scintillator size. We are discussing a VXD Cosmic Track finder

Backing Slides

Zoom on the frame



ALIBAVA Tracker

Two infiniband cables

EMCM piece

Patch Panel Cable

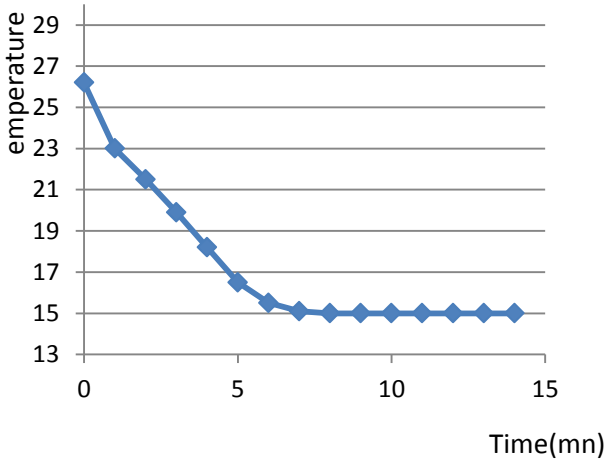
Cable from breakout board (Slow Control)

The EMCM removable plate had been extended with and additional Removable plate to hold patch panel and breakout board cable

Cooling the EMCM

Chiller Working well and tested with a continuous Heat source

Temperature reaches set temperature,
From ambient temperature in about 4-5 minutes



Tubing from chiller to EMCM is set.

Alibava Tracker

Two Alibava Detectors (2D 1x1cm^2) Upstream
And downstream the EMCM

Scintillator (Top)

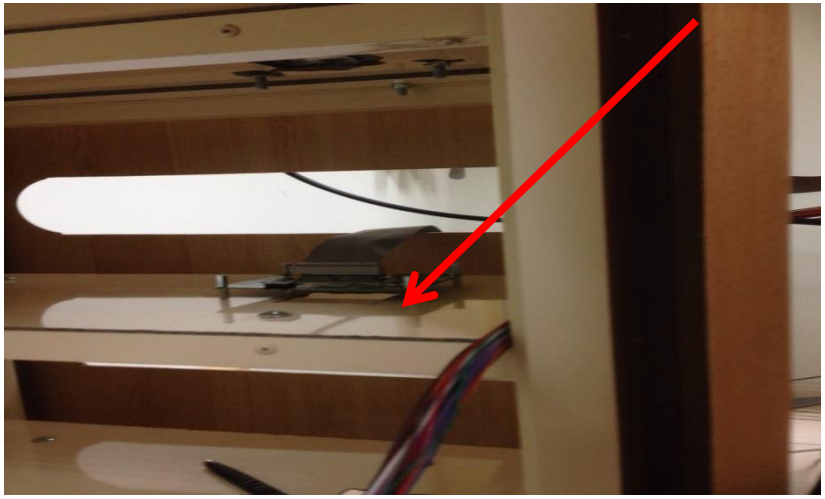
Alibava Tracker 1

EMCM now, PXD module later

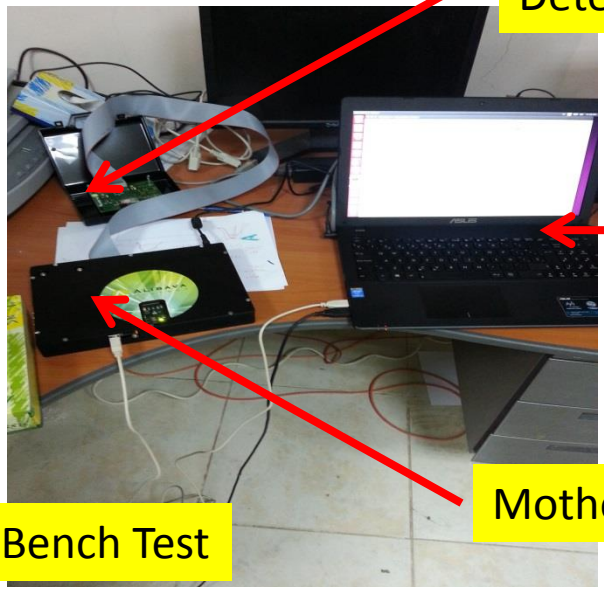
Alibava Tracker 2

Scintillator (Bottom)

Zoom: An Alibava detector plane
On its shelf



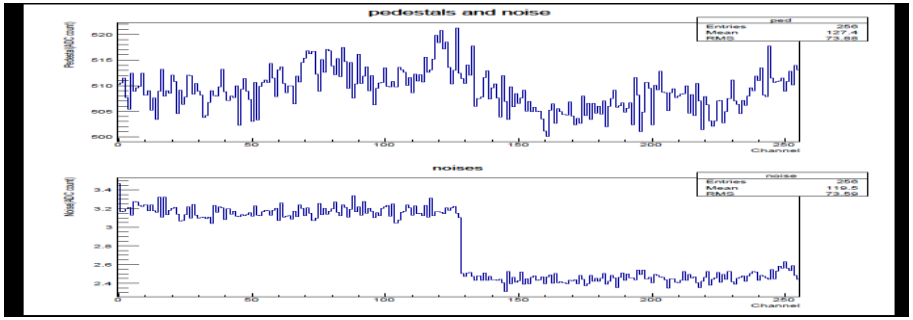
Detector PCB plane



PC

Mother Board

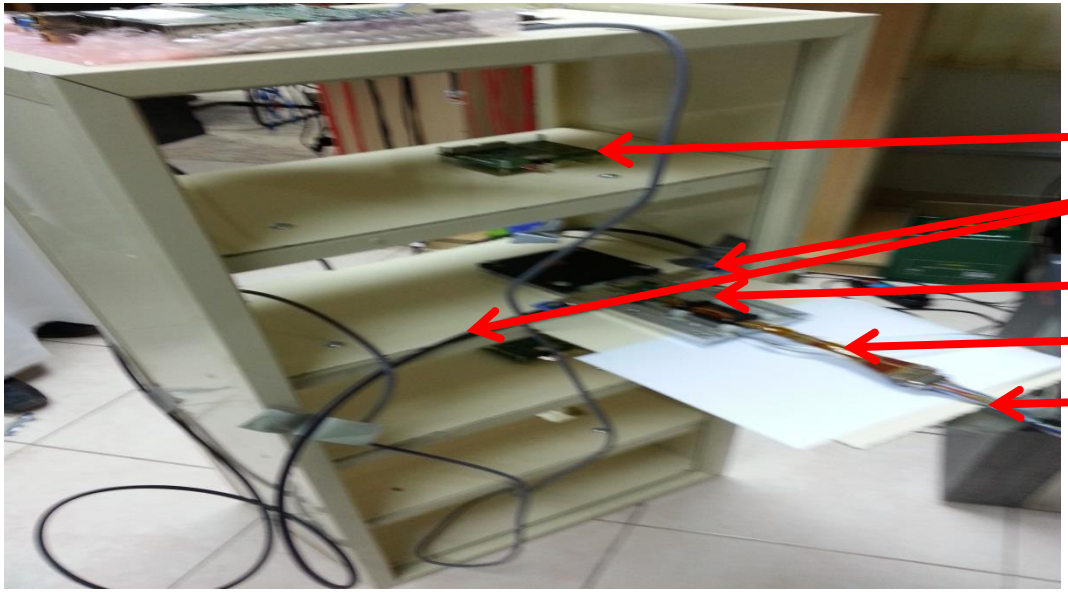
Bench Test



We can download pedestals and noise for 256 Channels (two (128 ch) chips)

Good job by ALIBAVA. All is available with a complete software with GUI. Now they are on a readout program for multiple boards.

DHH tests



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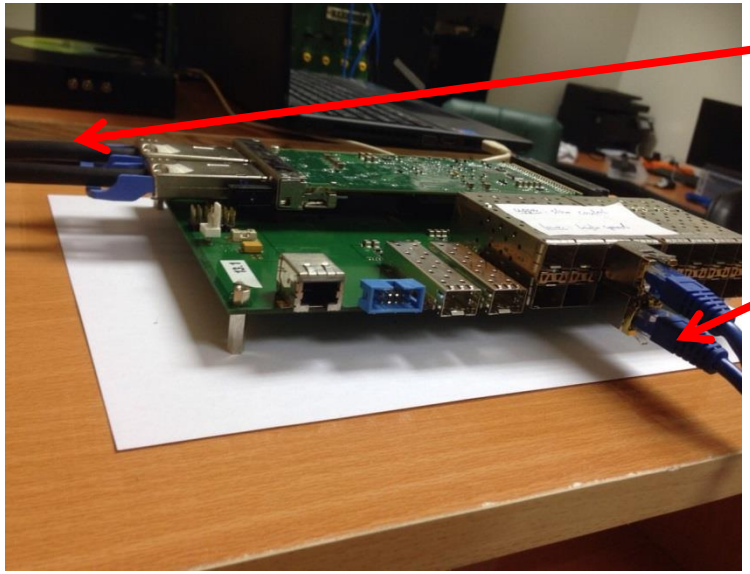


Infiniband cables from EMCM piece

Ethernet Cables to the DAQ PC

DHH board

PC with full installed DAQ is shipped from MPP. Two GUI tasks:

- Slow Control and trigger
- BONN-DAQ

All working well.

Tabuk PXD Cosmic Test

Bench Setup at Tabuk consisting of Slow Control, full tracking system: Scintillators trigger, ALIBAVA tracker (silicon planes), and an EMCM from MPP with cooling system.

Status: What is available now at Tabuk Here:

Slow Control: Need 6 power supplies, three received and 3 coming soon. PSs are fully controlled by the installed SL program. Banana Cables from PSs go to a breakout board, then to the EMCM piece via a hand made cable.

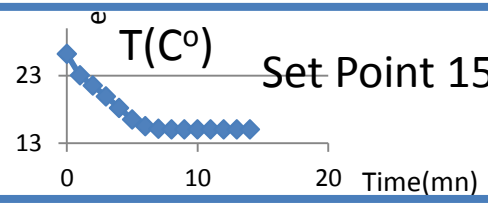
EMCM and DHH also received from MPP and A PC with full installed DAQ.

DHH Board

EMCM

ALIBAVA Tracker: 3 Detector planes (2D 1x1cm) and 3 mother boards, with tested software.

Chiller Working well and tested with a permanent Heat source



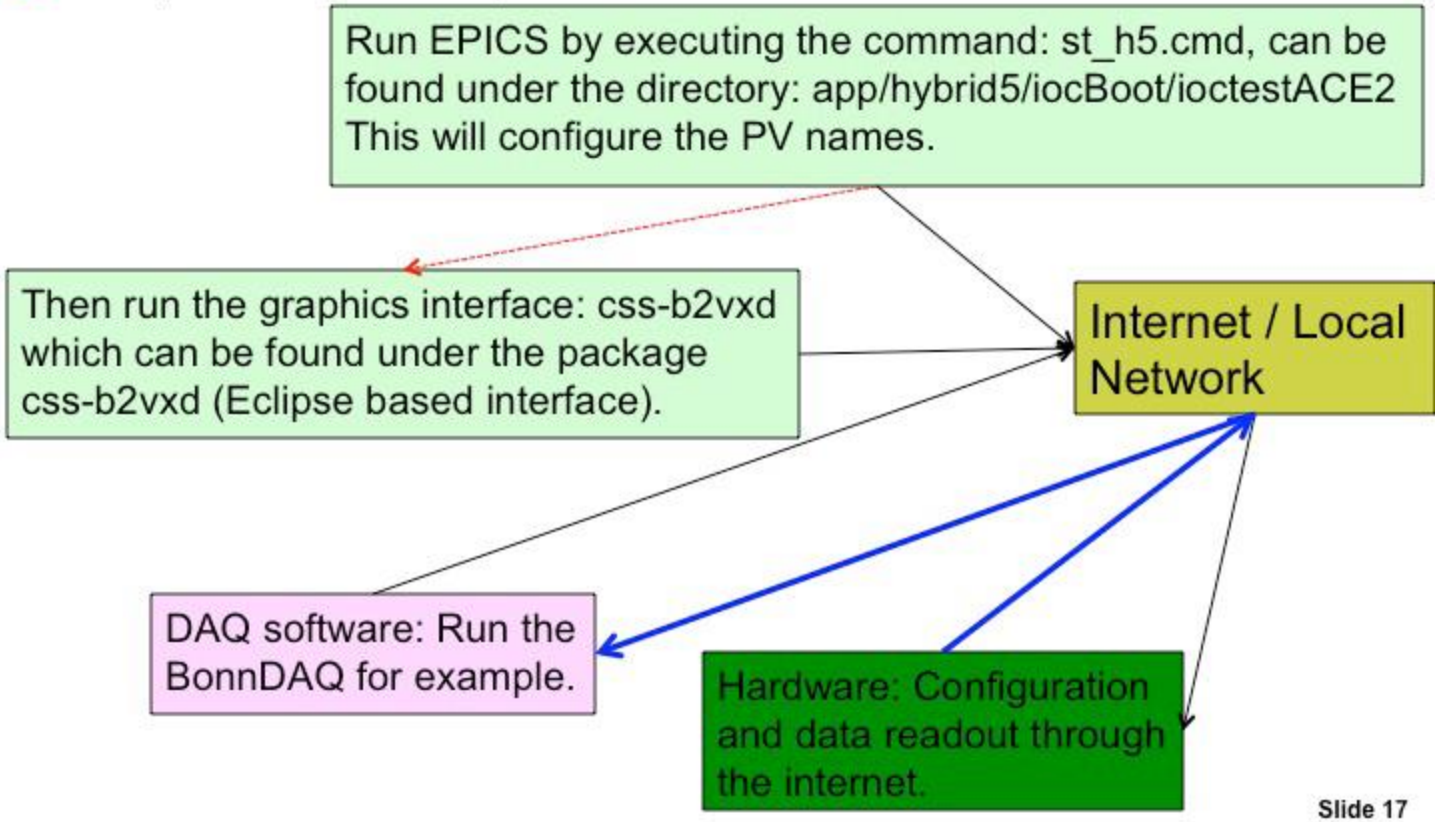
Trigger: Two scintillators with light guide build at MPP and now at Tabuk. HAMAMATSU with 8mm diameter window will arrive soon.

Now we are building a frame to hold Trigger, Trackers, and EMCM piece: Now is waiting its turn in the machineshop.

Overall: All equipment available just missing two ethernet adapters On the DHH board and two PMTs from HAMAMATSU.

How to run the software…

- Different communication components: EPICS needs to be run in order to configure the right processes with the right PV names. This is done by running st_h5.cmd
- Then, comes the data acquisition interface



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