Read Test Bench at Hiroshima

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ALICE MFT Meeting at Hiroshima University

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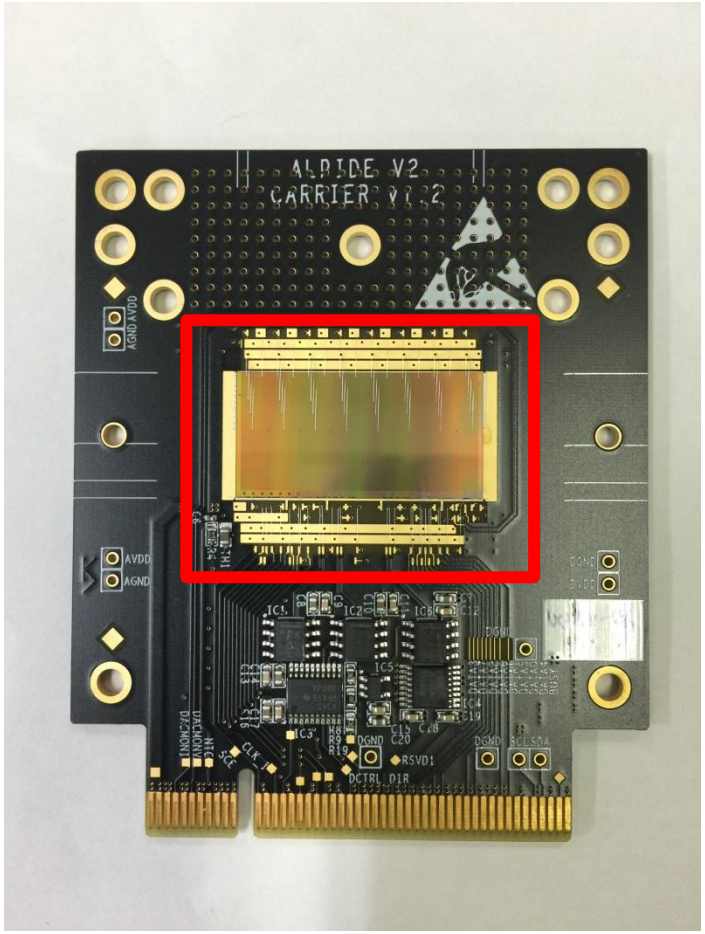
Outline

- What is pALPIDEfs
  - pALPIDEfe, DAQ board
- Hardware Setup
  - OS, USB cable, power supply cable
- Firmware Setup
- Software Setup
- Start the Test
- Summary

pALPIDEfs

-pALPIDEfs

- a Full Scale Prototype of the ALICE Pixel Detector



- 30 mm × 15.3 mm of dimension
- 512 × 1024 pixels of $28\mu m \times 28\mu m$
- Equivalent integration time is ~4 μs
- Power consumption of 50 mW/cm^2

DAQ board

DAQ board

- device which is necessary for reading data from pALPIDEfs with PC

- FPGA(Field Programmable Gate Array)
- It is accessible to a PC using USB-port
- Plug to the pALPIDEfs

pALPIDEfs and DAQ-board

We had the two devices of pALPIDEfs and DAQ board

Setup start!

Install the OS

To setup

- To refer to the web :

https://twiki.cern.ch/twiki/bin/view/ALICE/ITS-WP5

- We got some advice from Andry M. Rakotozafindrabe

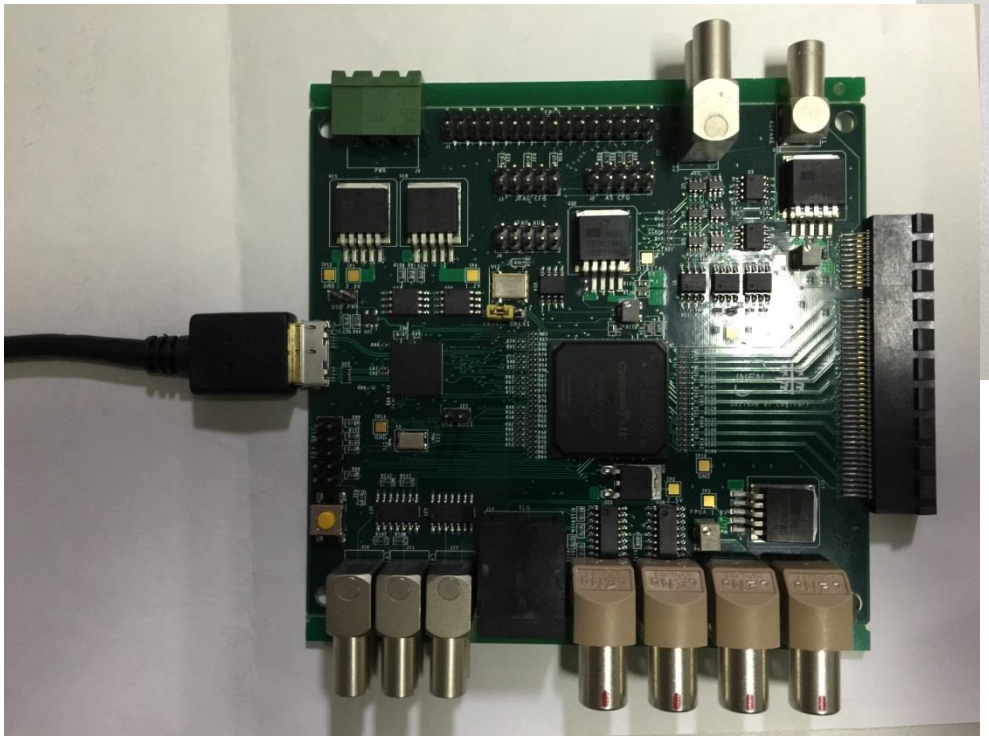
Install the CERN CentOS7 to PC

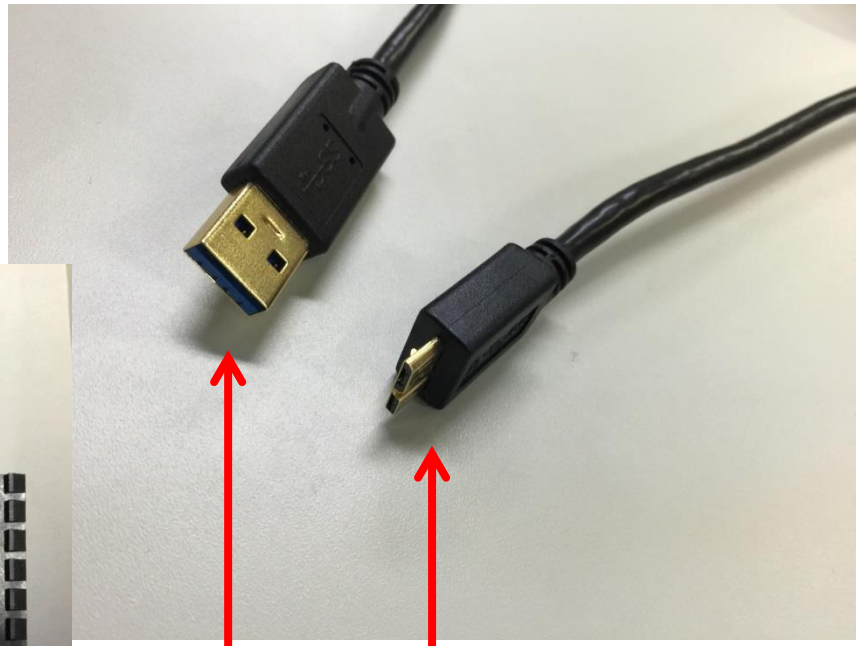
- CentOS7 : CERN community enterprise operating system

Connect to PC

In order to connect the DAQ board and PC

- USB connector(type : A-microB)





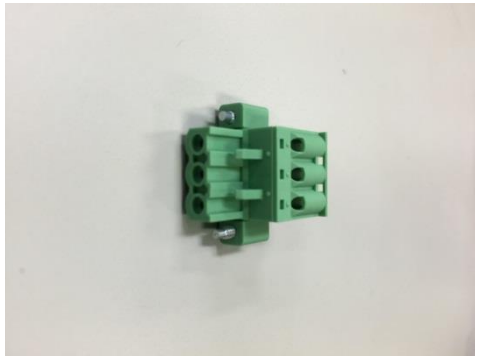
DAQ side

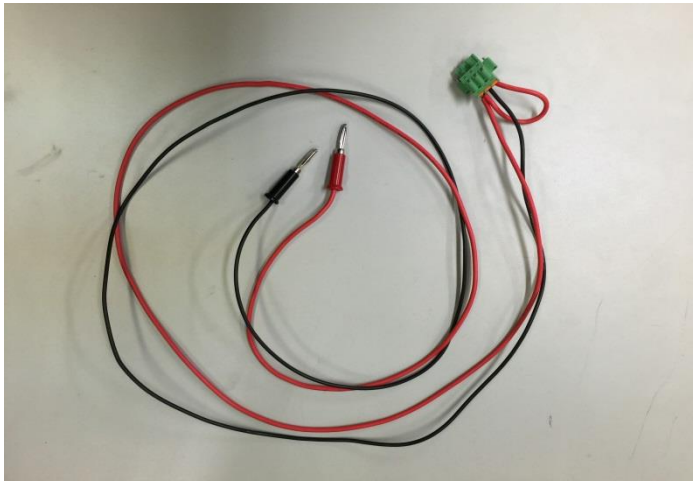
PC side

Power Supply to the DAQ-board

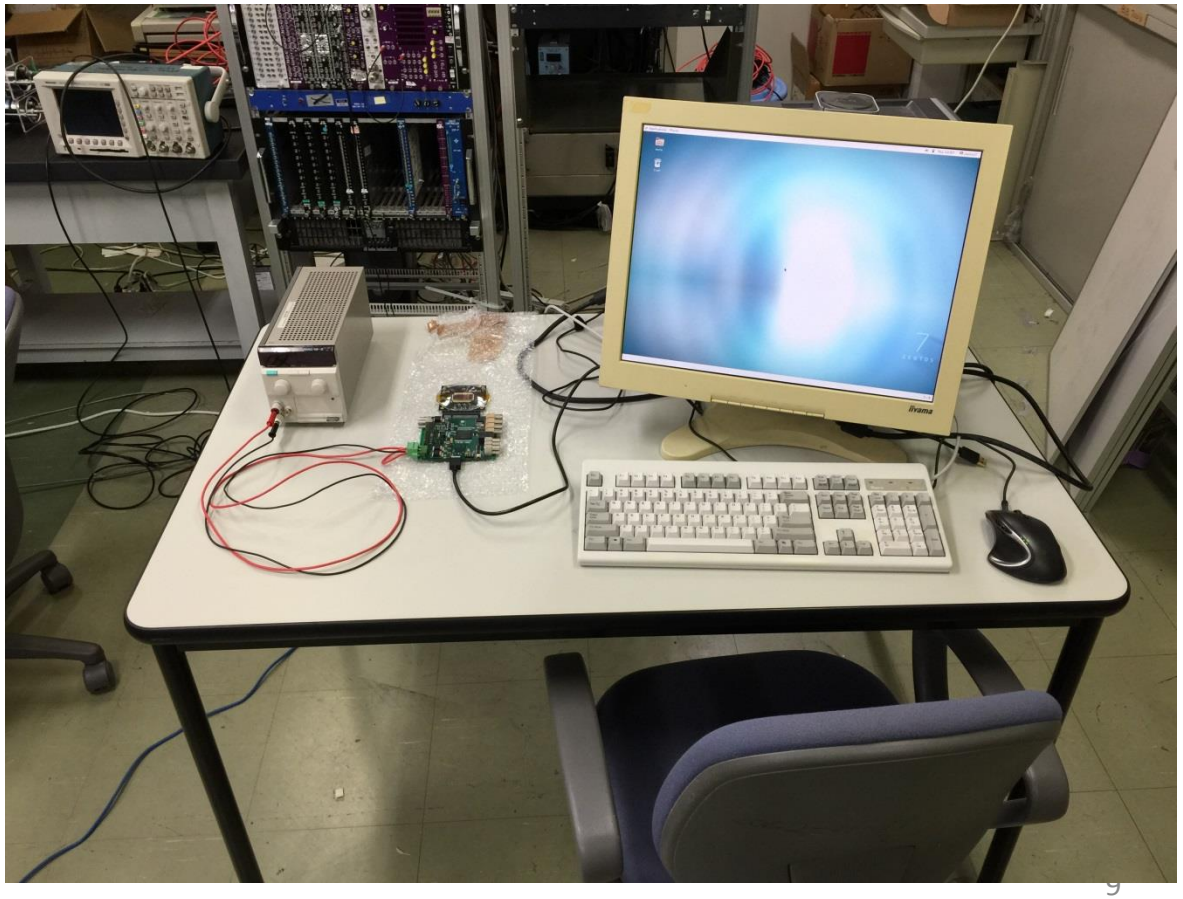
In order to operate the DAQ board and pALPIDEfs

- Make the power supply cable





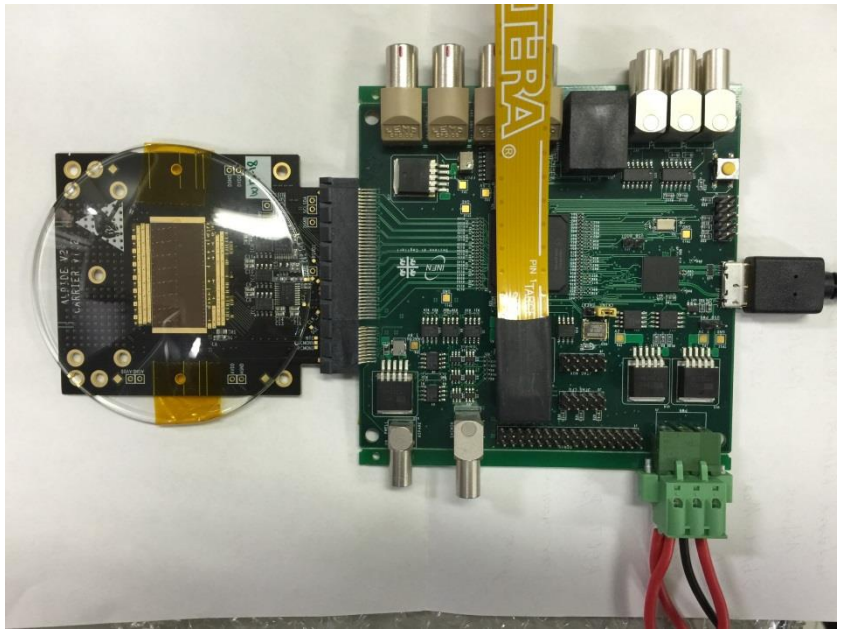
Completion of the Hardware



Install the Firmware

FPGA of the DAQ board is able to program the last version firmware using an ALTERA programing cable(e.q. USB blaster)

- Use Quartus Programmer to upload the firmware to flash memory
- v147DF917 is the last version as of today



Install the Software

In order to install the software to the PC we use git command

#git clone https://username@git.cern.ch/reps/pALPIDEfs-software

In order to compile the software we need have libusb

- libusb : a C library that gives applications easy access to USB devices on many different operating systems

In order to configure the the chip we excute build_linux.sh
(in the directory fx3)

In order to access the new USB device we add the rules file in the derectory : etc/udev/rules.d/

- BUS=="usb", SYSFS{idVendor}=="04b4", SYSFS{idProduct}=="00f3", MODE="0666"
  BUS=="usb", SYSFS{idVendor}=="04b4", SYSFS{idProduct}=="00f1", MODE="0666"
  BUS=="usb", SYSFS{idVendor}=="04b4", SYSFS{idProduct}=="00f0", MODE="0666“

Start the Test

Configure the chip

- This needs to be done after each power-cycle of the board and each reconfiguration of the FPGA

#./download_fx3 -t RAM -i SlaveFifoSync.img

- We saw the message :
  FX3 firmware programming to RAM completed

The test program is started by executing ./runTest in the directory pALPIDEfs-software

Test

Test 1 : FIFO Test

- FIFO(First In First Out) : a method for organizing and anipulating a data buffer, where the oldest entry of the queue is processed first.

- The test is started by passing the parameter FIFO

  ./runTest FIFO

Test

```
[root@localhost pALPIDEfs-software]# ./runTest FIFO
TConfig: Initialised setup of type 0 with 1 chips and 1 DAQ boards.
FIFO

============================
pALPIDE Test program
Git commit: TestBeamStable_2015-08-06-37-g2ea2e61
============================

Searching for DAQ boards

Created Setup with 1 DAQ Board(s):
 - Plane 0: TDAQBoard 2 ( GeoAdd: 0, firmware Version: 0x147df516 ) with TpAlpidefs2 ( Chip ID: 16 )

TTestSetup::PowerOnBoard: Trying to power on DAQ board 0
Voltages off, setting current limits

Switching on voltages...:

Reading all ADCs:
Read ADC: NTC            = -273.15 deg C
Read ADC: I(1.8 V Digital) = 0.241699 mA
Read ADC: I(1.8 V Output)  = 0.725098 mA
Read ADC: I(1.8 V Analog)  = 0.241699 mA
GetLDOStatus, LDO status = 0, 0, 0
Power on board failed, LDOs are off (overcurrent?)
Overflow in digital current
Overflow in analogue current

Exiting ...
[root@localhost pALPIDEfs-software]#
```

Power supply : 5.00 V
Current : 400 mA

Power supply : 5.00 V
Current : 300 mA

Test

```
[root@localhost pALPIDEfs-software]# ./runTest FIFO
TConfig: Initialised setup of type 0 with 1 chips and 1 DAQ boards.
FIFO

============================
pALPIDE Test program
Git commit: TestBeamStable_2015-08-06-37-g2ea2e61
============================

Searching for DAQ boards
[root@localhost pALPIDEfs-software]#
```

The DAQ board is not found at all

- Increasing current : overcrrent
- Decreasing the cuurent : not found

-> We don’t understand this problem now

Summary

・pALPIDEfs is a pixel sensor detector(e.q. detect efficiency or noise)

・By connecting the pALPIDEfs and the DAQ board and PC, we are able to operate the test system

・Hardware setup, firmware upload and software install are finished

・In order to detect we have to do runtests

・We want to do some mesurements as soon as posible

Back up