

Front end Hybrid Industrial Tester

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<http://www.fynu.ucl.ac.be/themes/he/cms/activities/tracker/hybrids.html>

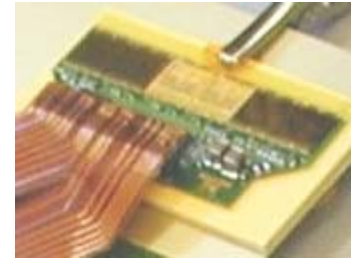
Front end Hybrid Industrial Tester

Three complementary tests of different natures :

Connectivity Test (CT)

Electrical Test (ET)

Functional Test (FT)



mono-FHIT

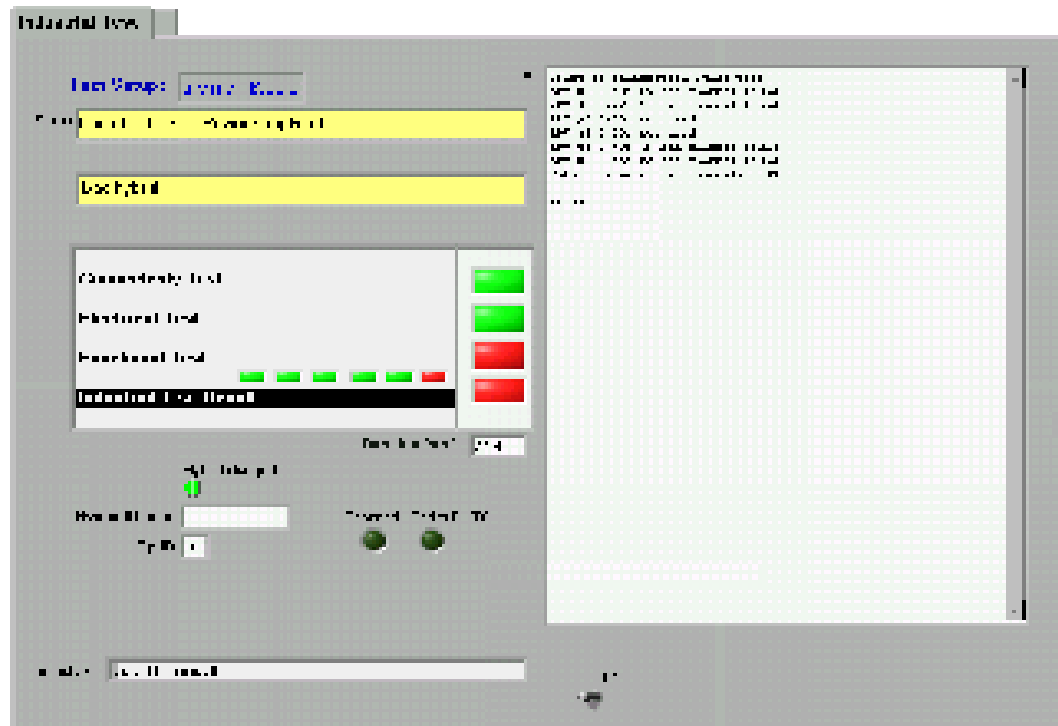
power supply

dual-FHIT



FHIT software

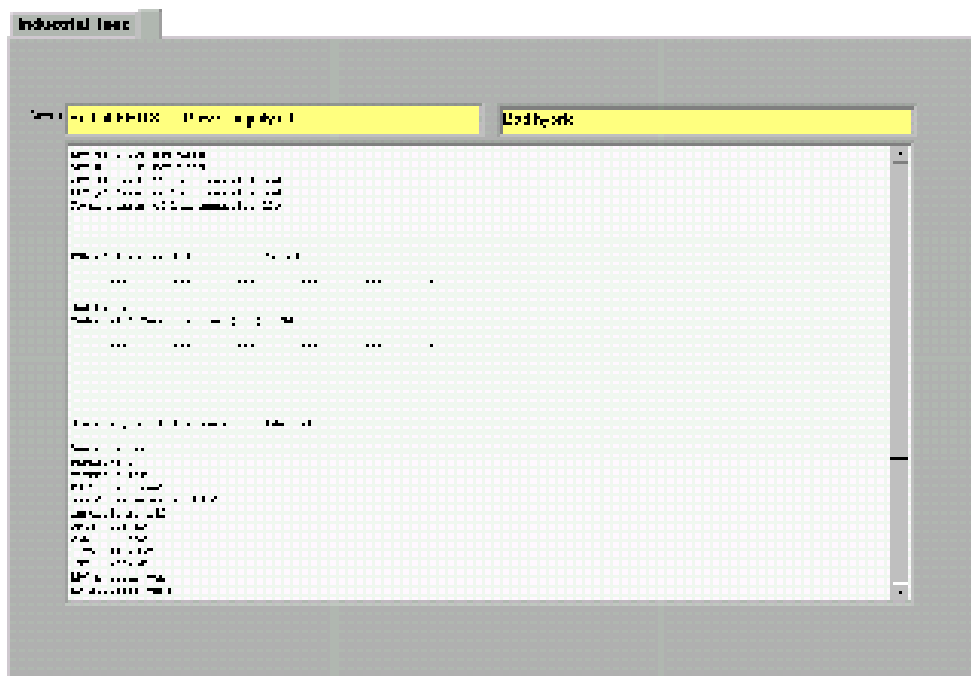
- test sequence, results and detected errors
- power supply control
- barcode scanning



LabVIEW interface

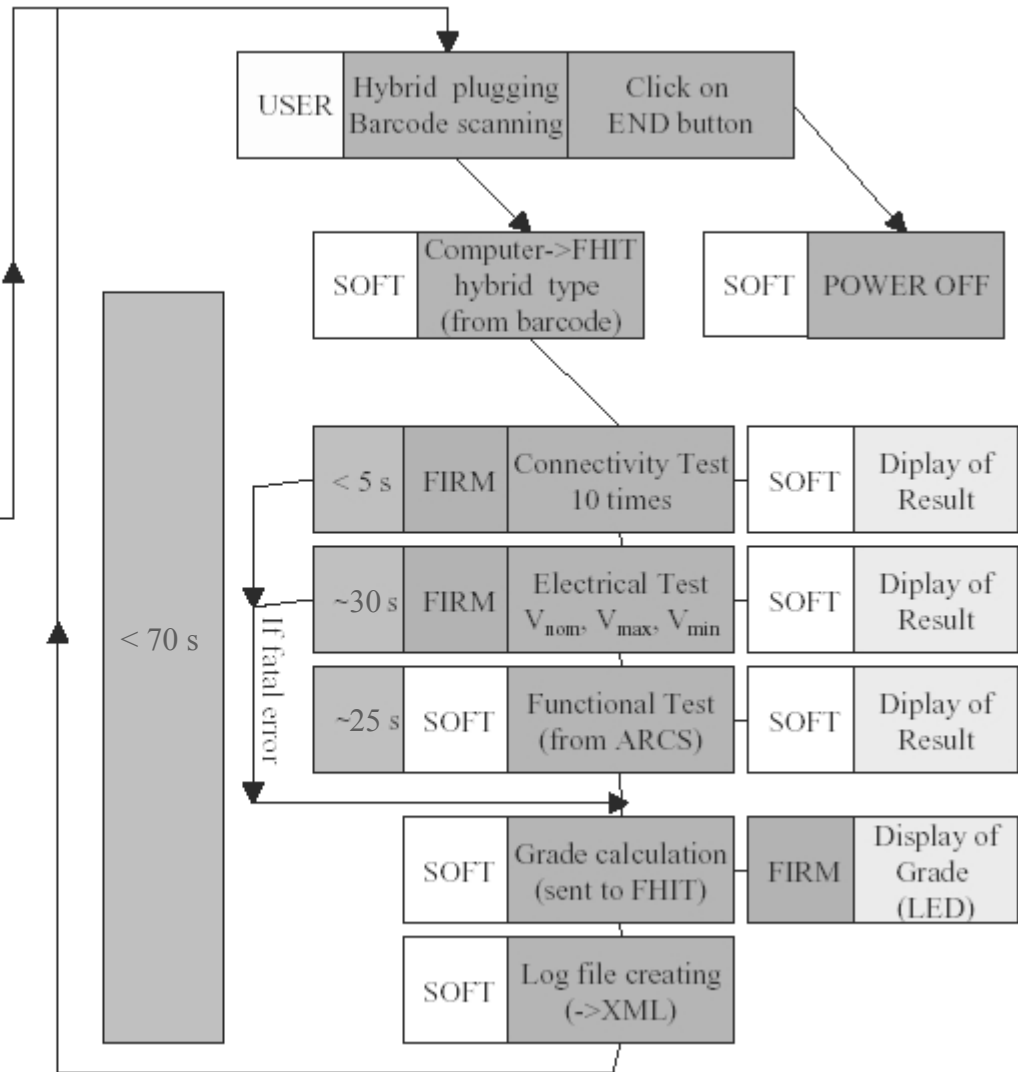
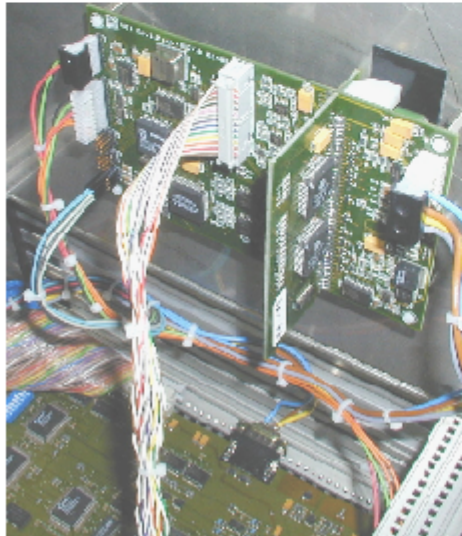
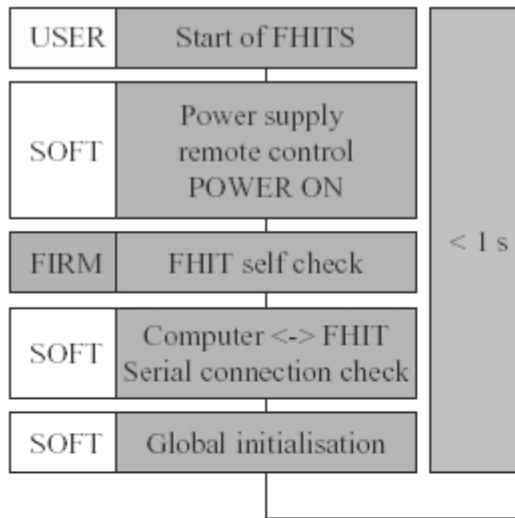
FHIT software

- log file creation + error file + hybrid identification file
 - XML (*CMS database*)
- mono- / dual-FHIT compatibility
- FHITS configuration via the config file



LabVIEW interface

Block diagram



Data acquisition

data acquisition in real (industrial like) conditions

62 FEH tested in Strasbourg

and 51 FEH passed CT and ET successfully

FEH types : 1663, 1664, 1665 = TOB/TEC top-4, bot-4, top-6

FHIT setup proved to be reliable

rapidity : dual-FHIT used

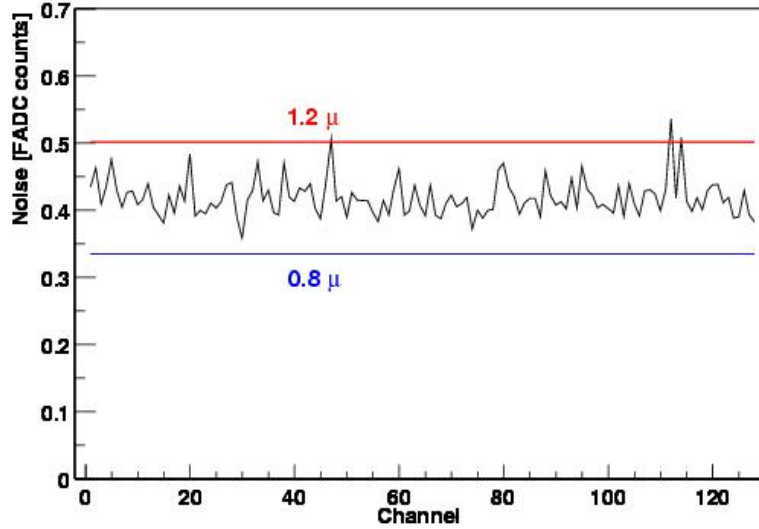
test ~ 70 seconds > time needed to handle FEH

analysis :

*APV25s currents, DCU calibration, APVMUX resistors,
pedestal, noise and gain measurements.*

Data analysis : noise (FT)

Noise distribution per channel (APV = 0x20, Part = 1665, N = 1)

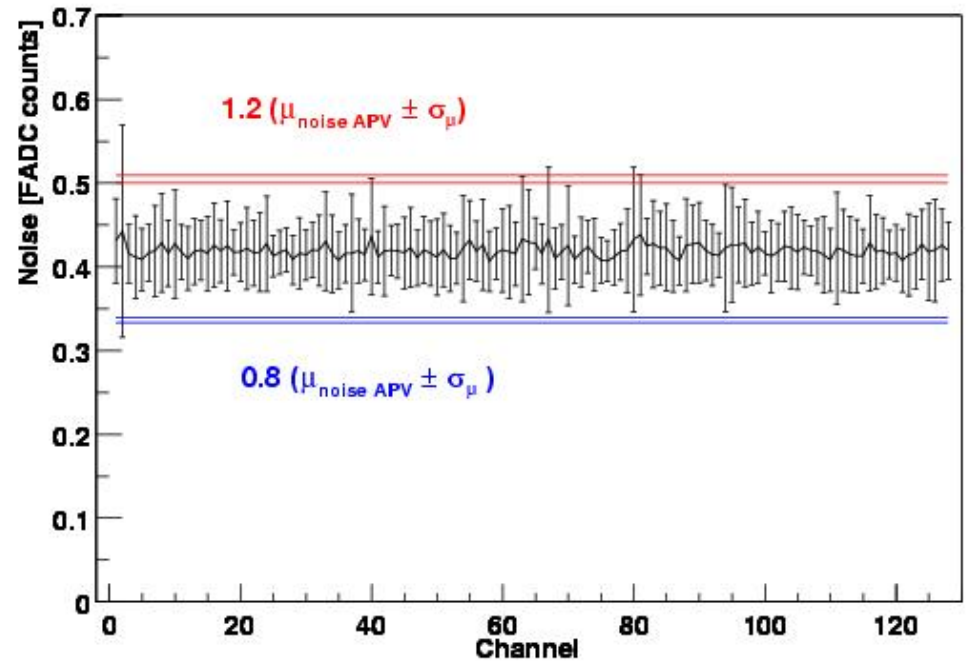


noise per channel for an APV of one FEH

good/bad channels selection criterion :

$$0.8 \mu < N_i < 1.2 \mu$$

Noise distribution per channel (APV = 0x20, Part = 1663, N = 38)

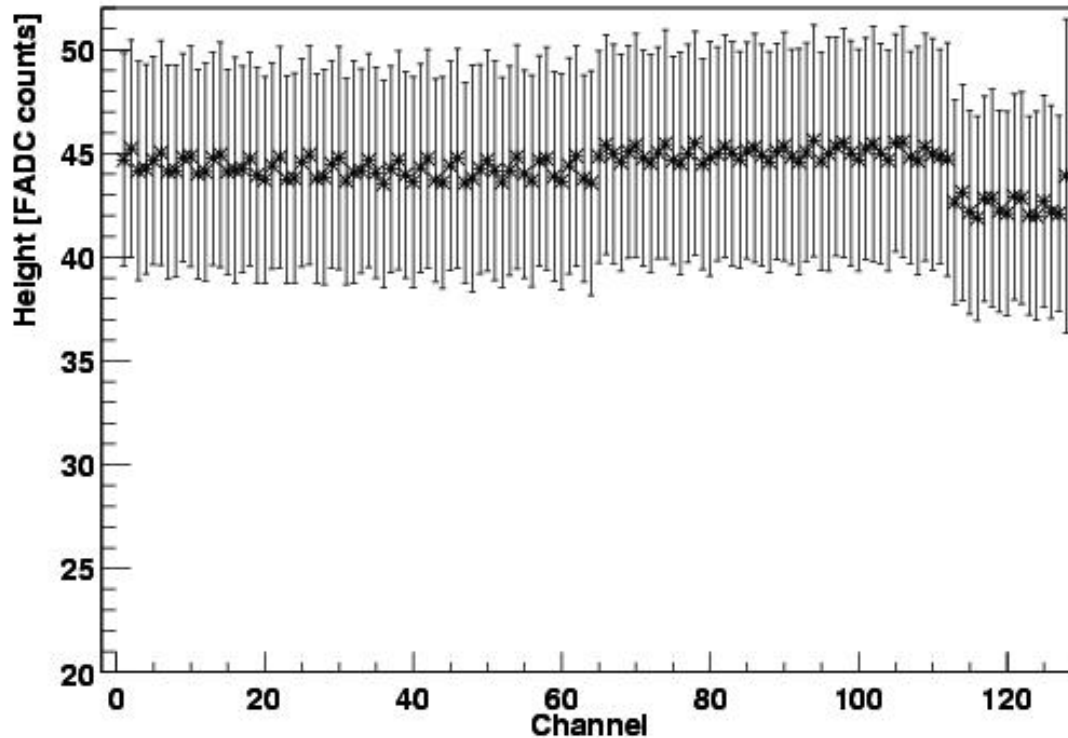


distribution of noise per channel for an APV address and for the sample of a given FEH type

critierion too restrictive !

Data analysis : gain (FT)

Distribution of response to calibration pulse per channel (APV = 0x21, Part = 1663, N = 38)



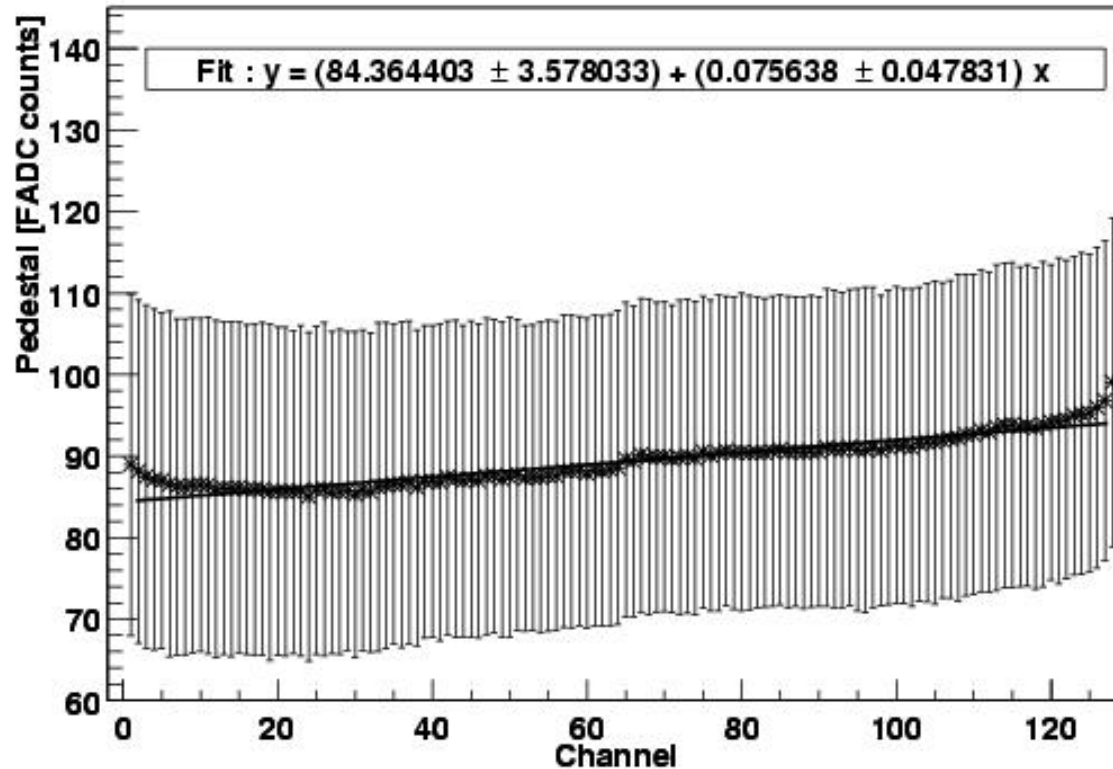
visible structures :
- 3 thresholds
- groups of 4 channels

channels NOT in order

gain distribution per channel for an APV
address and the sample of a given FEH type

Data analysis : pedestal (FT)

Pedestal distribution per channel (APV = 0x21, Part = 1663, N = 33)



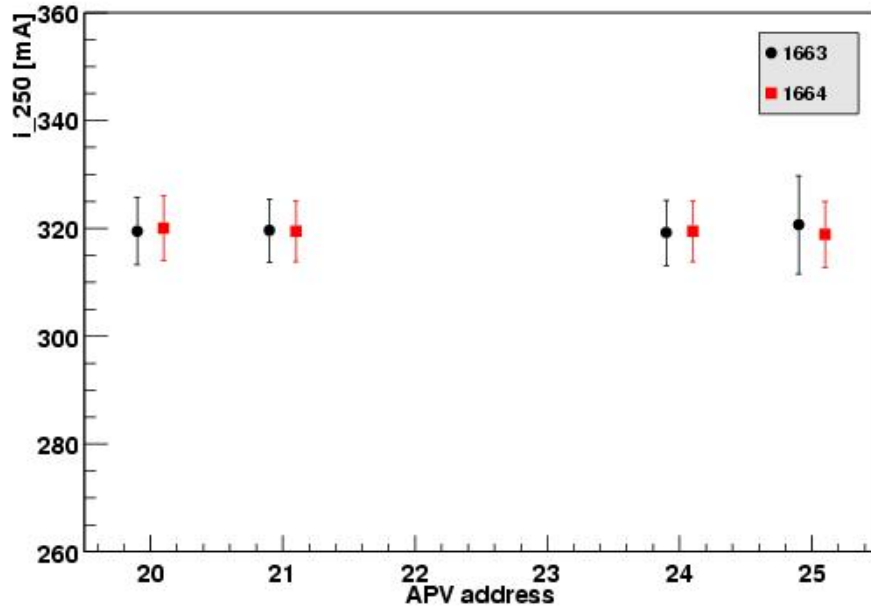
visible structures :
- linear increase
- border effects

*for each FEH :
strong correlation
between channels*

Pedestal distribution per channel for an APV address and for the sample of a given FEH type

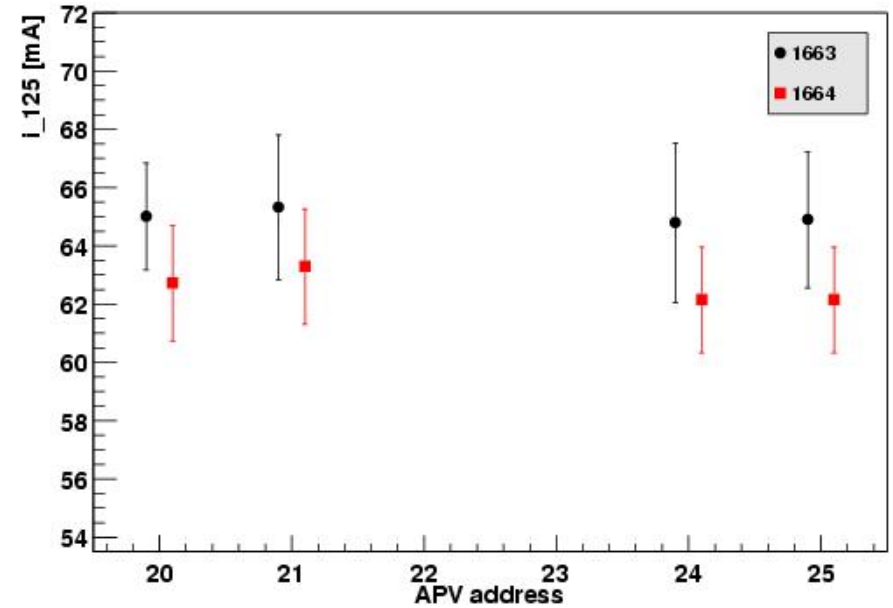
Data analysis : currents (ET)

1 σ current distribution per APV and FEH type (Vnom)



I_250

1 σ current distribution per APV and FEH type (Vnom)

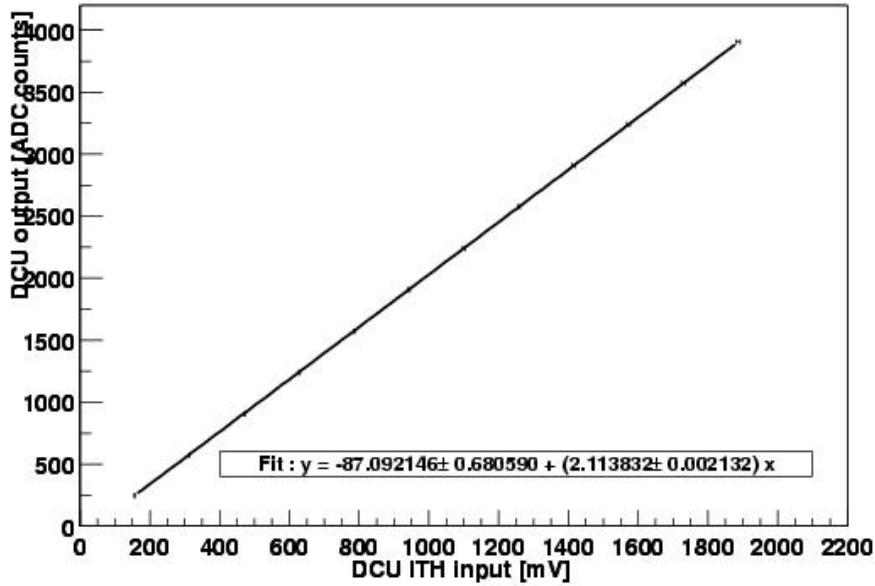


I_125

APV current consumption distribution
for an APV address and a sample of a given FEH type

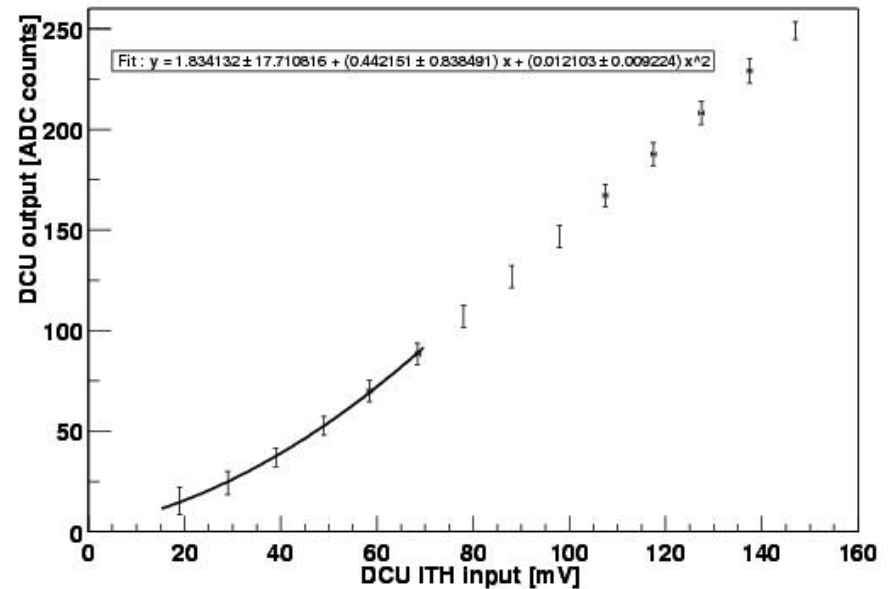
Data analysis : DCU (ET)

DCU calibration for FEH 1665 (Vnom, N= 1)



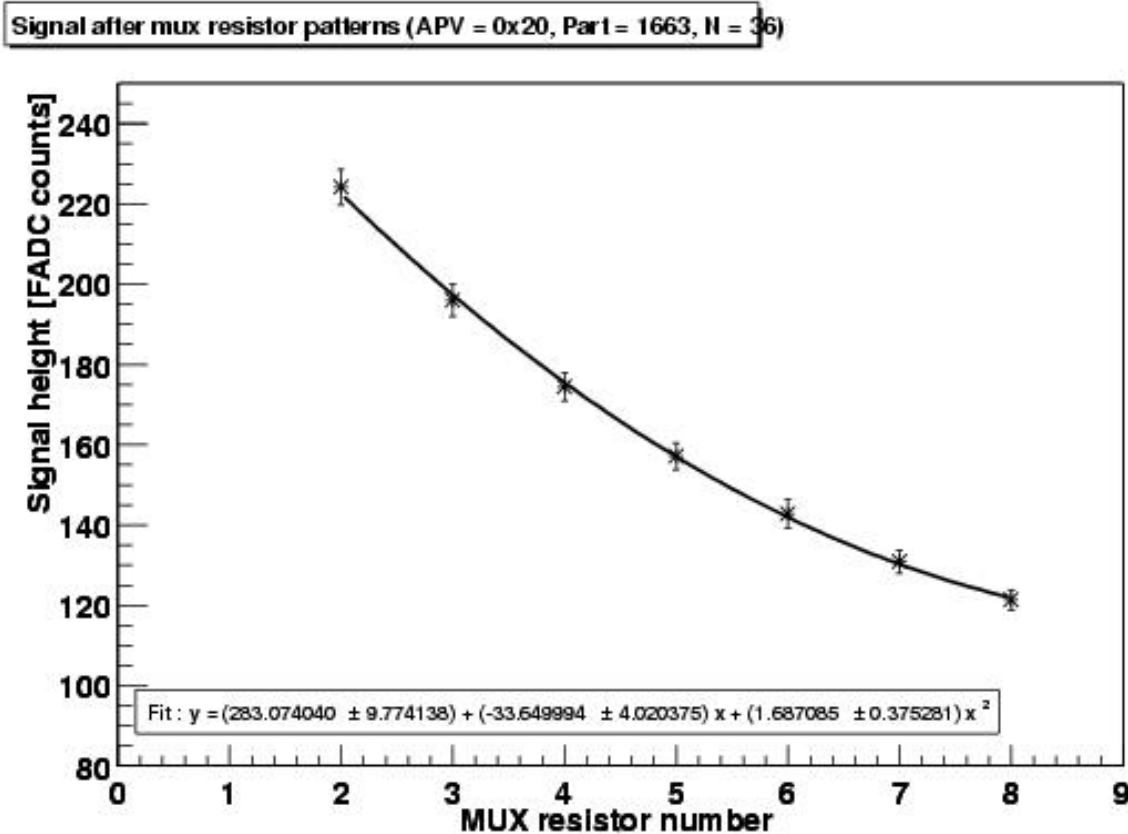
linear and non-linear regions

DCU calibration for FEH 1663 (Vnom, N= 38)



DCU calibration for an APV address and a given FEH

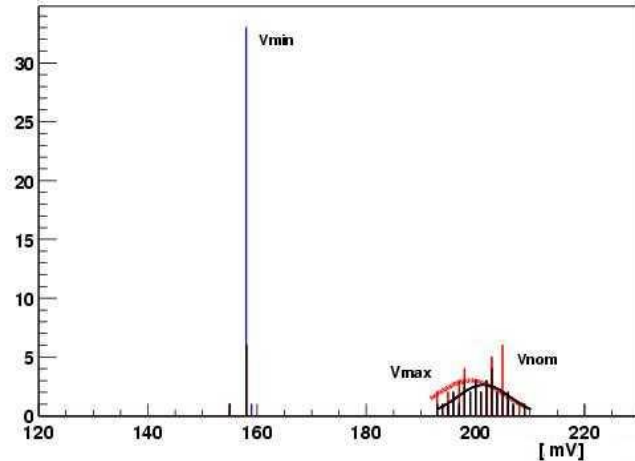
Data analysis : MUX resistors (FT)



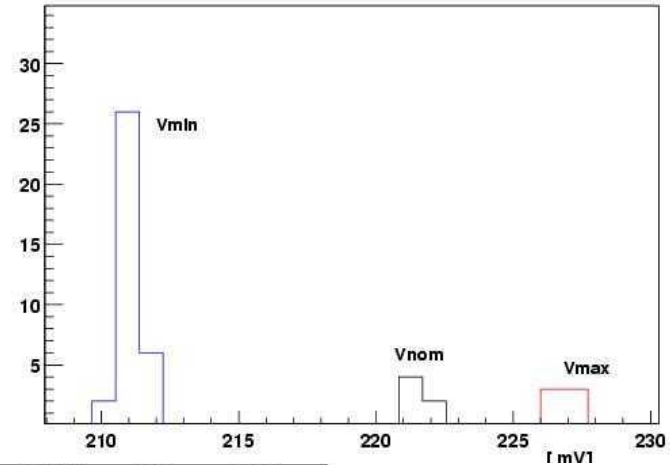
Signal height when MUX resistors are switched on for an APV address and a given FEH

Data analysis : DCU channels (ET)

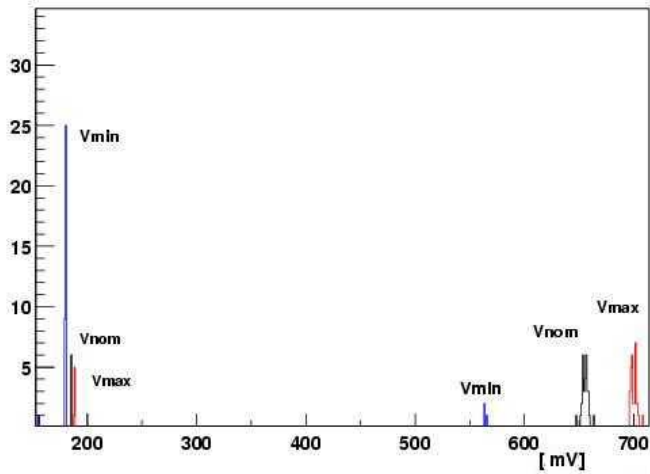
DCU channel 0 (part = 1663)



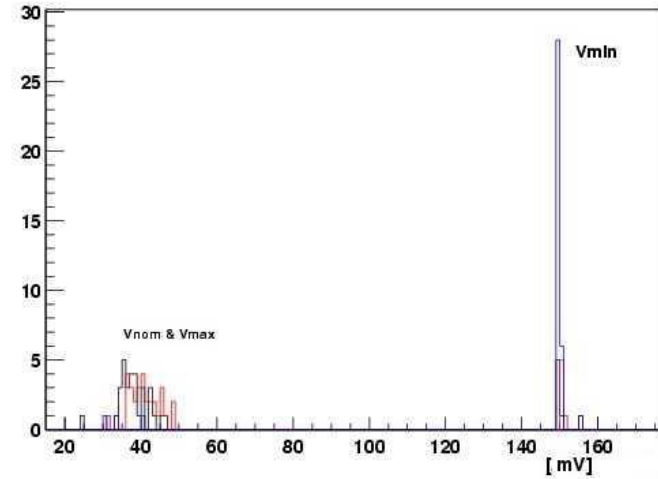
DCU channel 1 (part = 1663)



DCU channel 2 (part = 1663)



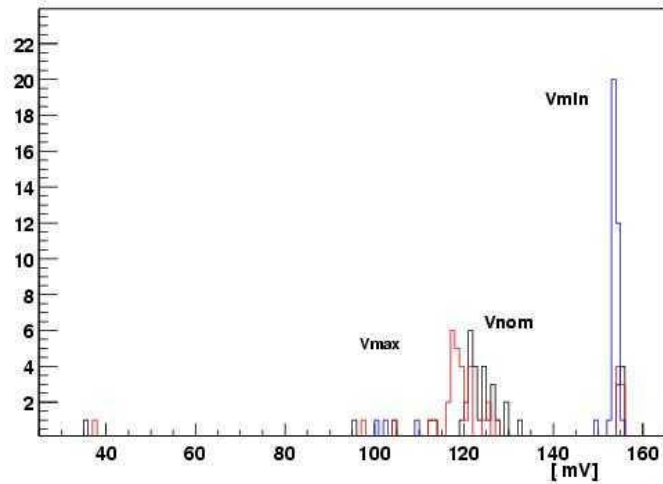
DCU channel 3 (part = 1663)



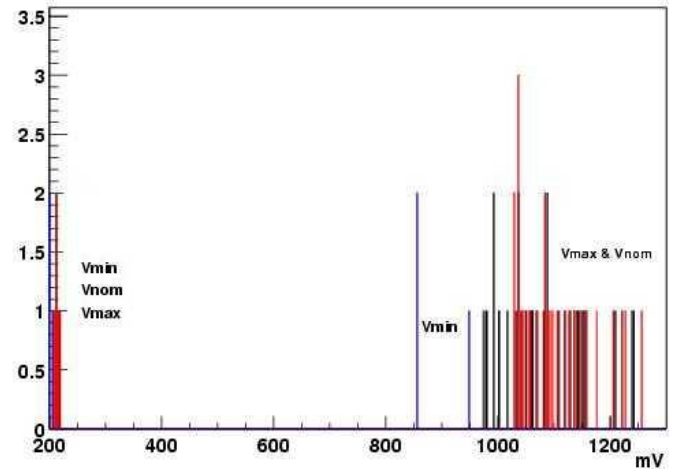
DCU channels [0..3] for a given FEH type

Data analysis : DCU channels (ET)

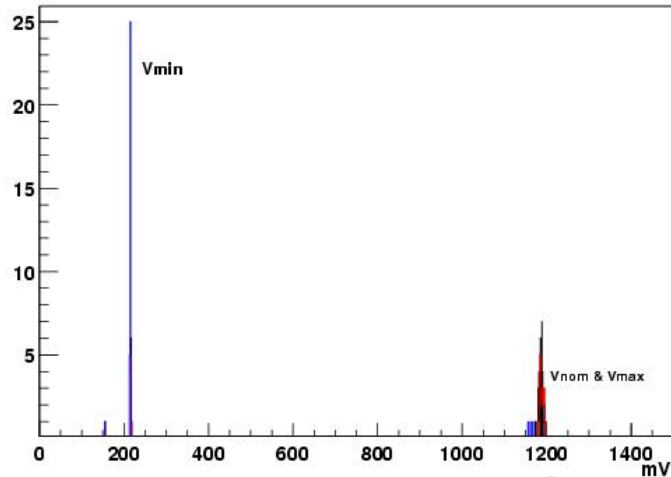
DCU channel 4 (part = 1663)



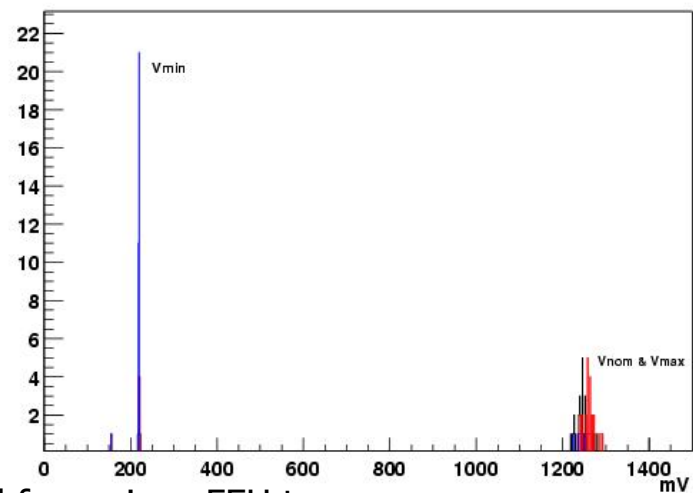
DCU channel 5 (part = 1663)



DCU channel 6 (part = 1663)



DCU channel 7 (part = 1663)



DCU channels [4..7] for a given FEH type

Conclusions

FHIT & FHITS : realised and tested

data acquisition in *industrial* conditions

first data analysis : carактерization of hybrids

FHIT quick reference guide available

<http://www.fynu.ucl.ac.be/themes/he/cms/activities/tracker/hybrids.html>