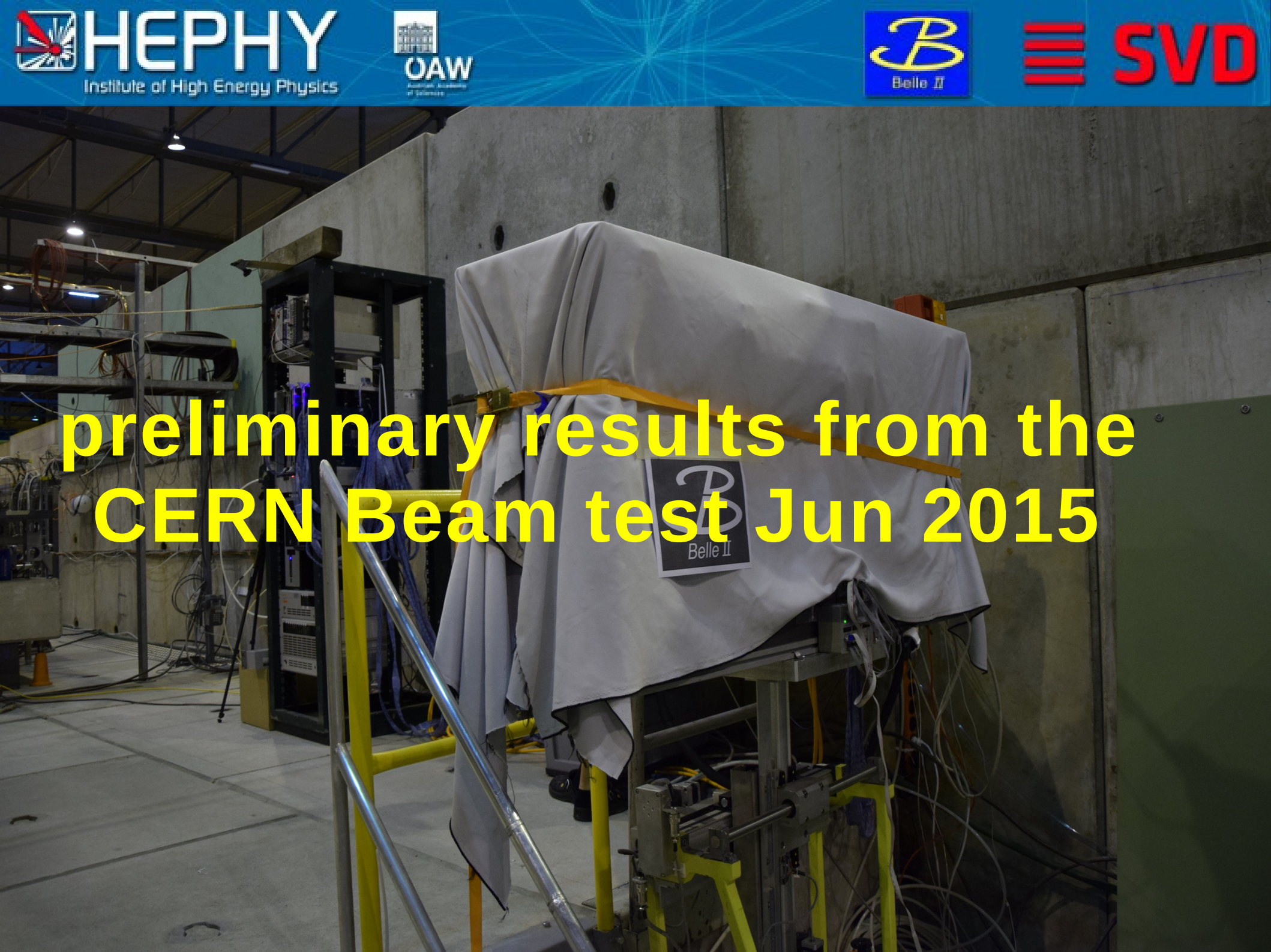
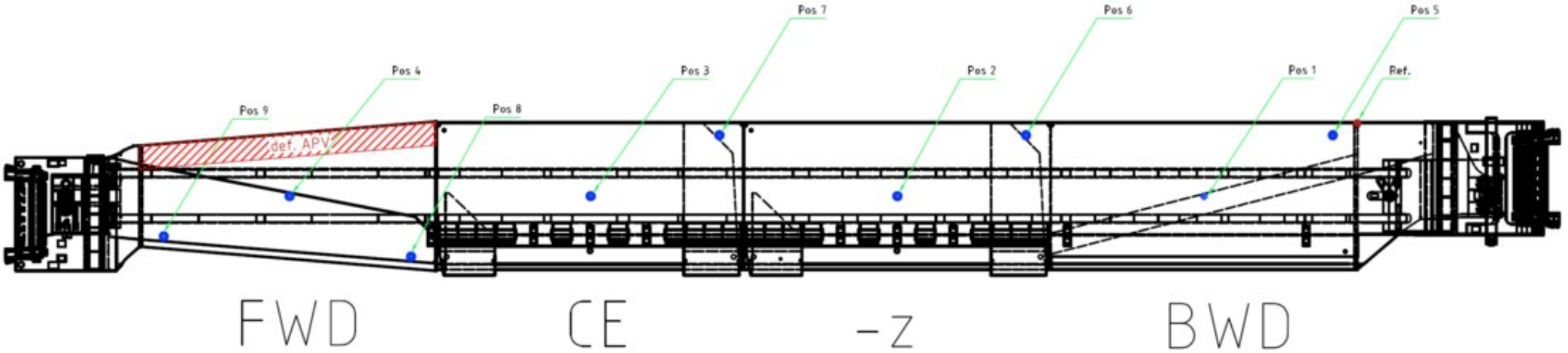

HEPHY
Institute of High Energy Physics
OAW
Belle II
SVD
preliminary results from the
CERN Beam test Jun 2015
Belle II

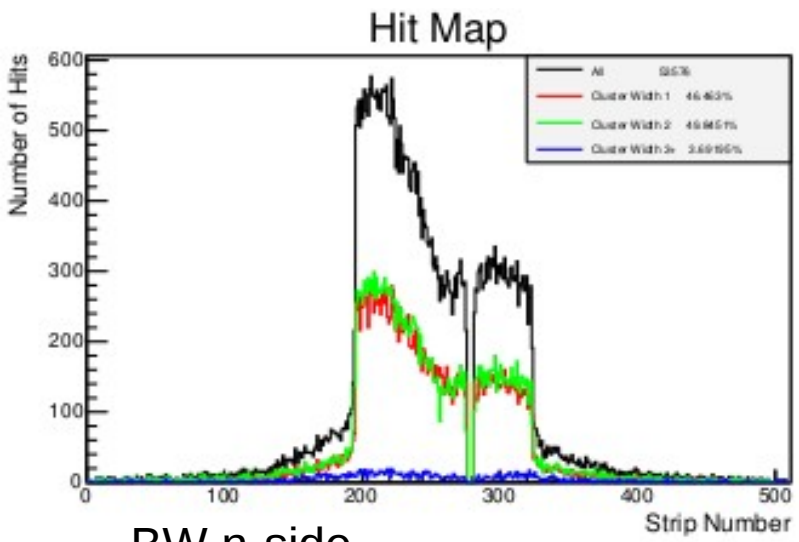
Setup Overview

- SVD L3-L6 Origami modules
- L5 Ladder (Class-B) L5.903
- CO2 Cooling
- FADC readout chain

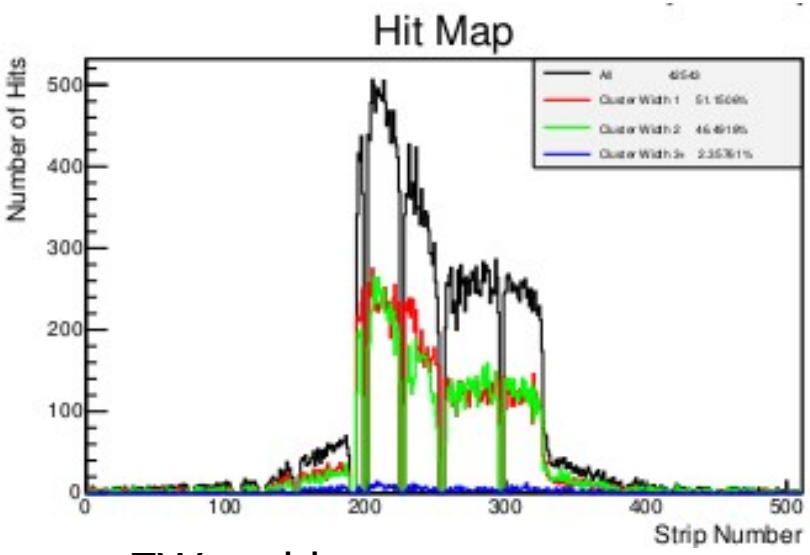
Beam positions on the Ladder



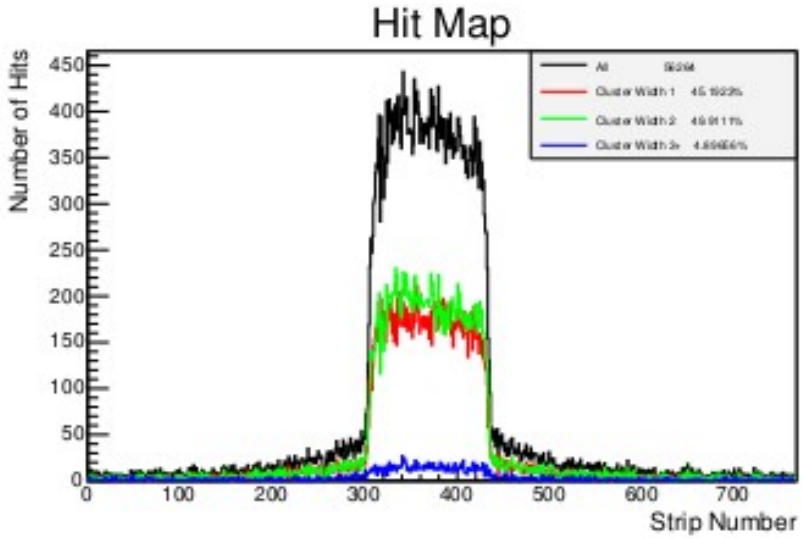
BEAM profile (Hit maps)



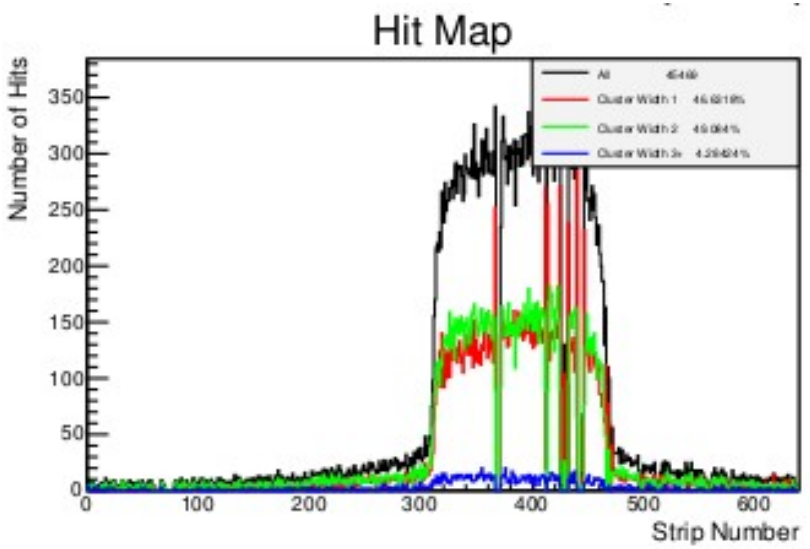
- BW n-side



- FW n-side

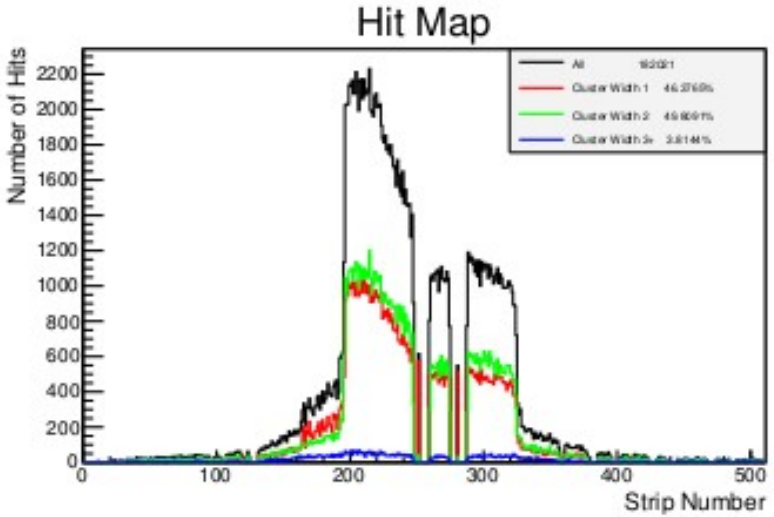


- BW p-side

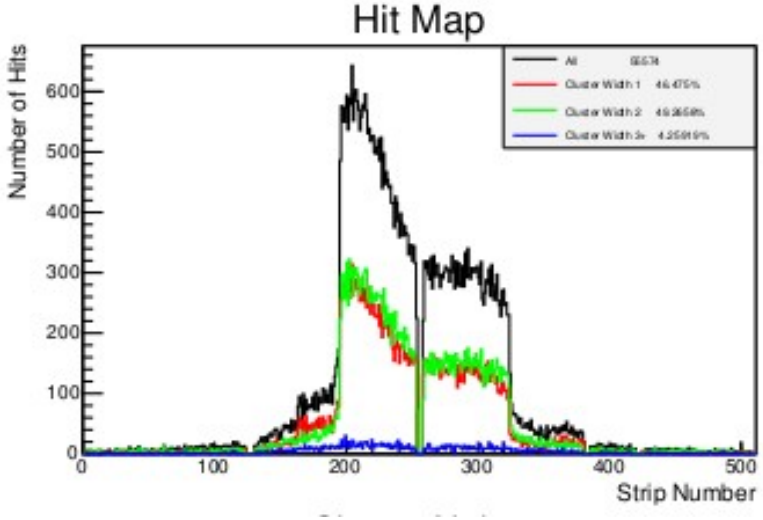


- FW p-side

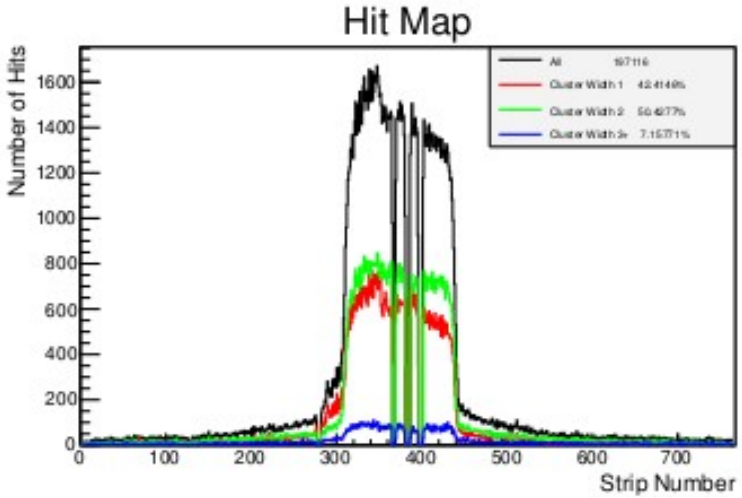
BEAM profile (Hit maps)



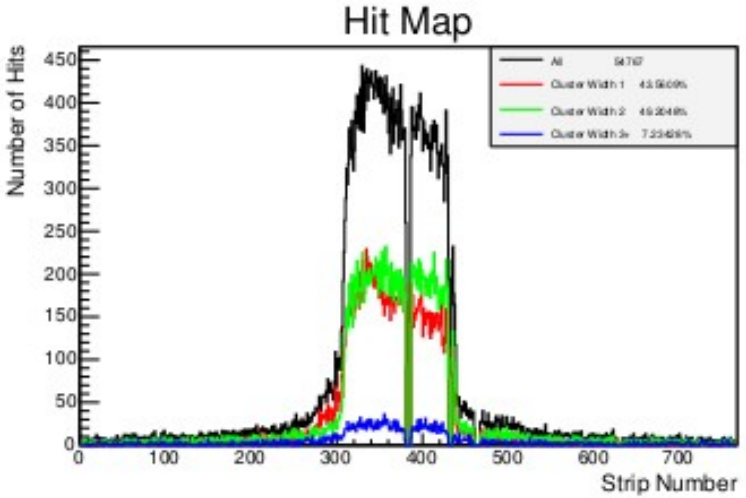
- CE n-side



- -Z n-side

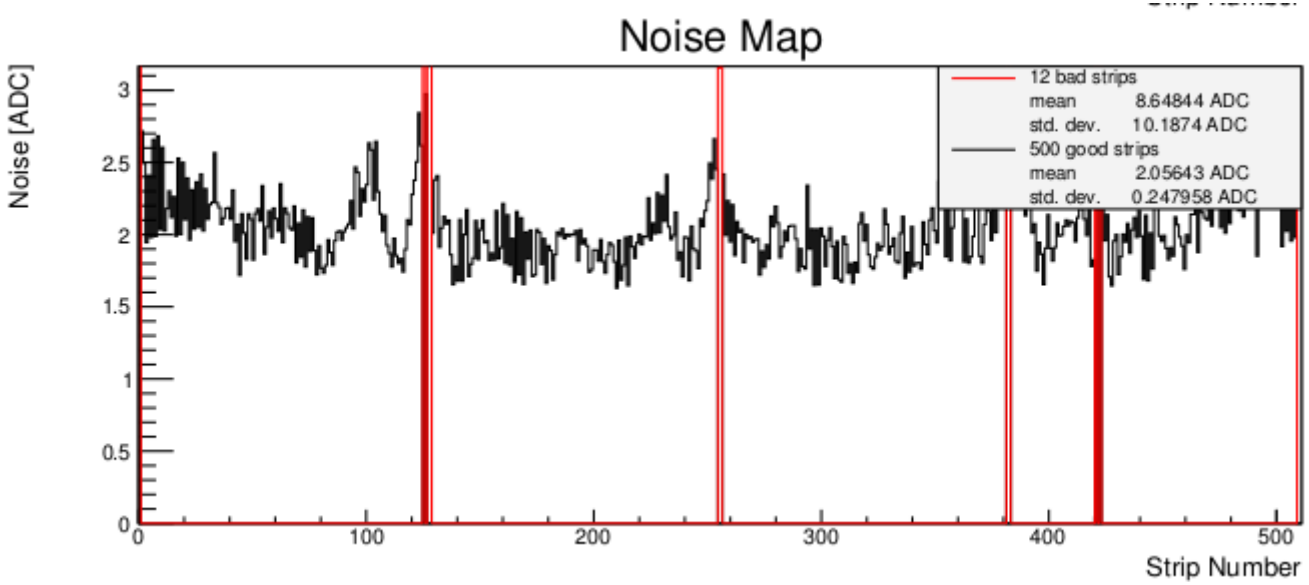


- CE p-side

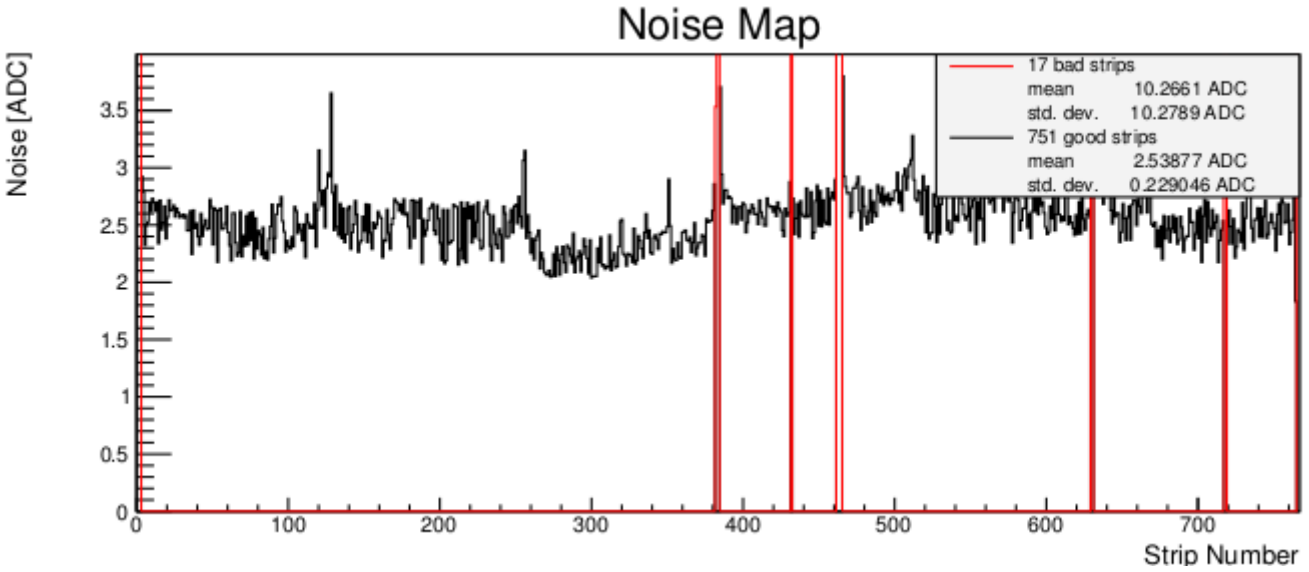


- -Z p-side

Noise Maps

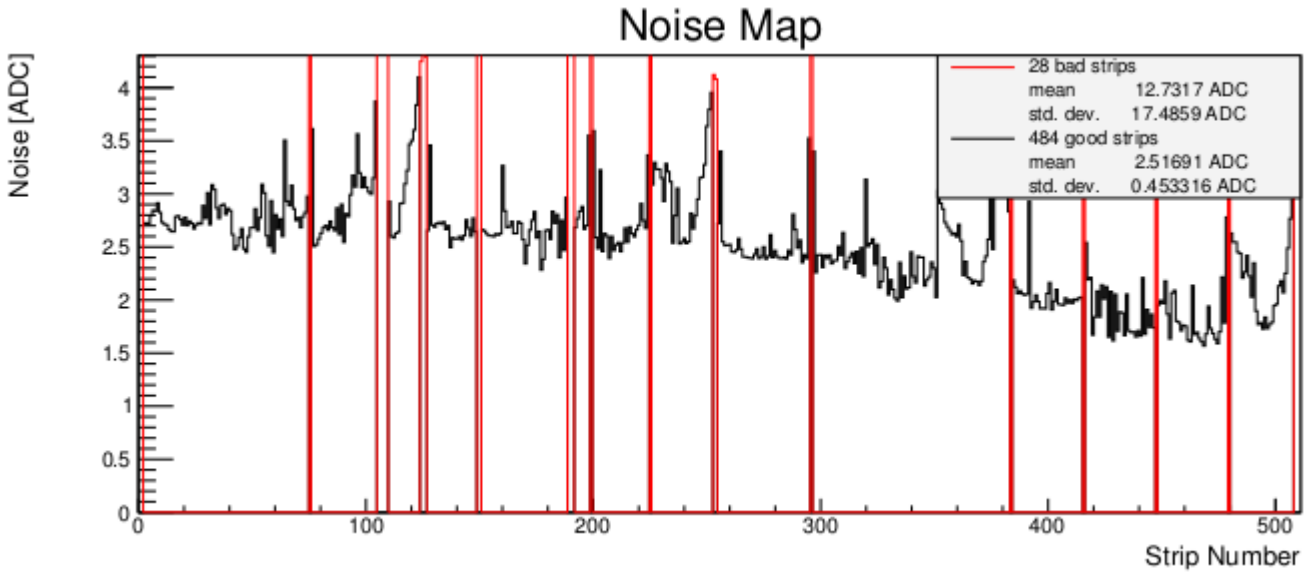


- Z n-side:
  - 12 bad Strips
  - Mean Noise 2.05 ADC

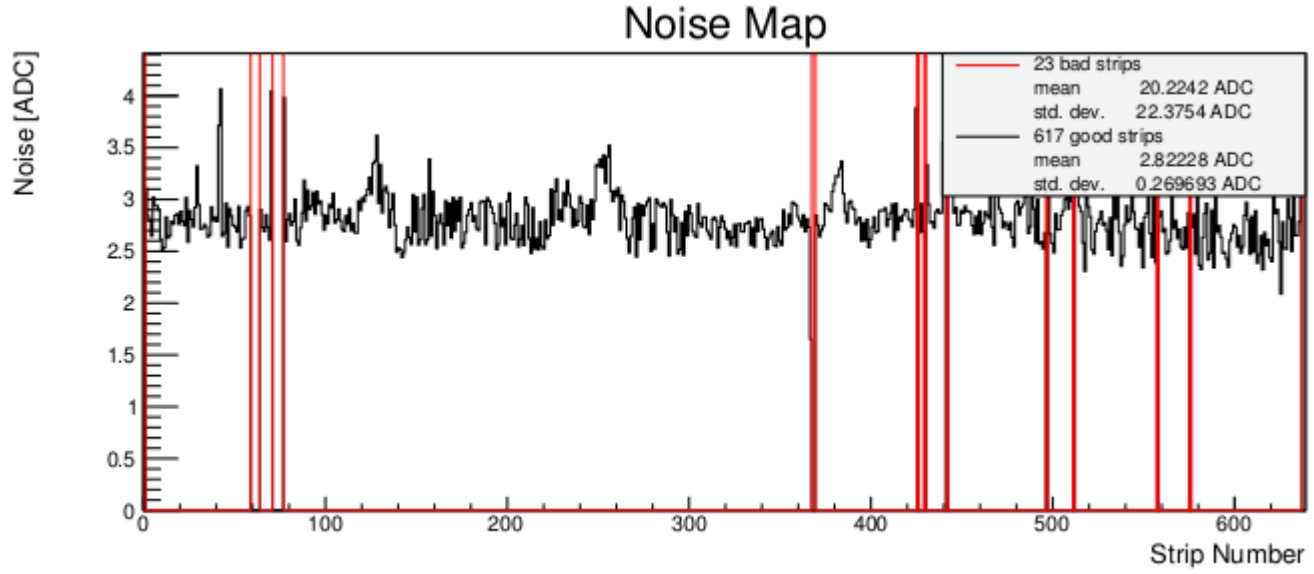


- Z p-side:
  - 17 bad Strips
  - Mean Noise 2.54 ADC

Noise Maps

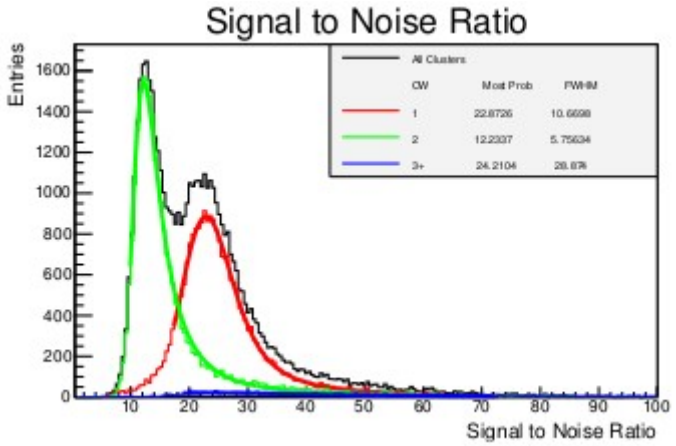


- FW n-side:
  - 28 bad Strips
  - Mean Noise 2.51 ADC
  - Slight decrease due to trapezoid geometry



- FW p-side:
  - 23 bad Strips
  - Mean Noise 2.82 ADC

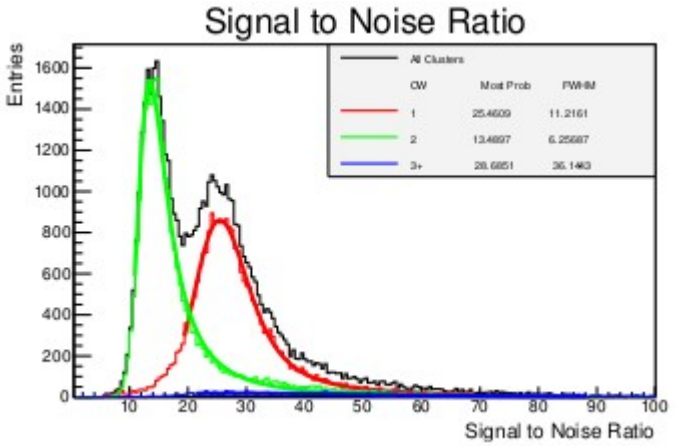
Signal to Noise



CW 1
S/N = 22.8

CW 2
S/N = 12.2

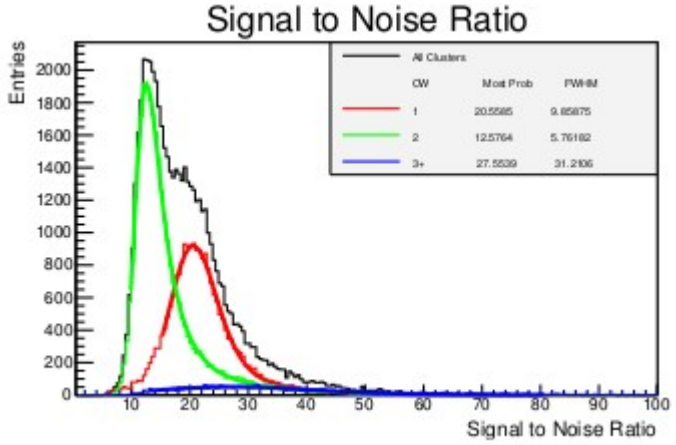
BW n-side without cooling



CW 1
S/N = 25.4

CW 2
S/N = 13.4

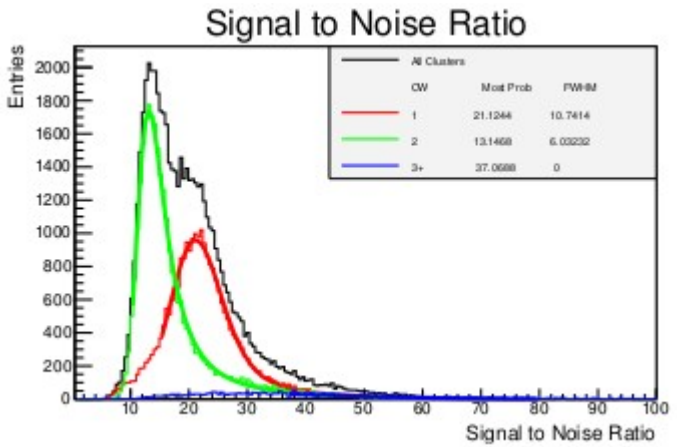
BW n-side with cooling (-20C°)



CW 1
S/N = 20.5

CW 2
S/N = 12.5

BW p-side without cooling

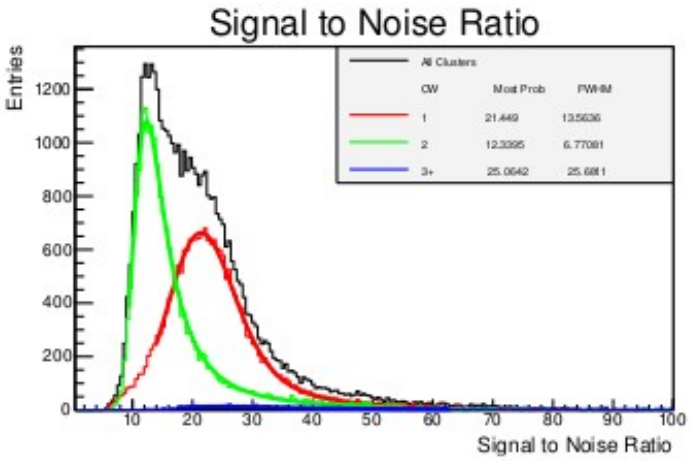


CW 1
S/N = 21.1

CW 2
S/N = 13.1

BW p-side with cooling (-20C°)

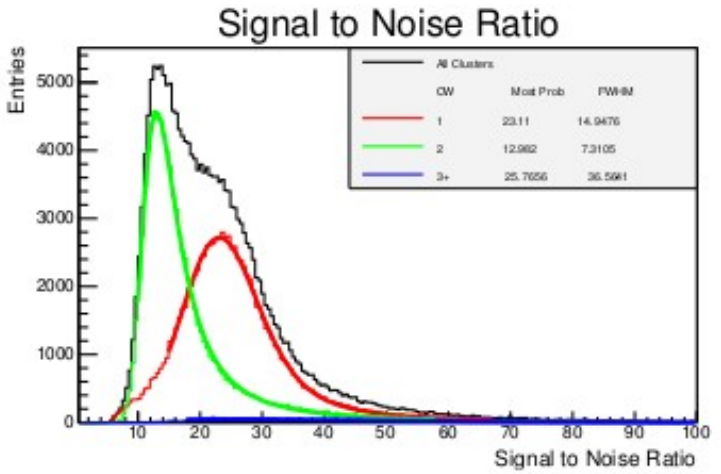
Signal to Noise



CW 1
S/N = 21.4

CW 2
S/N = 12.3

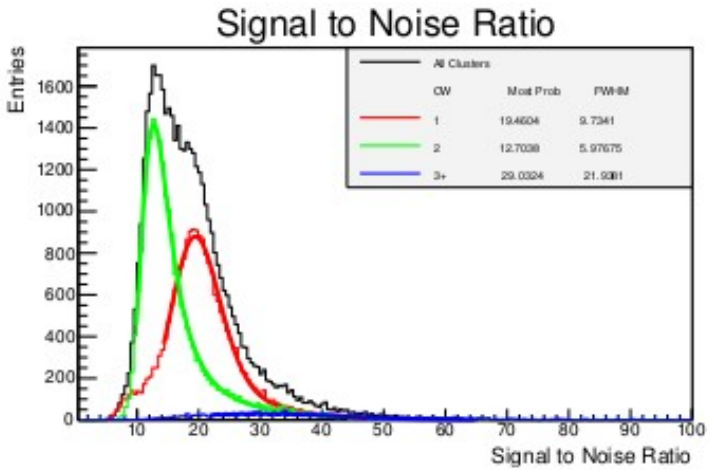
-FW n-side without cooling



CW 1
S/N = 23.1

CW 2
S/N = 12.9

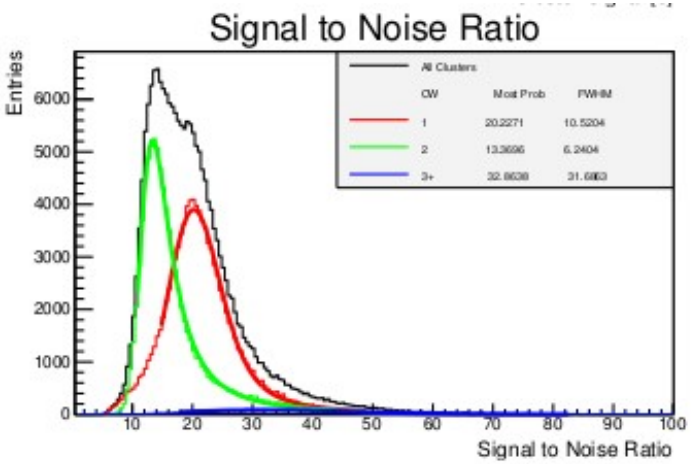
-FW n-side with cooling (-20C°)



CW 1
S/N = 19.4

CW 2
S/N = 12.7

-FW p-side without cooling

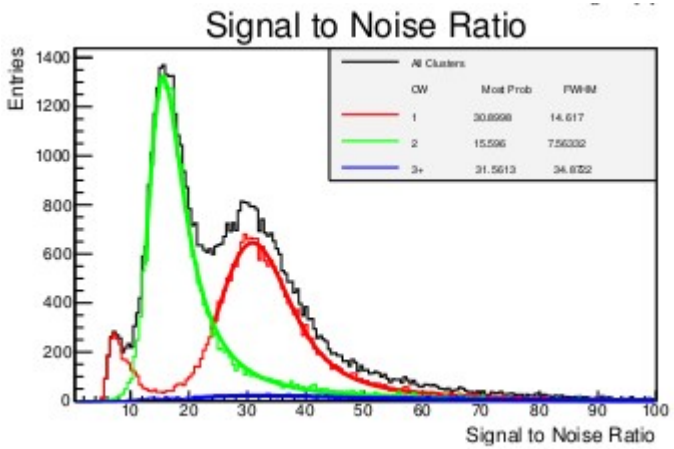


CW 1
S/N = 20.2

CW 2
S/N = 13.3

-FW p-side with cooling (-20C°)

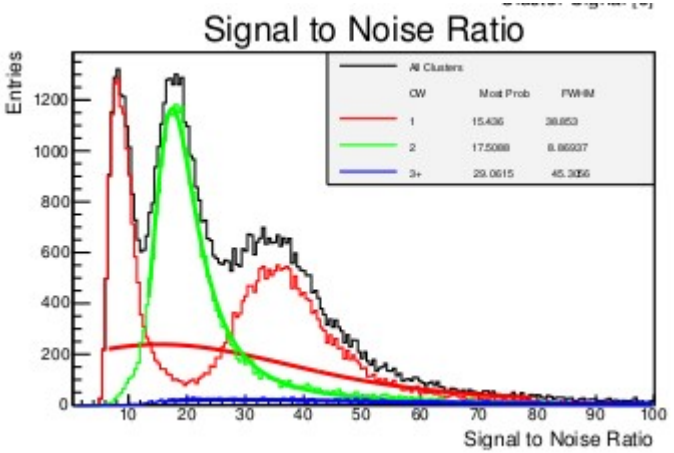
Signal to Noise



CW 1
S/N = 30.8

CW 2
S/N = 15.5

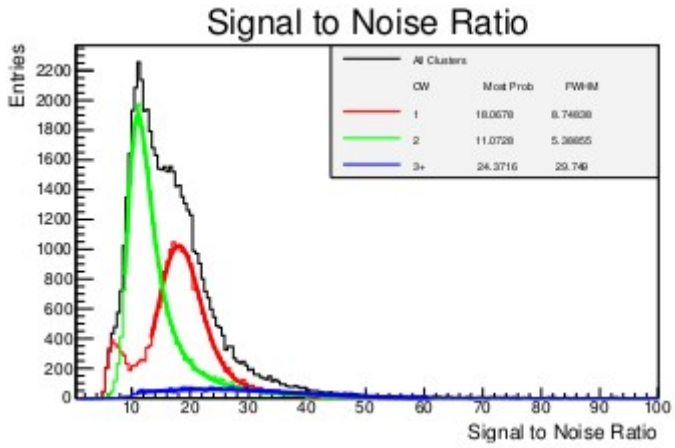
-Z n-side without cooling



CW 1
S/N = 35.1

CW 2
S/N = 17.5

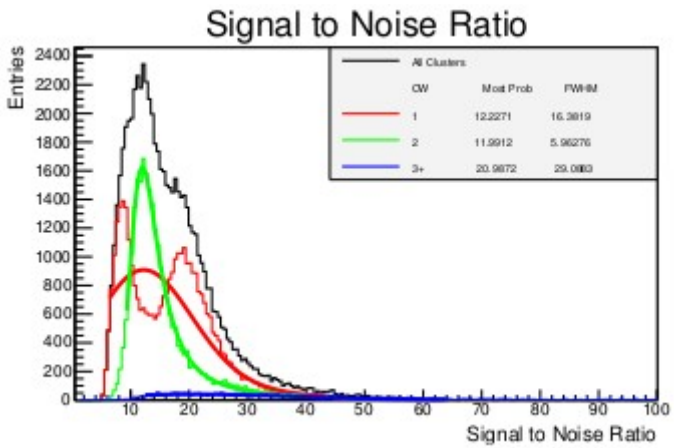
-Z n-side with cooling (-20C°)



CW 1
S/N = 18.0

CW 2
S/N = 11.0

-Z p-side without cooling



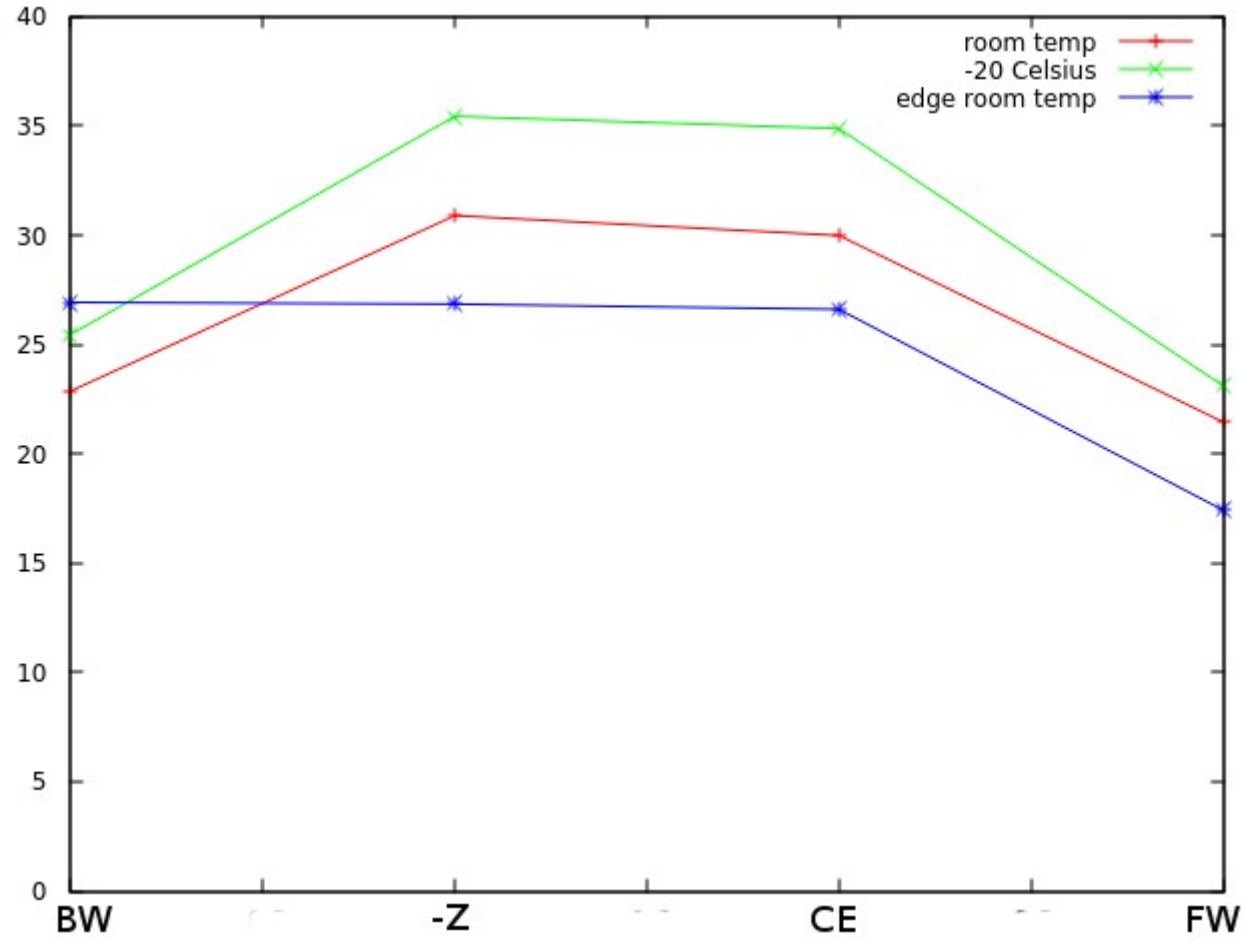
CW 1
S/N = 21.1

CW 2
S/N = 11.9

-Z p-side with cooling (-20C°)

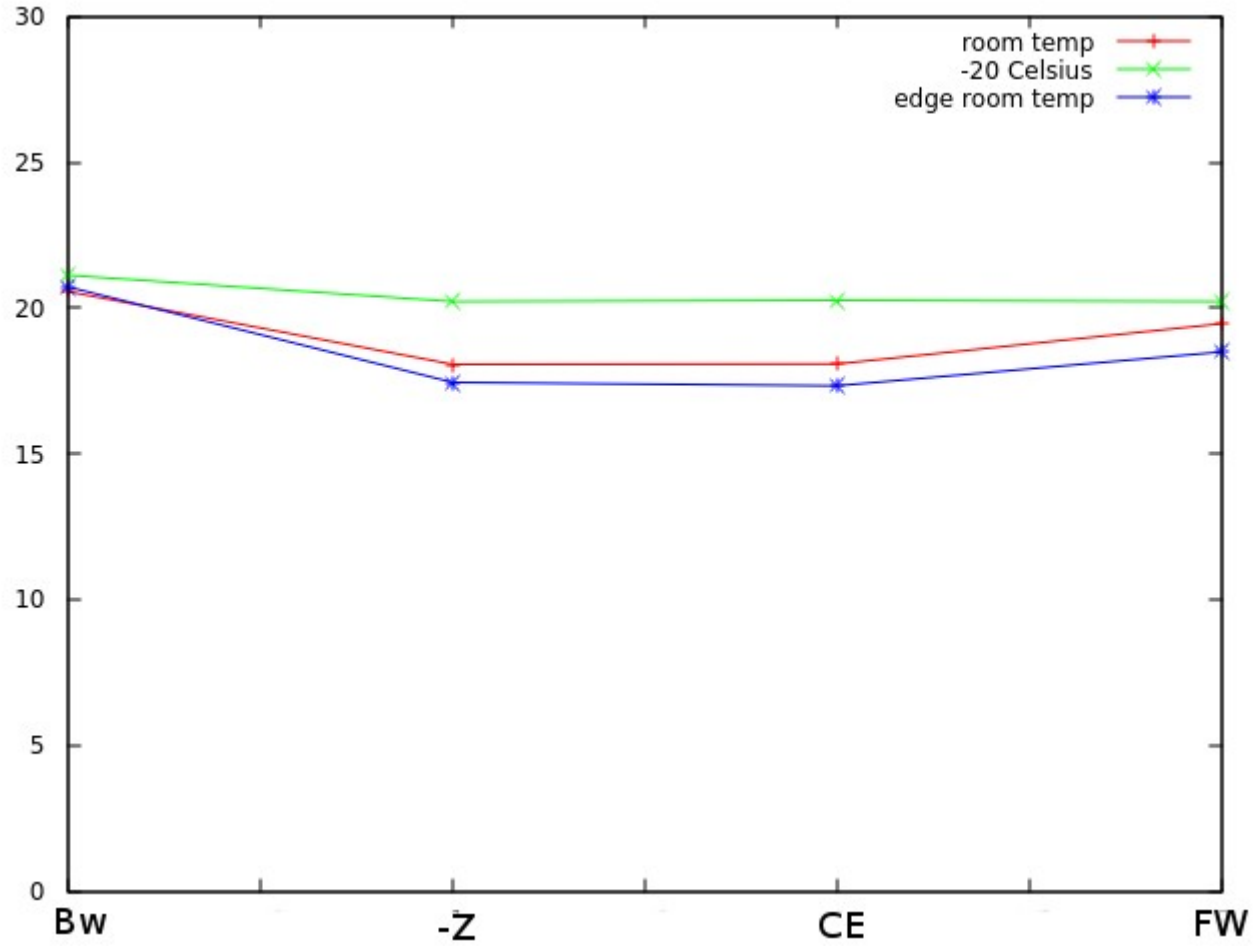
Signal to Noise

SNR n-side: all detectors



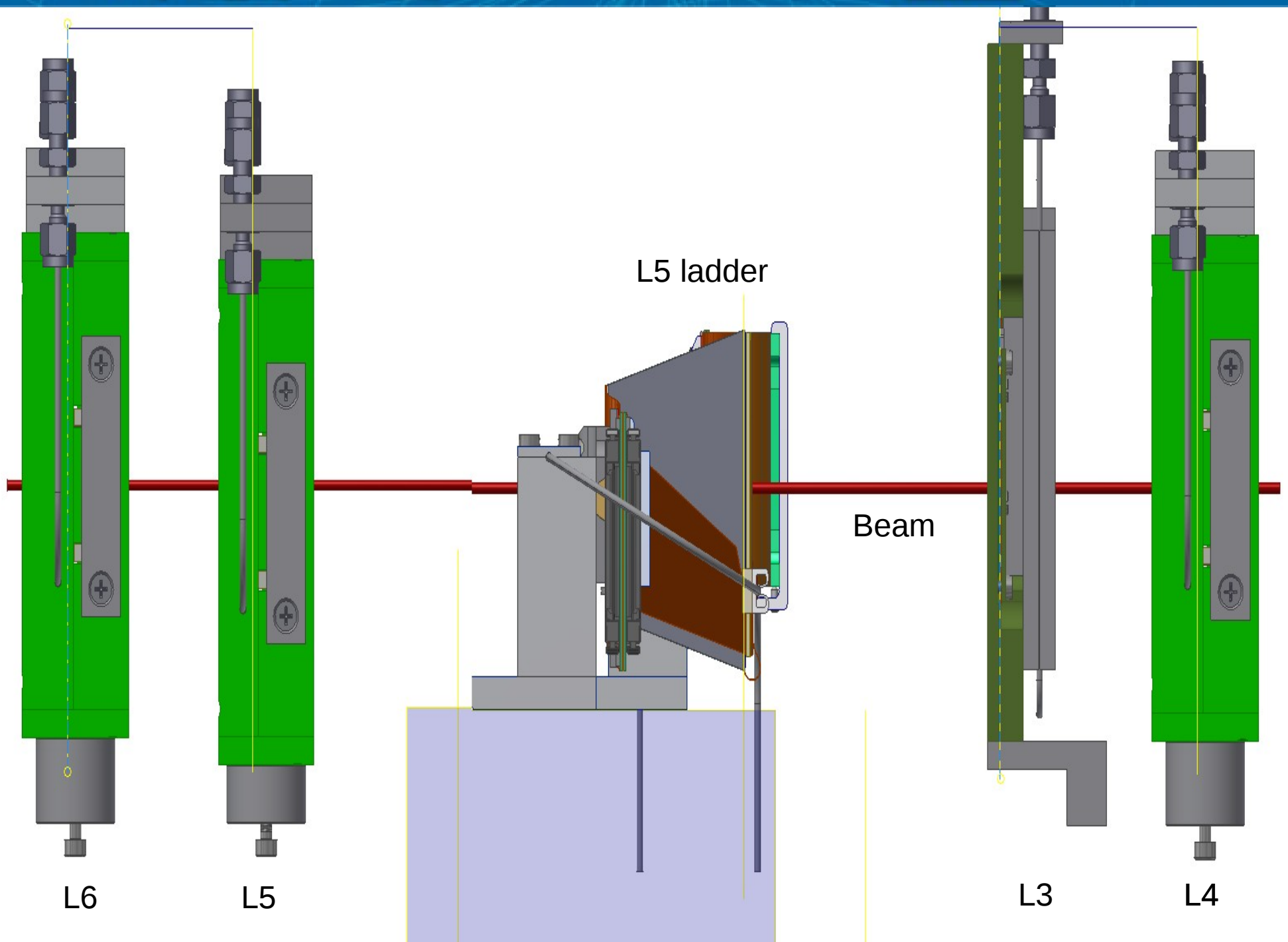
Signal to Noise

SNR p-side: all detectors



Tracking with the “Pseudo” Telescope

- **Software:**
  - Aida Eutel Telescope Framework
  - LCIOconv (with ghost hit elimination and eta correction)
  - TUXOA
- **DUT:**
  - L5 Ladder
- **Telescope planes: (from DESY beam test 2014)**
  - L4 Origami Module
  - L3 Module
  - L5 Origami Module
  - L6 Origami Module


L5 ladder
Beam
L6
L5
L3
L4

Expected Resolutions

Binary Resolution: (pitch/sqrt(12))

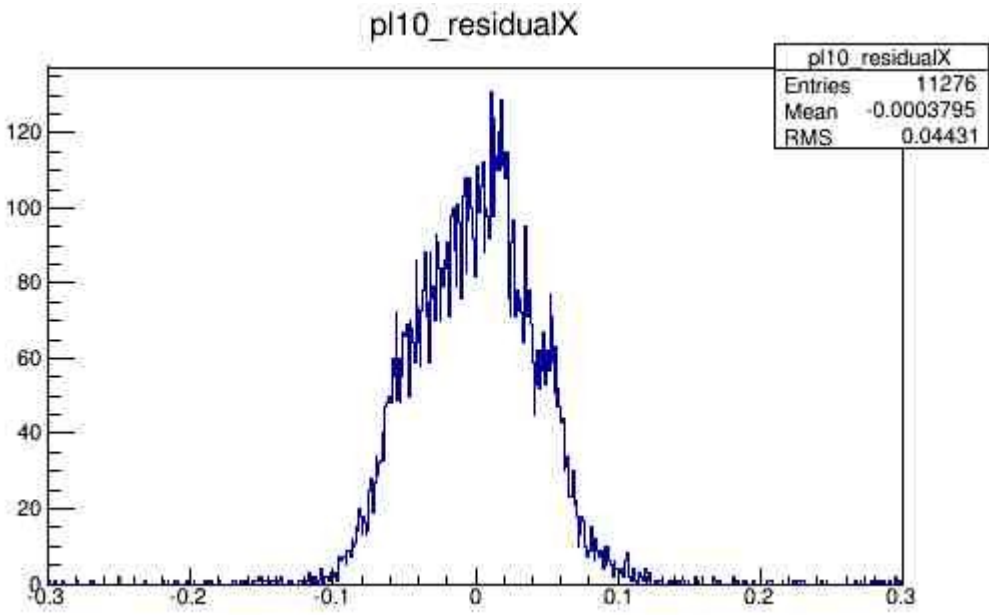
- L4 L5 L6
  - N-side: 69.2 um
  - P-side: 21.6 um
- Pitch
  - N-side: 240 um
  - P-side: 75 um
- Also for L5 ladder except FW

- L3
  - N-side: 46.1 um
  - P-side: 14.4 um
- Pitch
  - N-side: 160 um
  - P-side: 50 um

Expected resolutions are better due to cluster width > 1 for which eta correction is used

Residuals

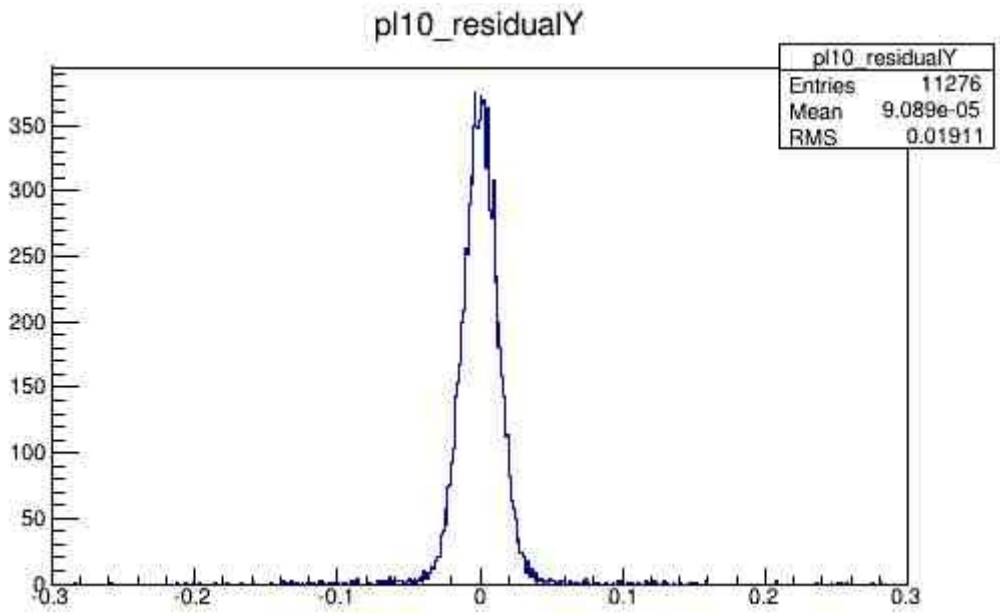
Ladder BW n-side :



RMS = 44.31 um

(BIN = 69.2 um)

Ladder BW p-side :

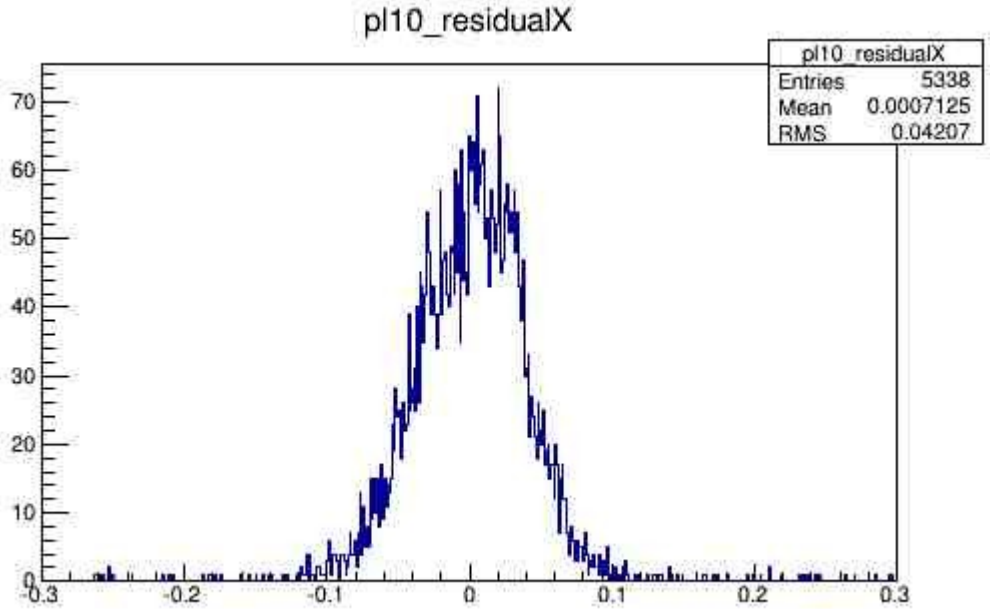


RMS = 19.11 um

(BIN = 21.6 um)

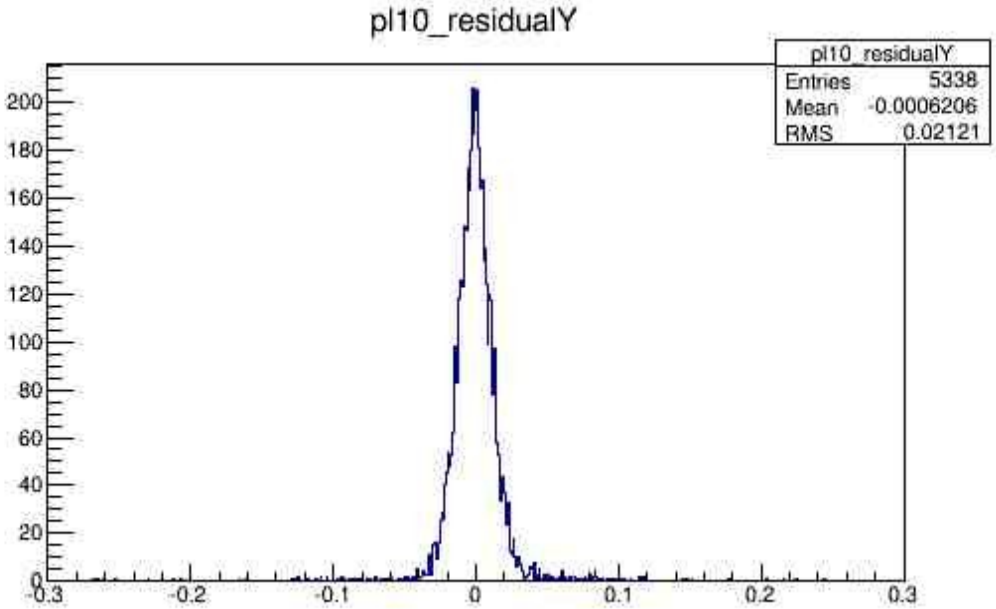
Residuals

Ladder BW n-side : edge



RMS = 42.07 um
(BIN = 69.2 um)

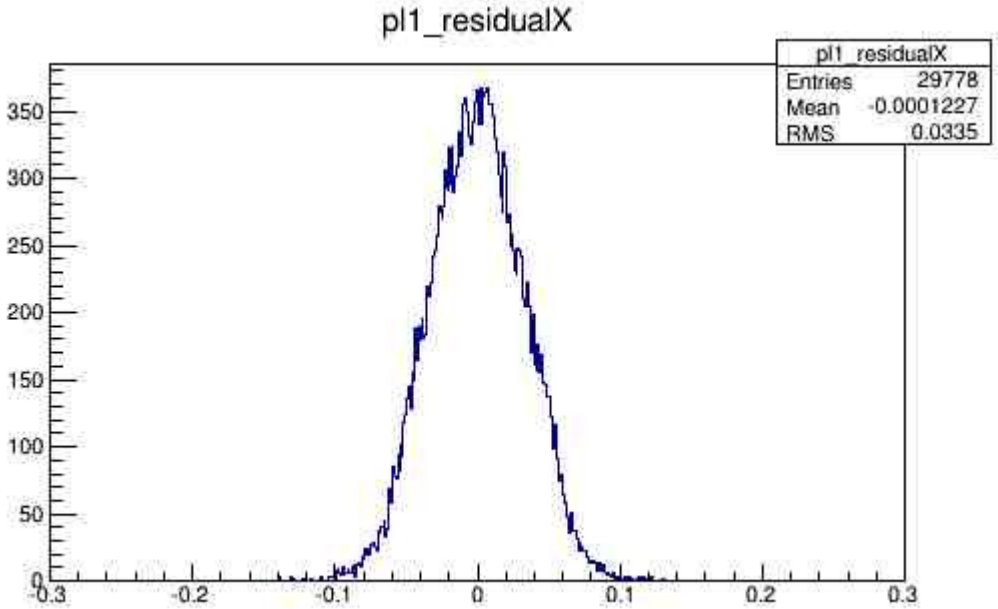
Ladder BW p-side : edge



RMS = 21.21 um
(BIN = 21.6 um)

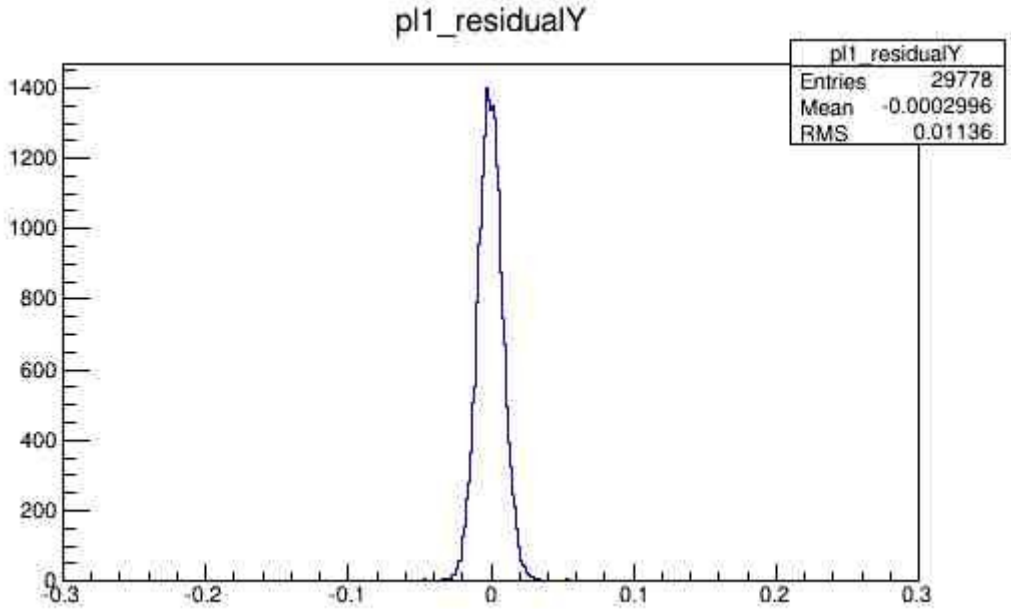
Residuals

L3 n-side :



RMS = 33.5 um
(BIN = 46.1 um)

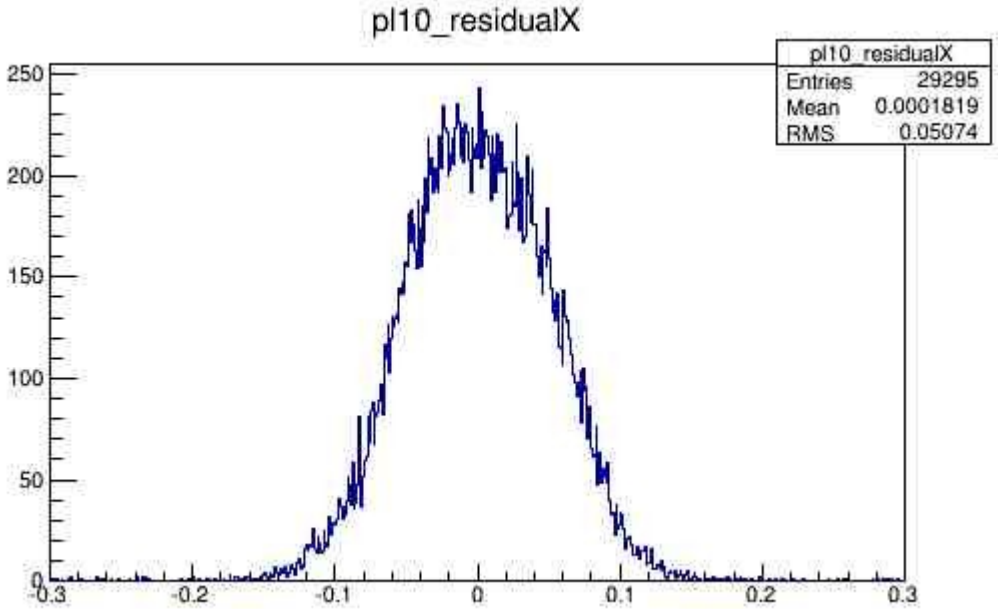
L3 p-side :



RMS = 11.36 um
(BIN =14.4 um)

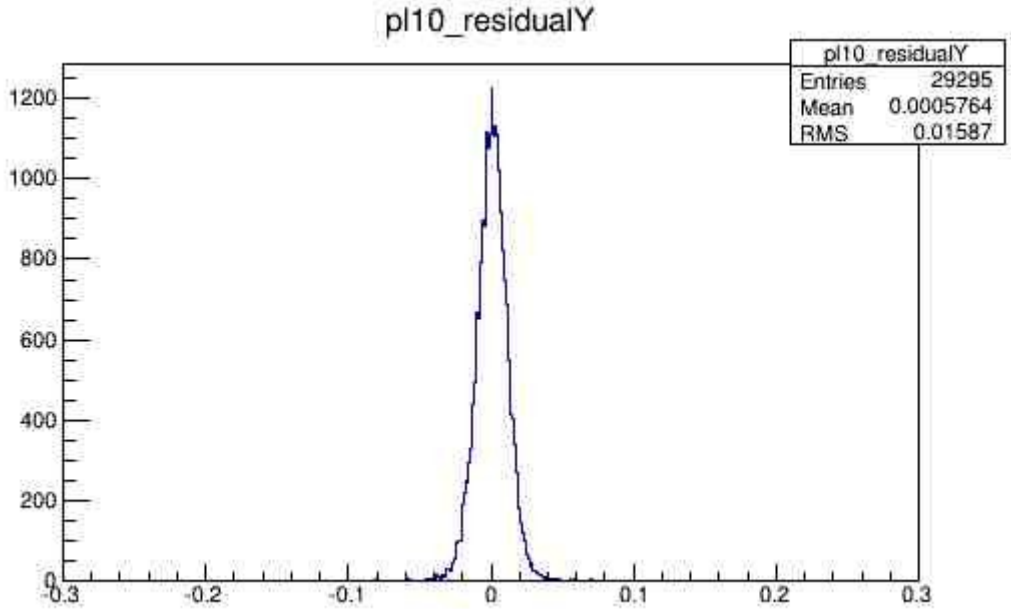
Residuals

FW n-side :



RMS = 50.74 um
(BIN = 69.2 um)

FW p-side :

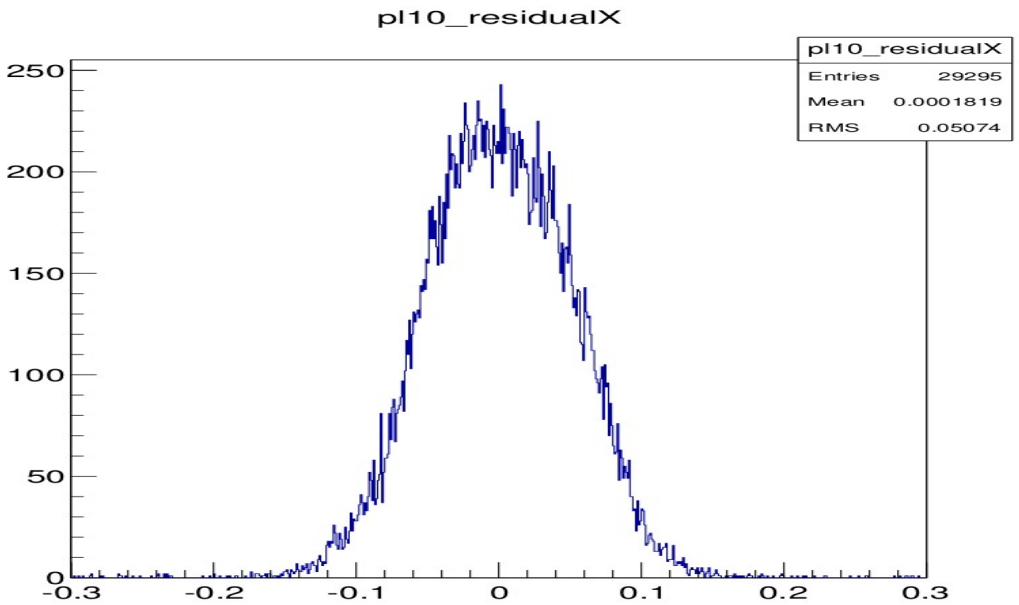


RMS = 15.87 um
(BIN = 21.6 -14.4 um)

Residuals

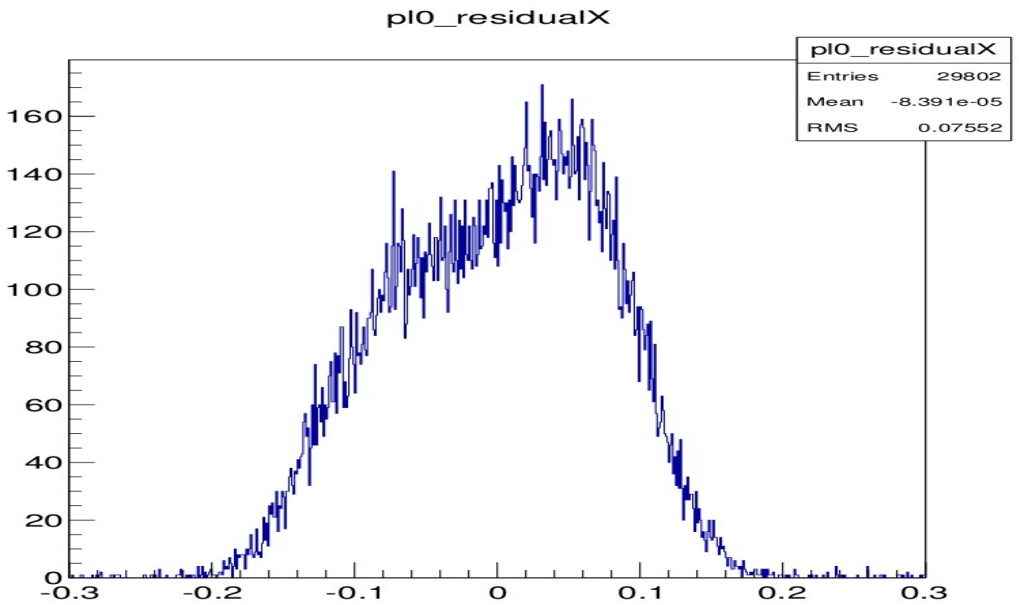
Discovered Problem !

FW n-side : 14°



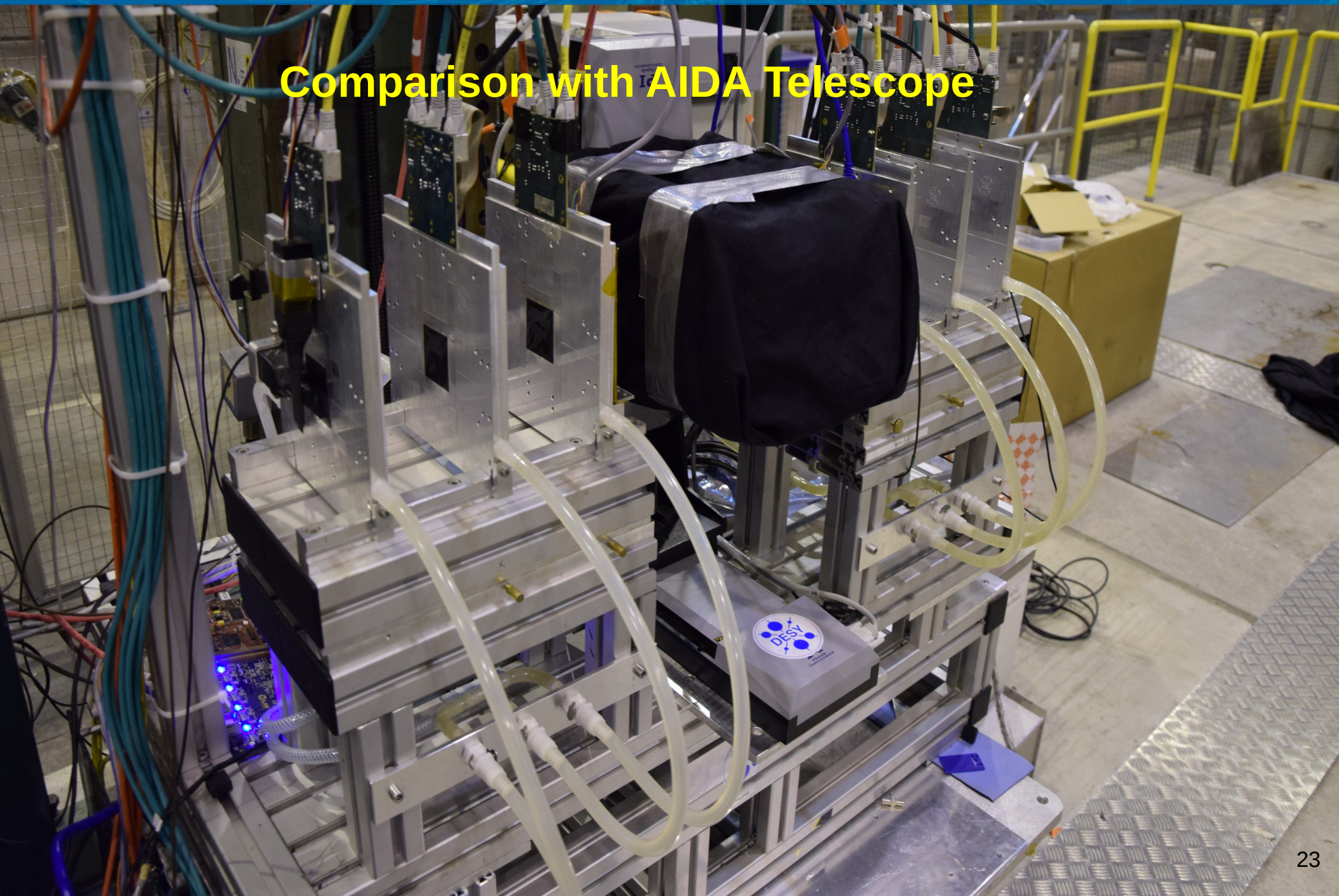
RMS = 50.74 um

FW n-side : 16°



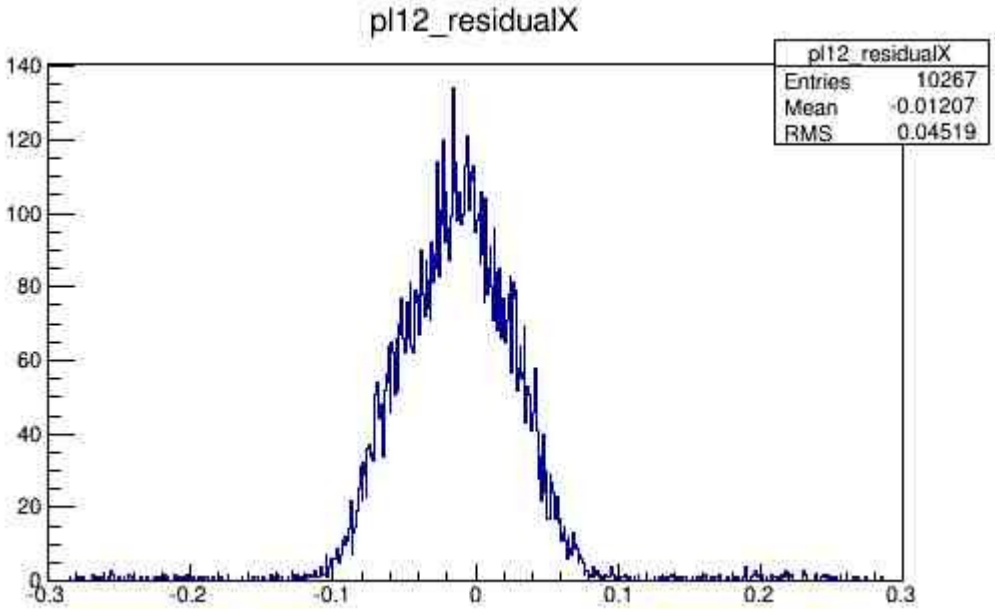
RMS = 75.52 um

N-side residuals very sensitive to variations of the angle in beam direction


Comparison with AIDA Telescope
DESY

Comparison of Residuals

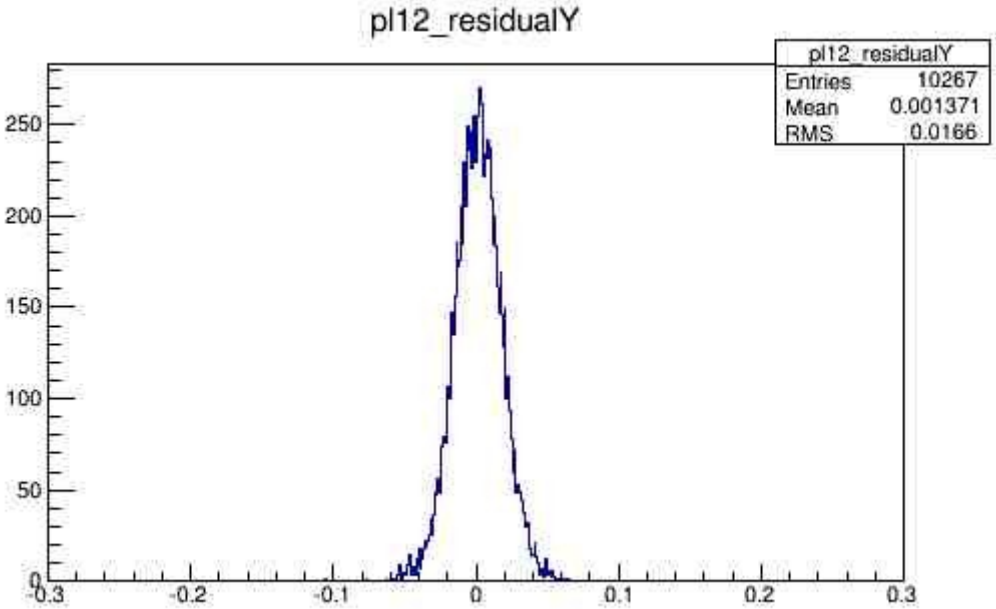
BW n-side :



RMS = 45.19 um

(ref = 44.31 um)

BW p-side :

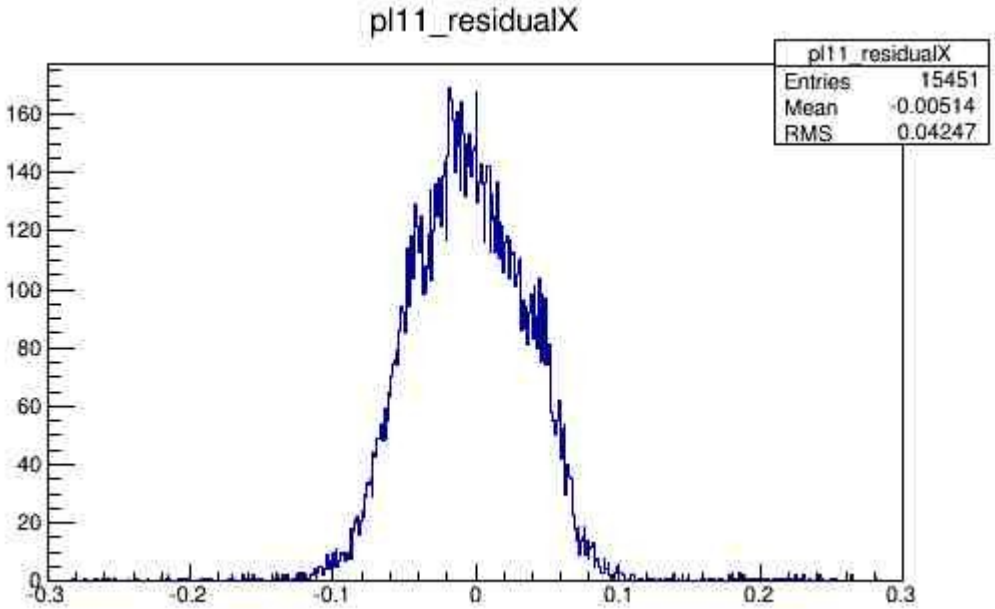


RMS = 16.6 um

(ref = 19.11 um)

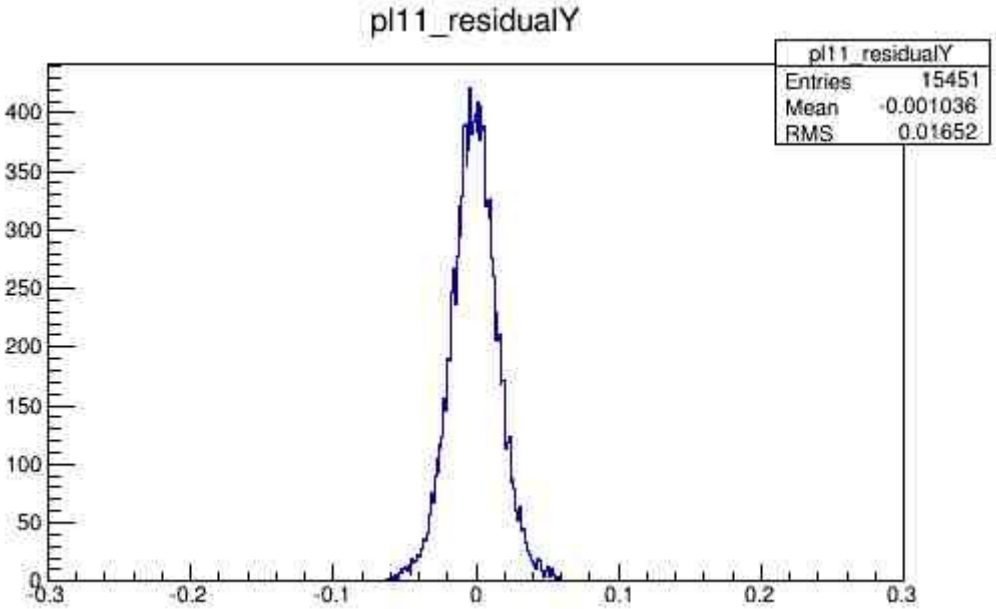
Comparison of Residuals

FW n-side :



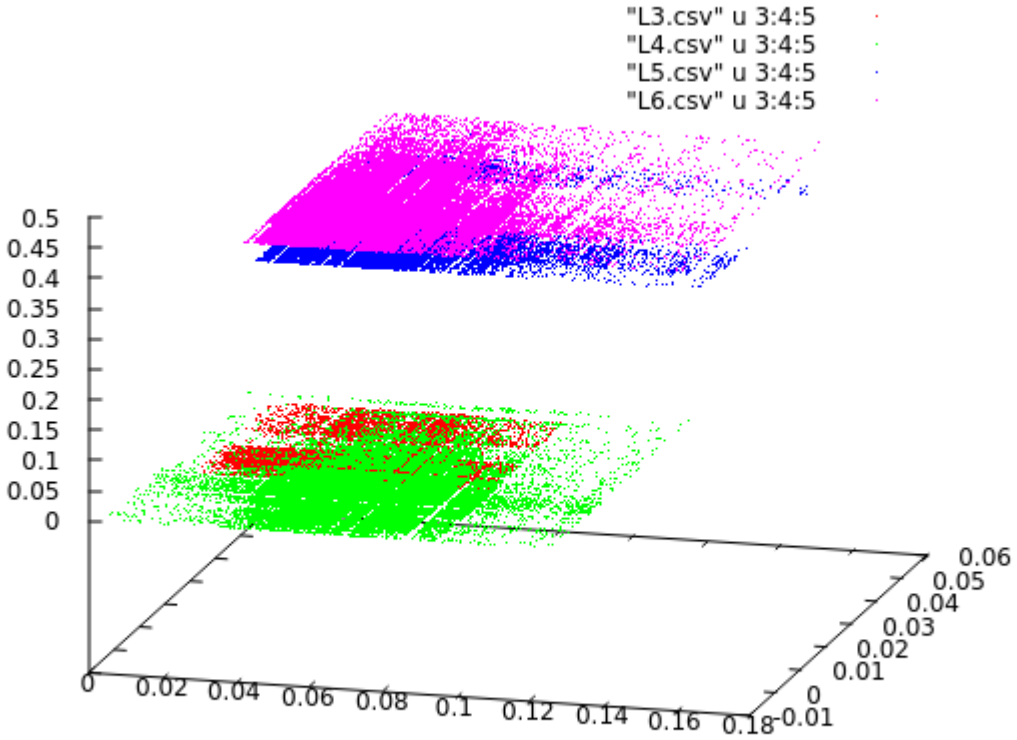
RMS = 42.47 um
(ref = 50.74 um)

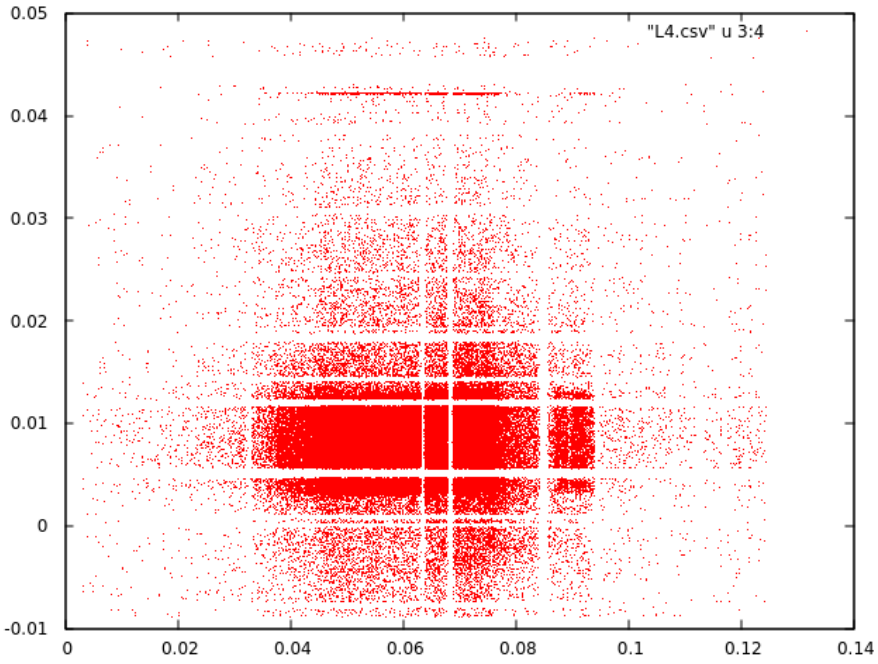
FW p-side :



RMS = 16.52 um
(ref = 15.87 um)

END. Thanks


"L3.csv" u 3:4:5
"L4.csv" u 3:4:5
"L5.csv" u 3:4:5
"L6.csv" u 3:4:5
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01


"L4.csv" u 3:4
0.05
0.04
0.03
0.02
0.01
0
-0.01
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14