

Chess1 at Oxford

LUIGI VIGANI

Status of the chips and DAC

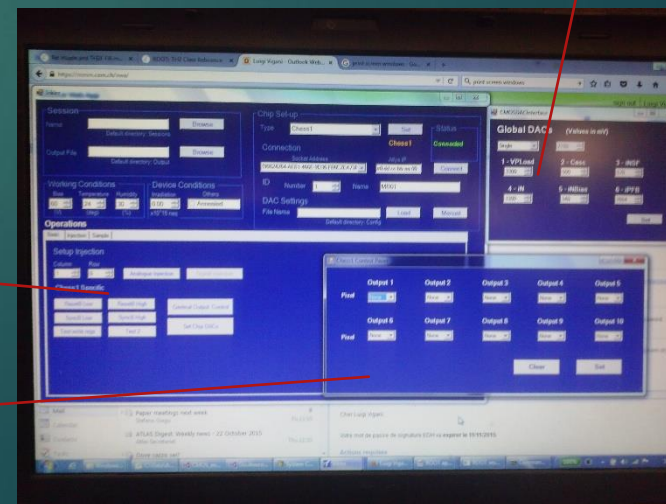
2

- ▶ Chess1 motherboards arrived and being tested
 - ▶ 3 of them proved to be working, others under test
- ▶ 12 Daughterboard arrived
- ▶ Specific firmware implemented (J. John and M. Warren)
- ▶ Paired with a specific software (L. Vigani)
 - ▶ No *sctdaq*
 - ▶ Either implemented with a .dll loaded by ROOT (debug version)
 - ▶ Or directly with an executable and GUI (user version)
 - ▶ Easy to export to other computers

Main Panel

Set Output channels

Set DAC values



Laser scans (1)

3

First DAC configuration (default):

- ▶ VPLoad 1.85 V
- ▶ Casc 2.4 V
- ▶ iNSF 357mV
- ▶ iN 940 mV
- ▶ iNBias 322 mV
- ▶ iPFB 2.67 V

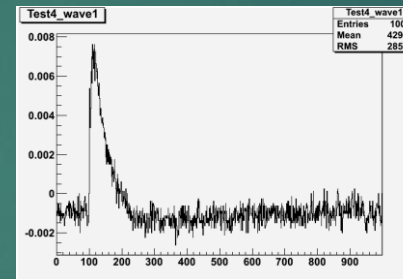
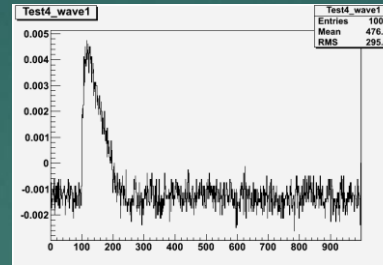
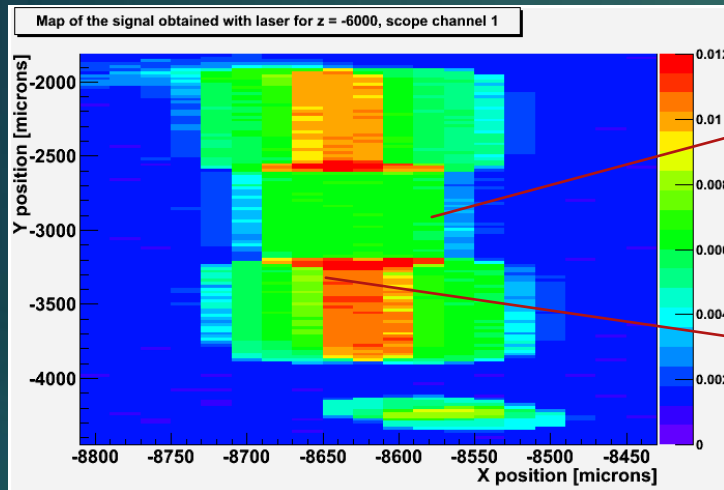
Scope channel connections:

Channel 1 : pixel 33 (APA8_Out2)
Channel 3 : pixel 34 (APA8_Out1)

Laser scans (1)

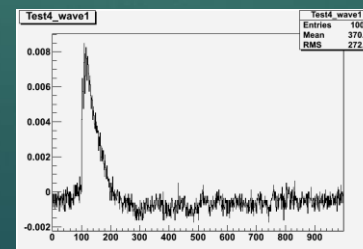
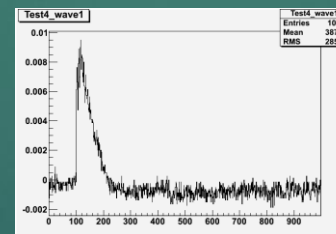
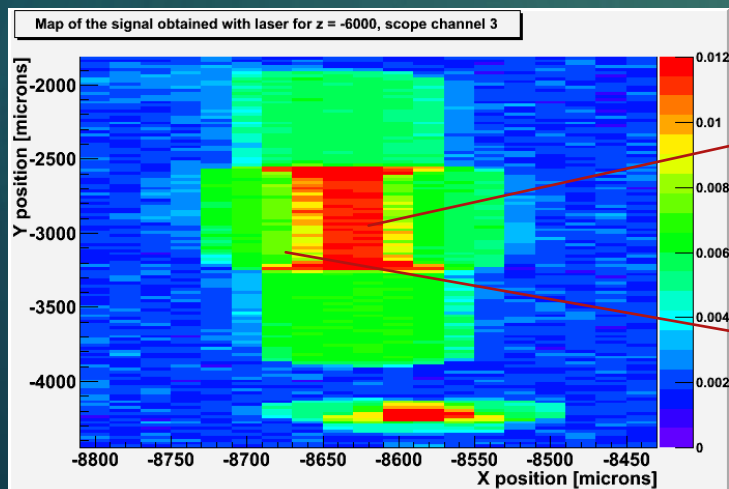
4

Pixel 33



- Still not focused
- No pixel-like structures
- On z axis signals in V

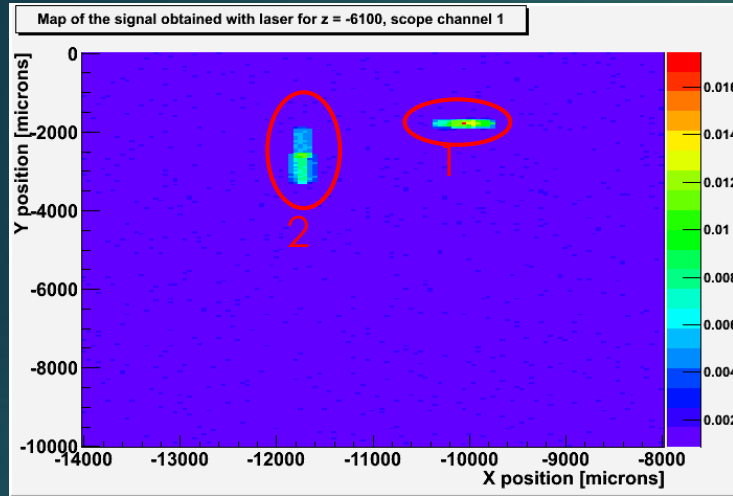
Pixel 34



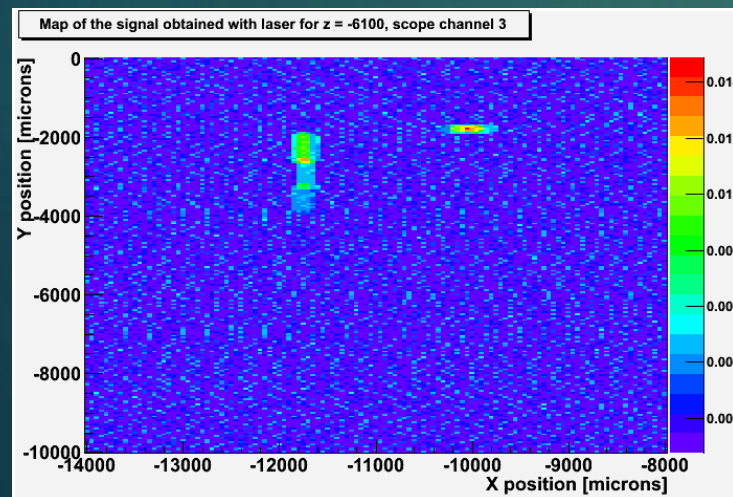
Laser scan (2)

5

Pixel 31



Pixel 32



Scope channel connections:

Channel 1 : pixel 31 (APA8_Out4)

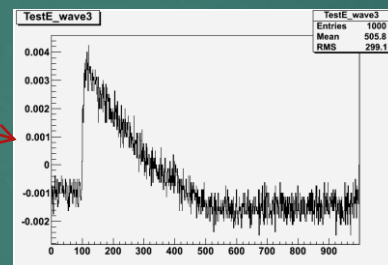
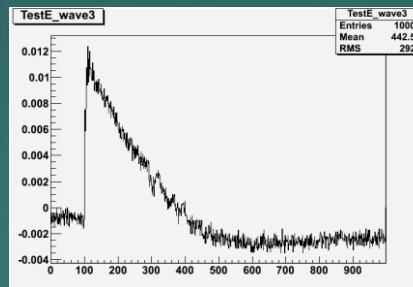
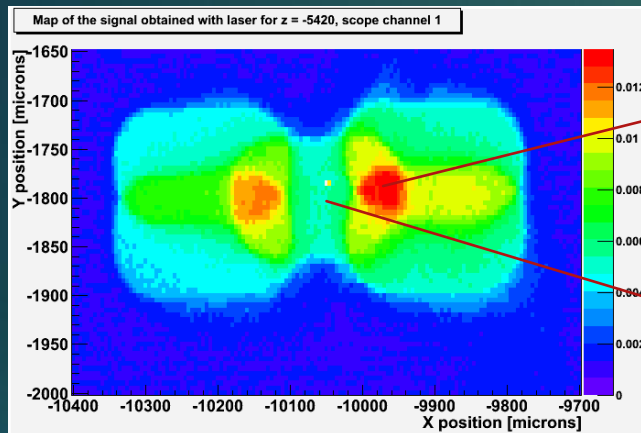
Channel 3 : pixel 32 (APA8_Out3)

- Still not focused
- 2 structures
- Structure 2 recalls a pixel...

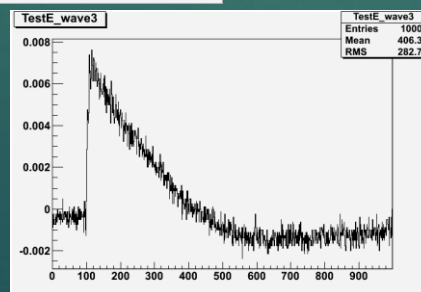
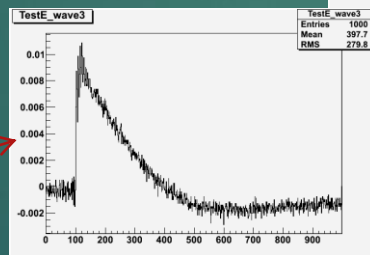
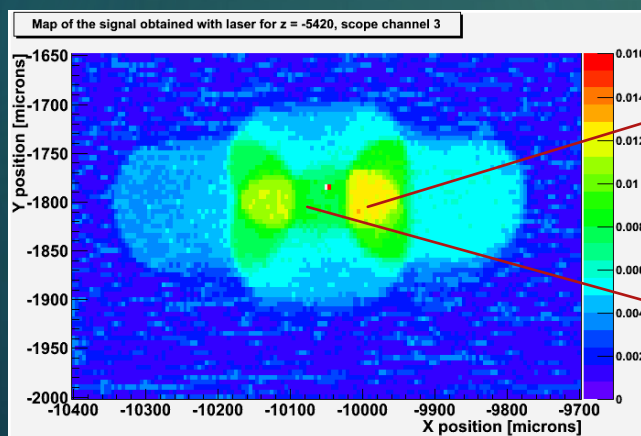
Laser scan (2): structure 1

6

Pixel 31



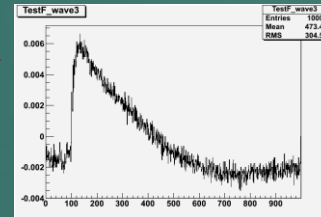
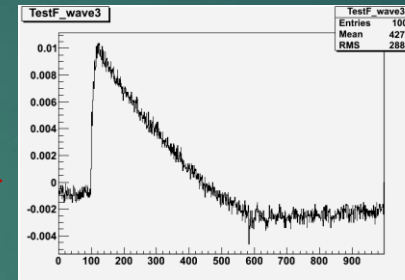
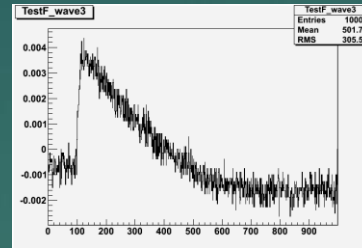
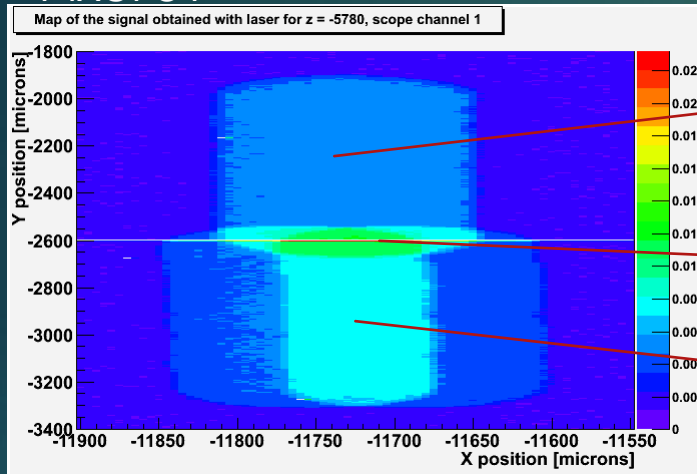
Pixel 32



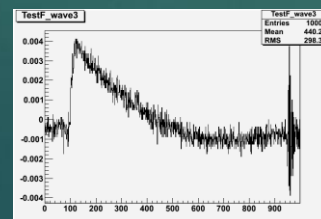
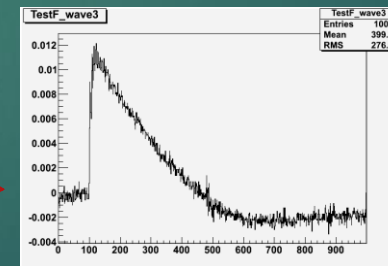
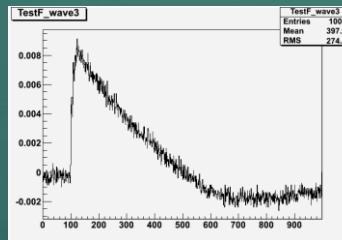
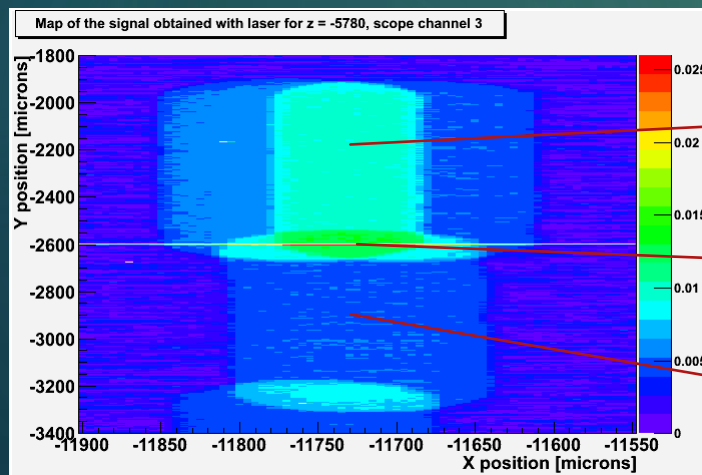
Laser scan (2): structure 2

7

Pixel 31



Pixel 32



- Pixels...?
- Signals very small...

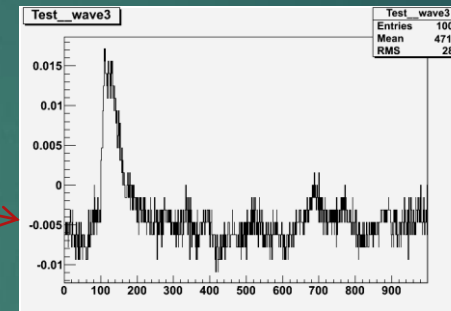
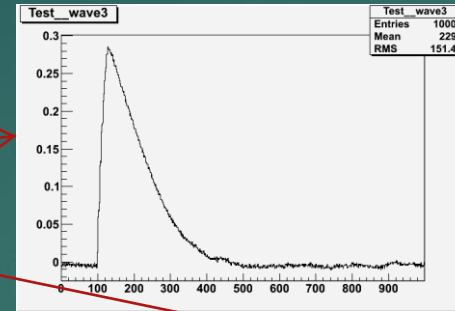
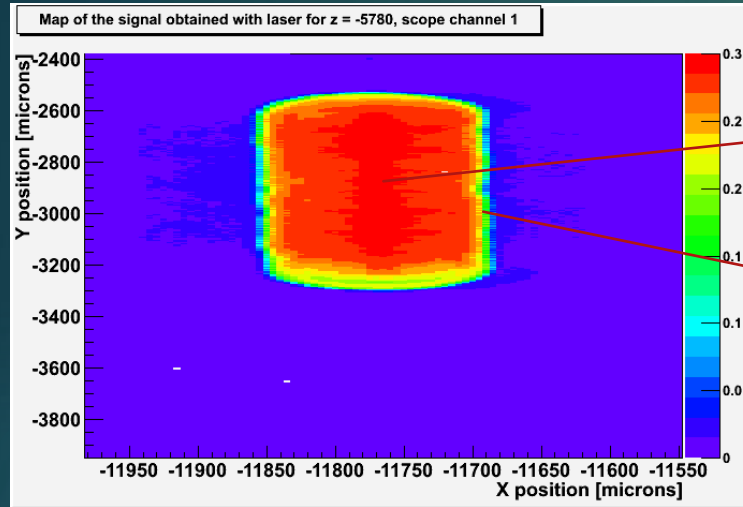
Laser scan (3)

8

Pixel 29

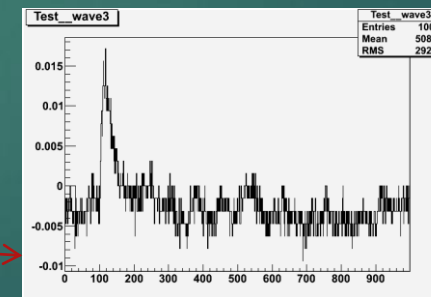
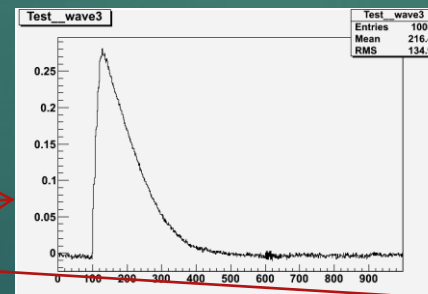
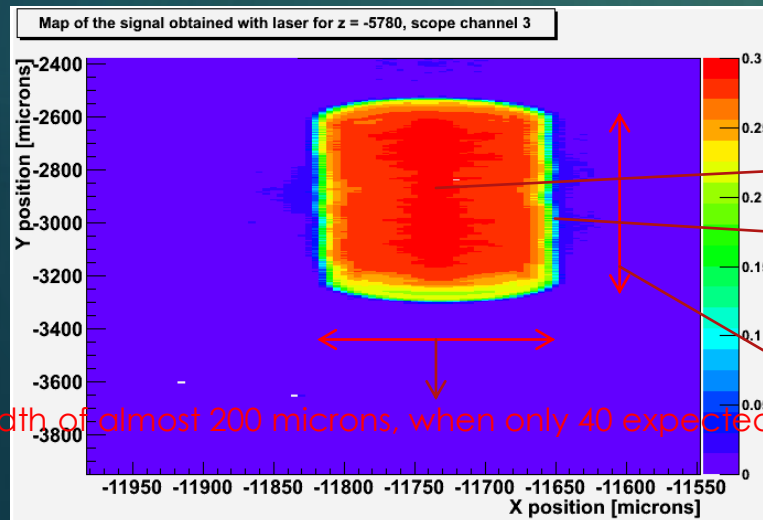
Decent outputs ~ 300mV!

Scope channel connections:
Channel 1 : pixel 29 (APA8_Out6)
Channel 3 : pixel 30 (APA8_Out5)



- Focus still not improved, but it seems it's not the issue...

Pixel 30



Width of almost 200 microns, when only 40 expected...

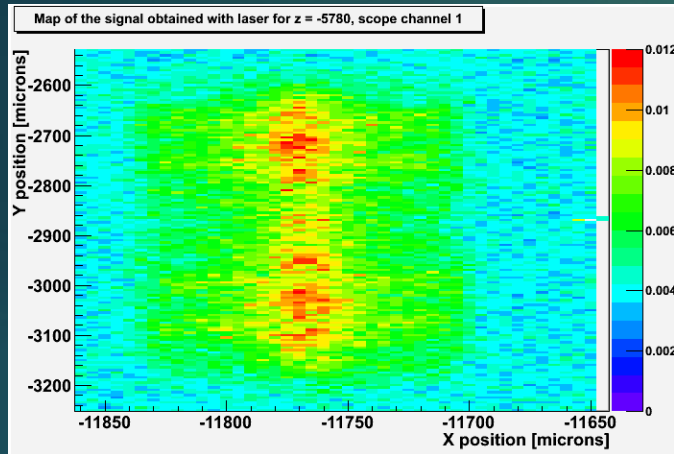
Height of about 700 microns, close to real of 800...

Laser Scan (3)

9

Reducing laser power:

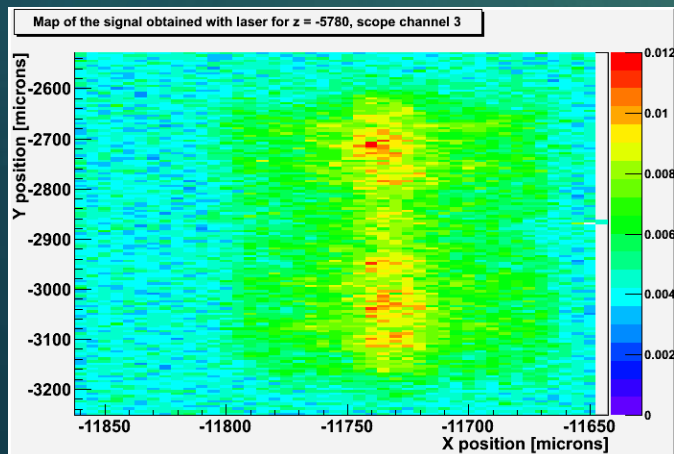
Pixel 29



The structures in the middle look a lot like real pixels, and they have nearly the correct dimensions. They even look to sit one beside the other, as we expect. So what is the area around them..?

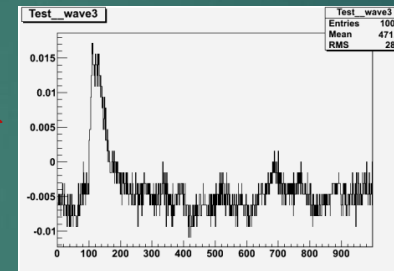
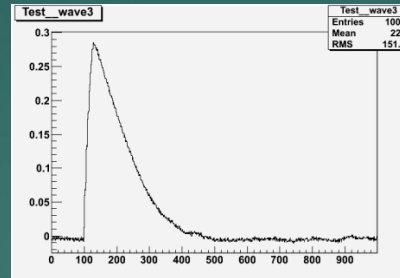
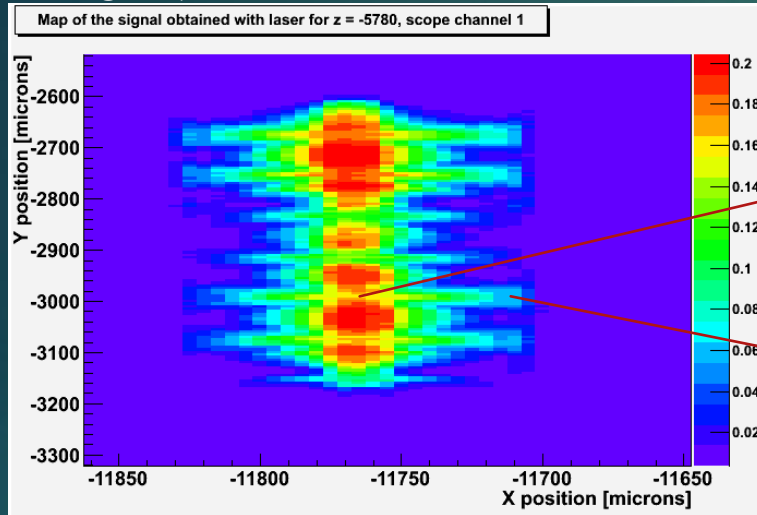
One thought: maybe we are collecting some extra signal, so we played with DACs...

Pixel 30

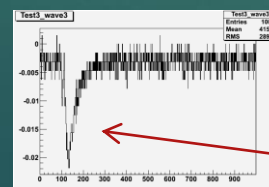
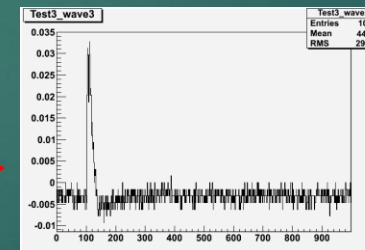
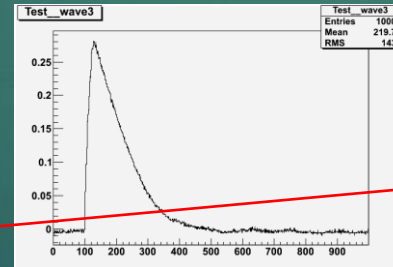
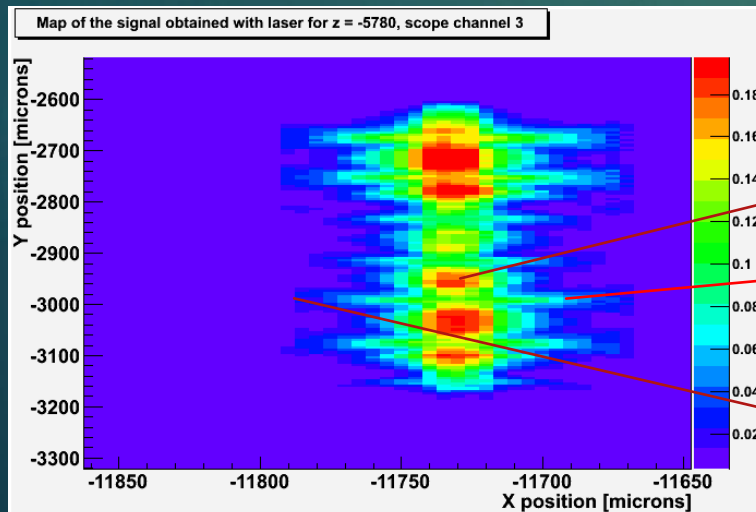


Laser scan (4)

Pixel 29



Pixel 30



New configuration:

- ▶ VPLoad 3.3 V
- ▶ Casc 3.3 V
- ▶ iNSF 600mV
- ▶ iN 1.4 mV
- ▶ iNBias 341 mV
- ▶ iPFB 2.664 V

Full laser power

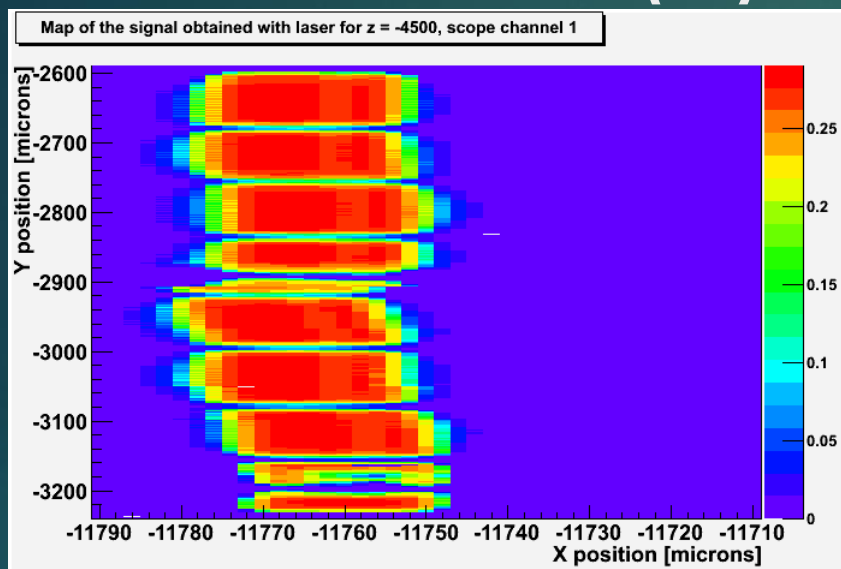
10

Cross-talk??

The situation looks more ideal, but many times we have those undershoots...

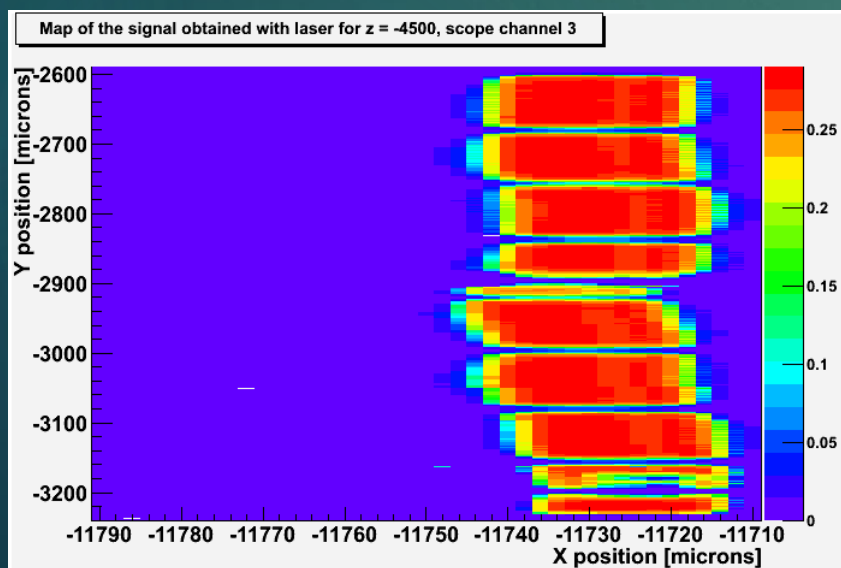
Laser scan (5)

11



Pixel 29

Laser position optimized

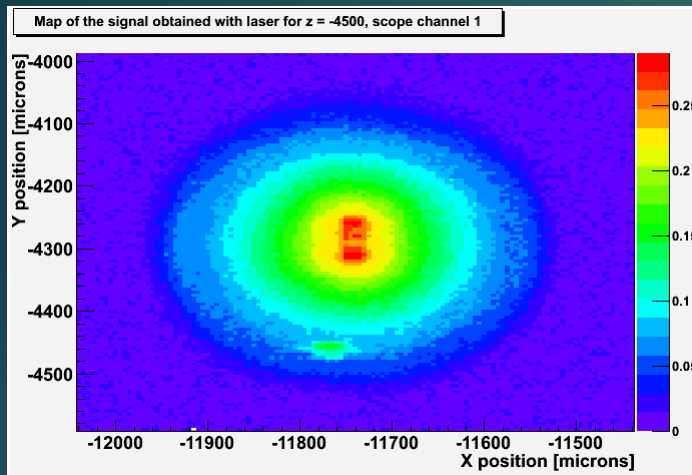


Pixel 30

Laser scan (6)

12

Pixel 57



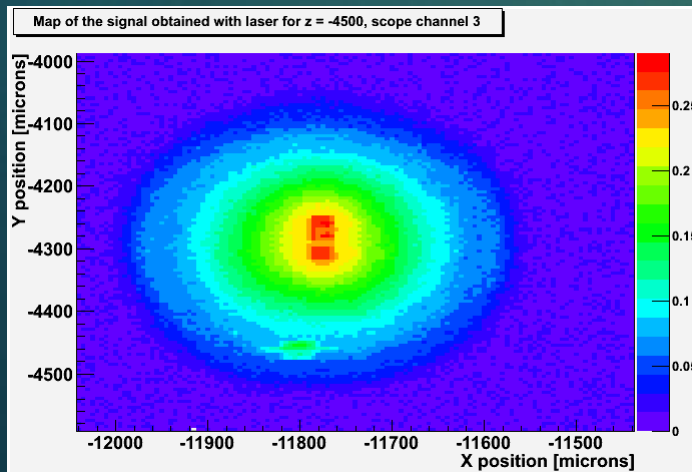
First DAC configuration (default):

- ▶ VPLoad 1.85 V
- ▶ Casc 2.4 V
- ▶ iNSF 357mV
- ▶ iN 940 mV
- ▶ iNBias 322 mV
- ▶ iPFB 2.67 V

Full laser power

Scope channel connections:
Channel 1 : pixel 57 (APA2_Out5)
Channel 3 : pixel 56 (APA2_Out6)

Pixel 56

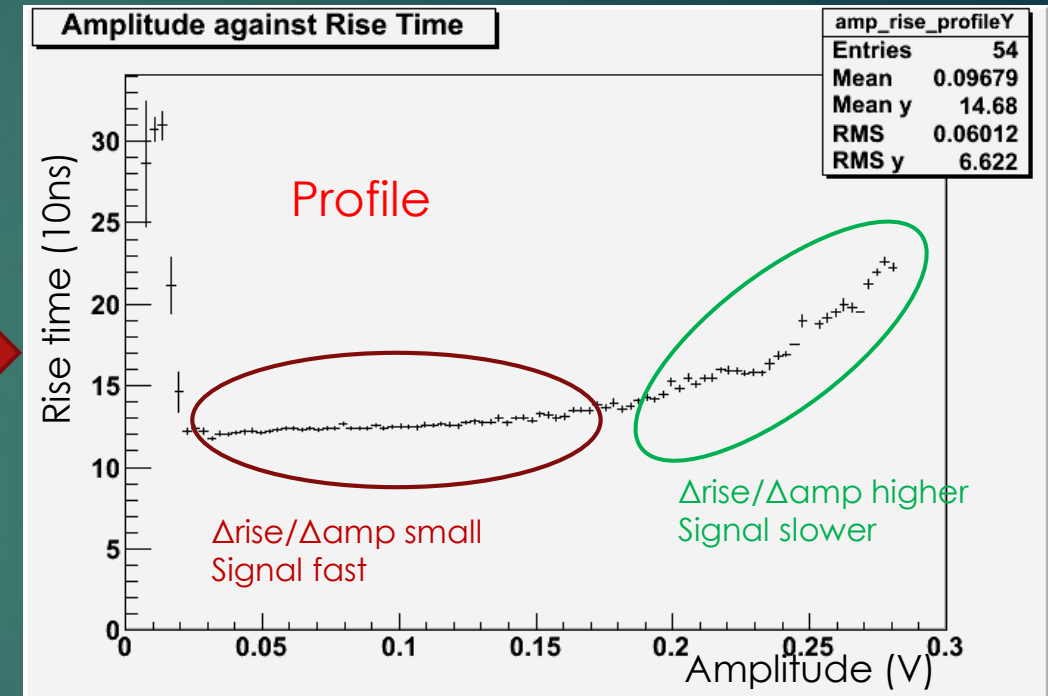
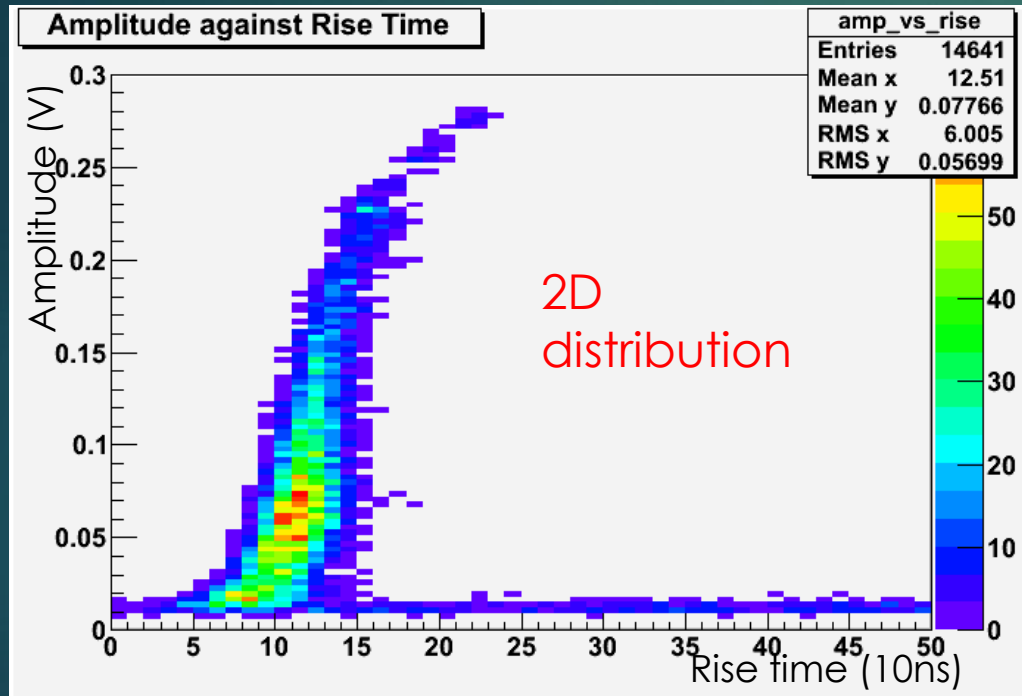


Again, signal wider than the expected
 $45 \times 100 \mu\text{m}^2$
(laser optimized)

Laser scan (6)

13

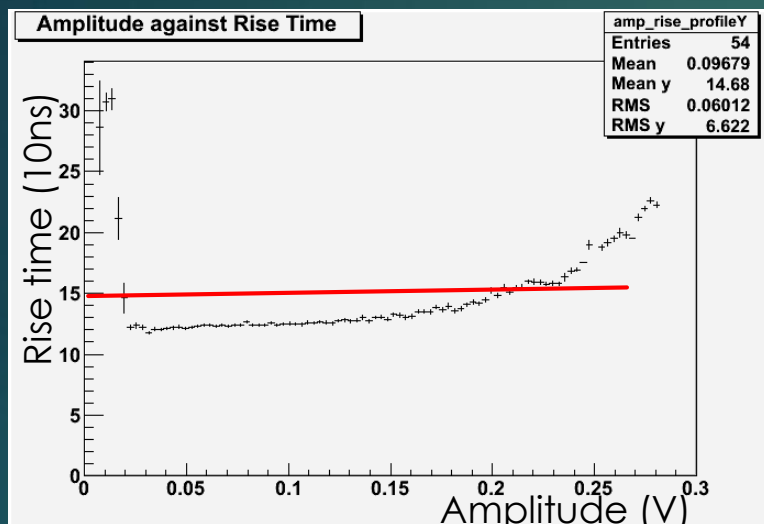
- What is the rise-time of the output waves vs the amplitude?



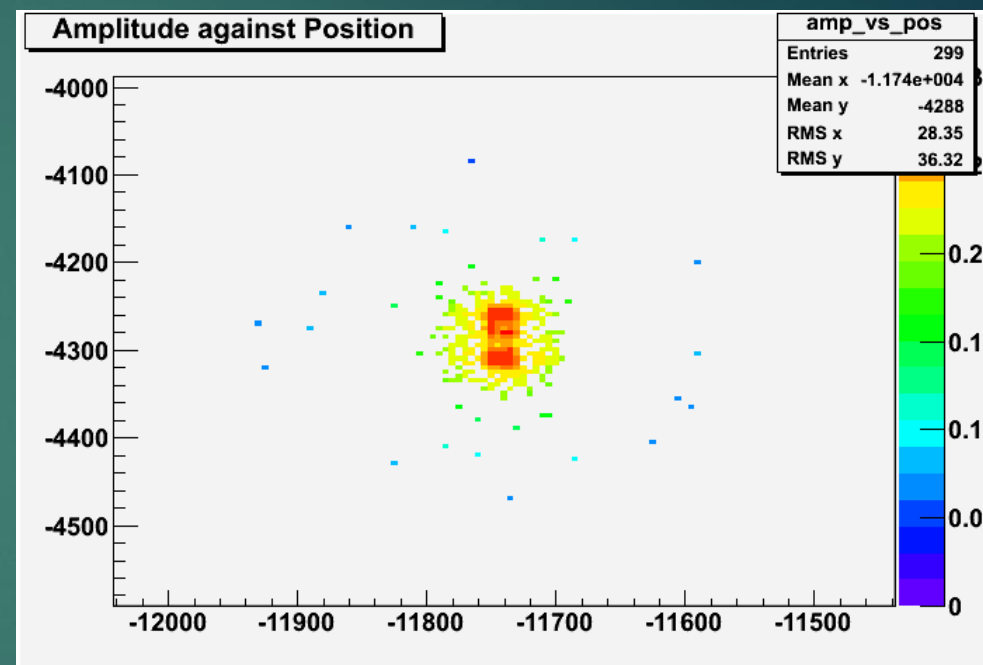
$\Delta \text{amp} / \Delta \text{rise}$
indicates the
speed of the
signal

Laser scan (6)

14



Cut over rise-time less than 150 ns to reject fast signals

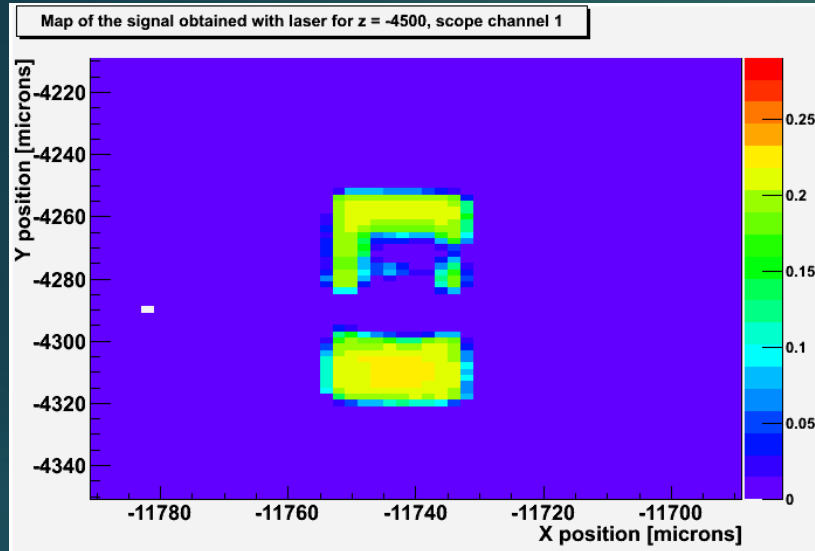


Internal pixel almost isolated...

Laser Scan (7)

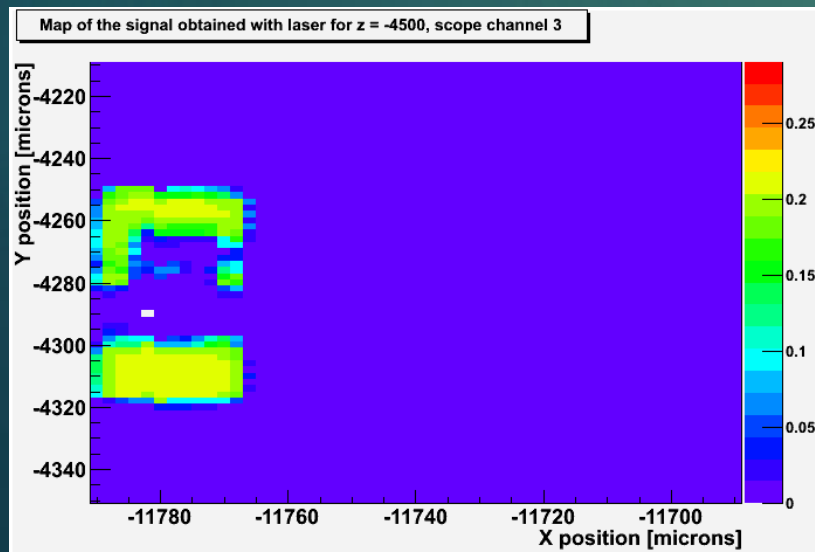
Played again with DACs:

15



Pixel 57

- ▶ VPLoad 3.3 V
- ▶ Casc 0.5 V
- ▶ iNSF 570 mV
- ▶ iN 3.3 V
- ▶ iNBias 340 mV
- ▶ iPFB 2.664 V



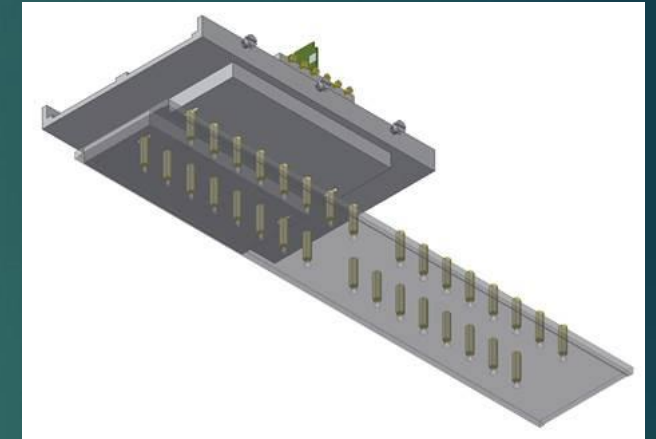
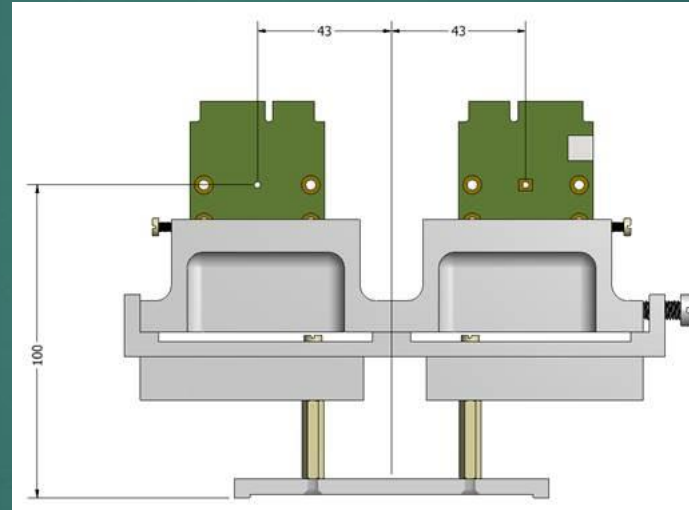
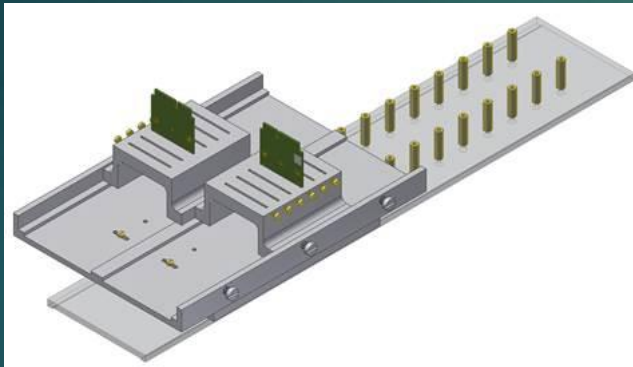
Pixel 56

Different combination than laser scan (5) but similar result...

Irradiation at PS

16

- ▶ Move into beam area on 4th November
- ▶ 3.3 LV will be supplied
- ▶ 'Double wide support rail' currently under fabrication at Oxford (K. Arndt)



- ▶ Plan is to irradiate some chips at about 5×10^{14} neq and some to 10^{15} neq
 - ▶ Rail will be moved laterally
- ▶ We can't get in until next Wednesday, so idea is to start the irradiation close to that date to avoid annealing as much as possible
 - ▶ How close to the date can be discussed...