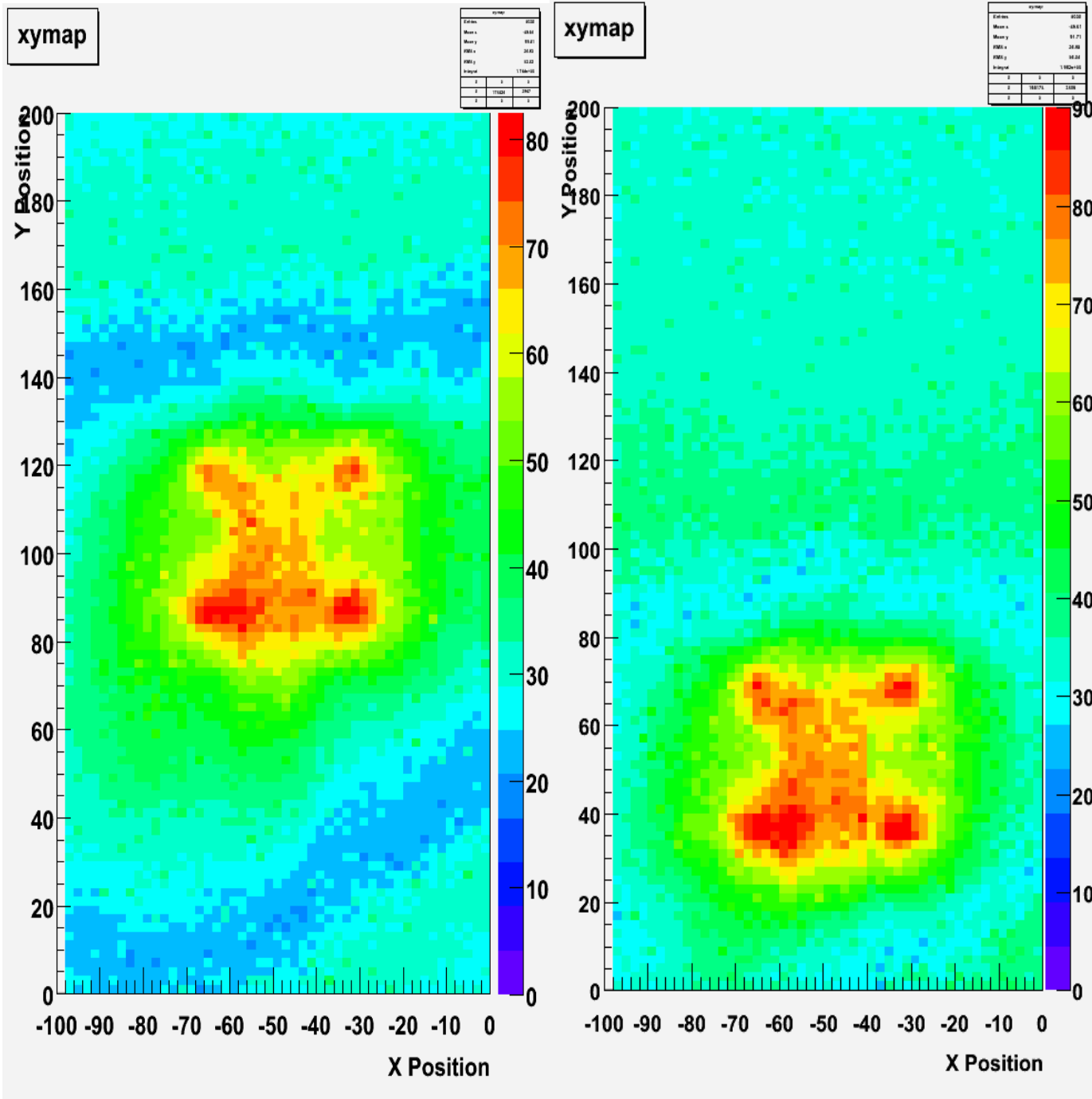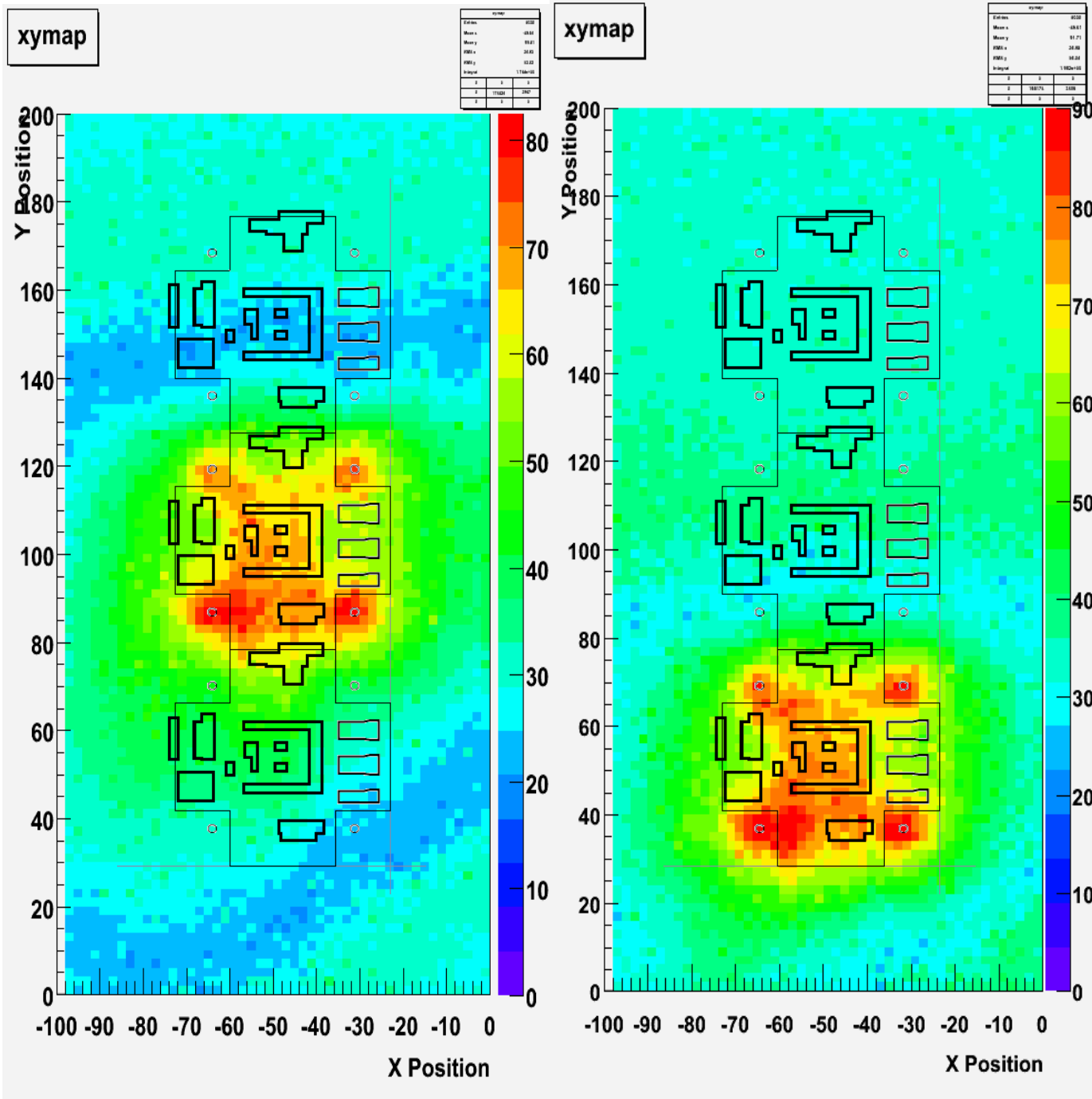# TPAC1.0

Jamie Crooks

Laser Scans

2um spot
2um steps
Analog readout
Mean Signal
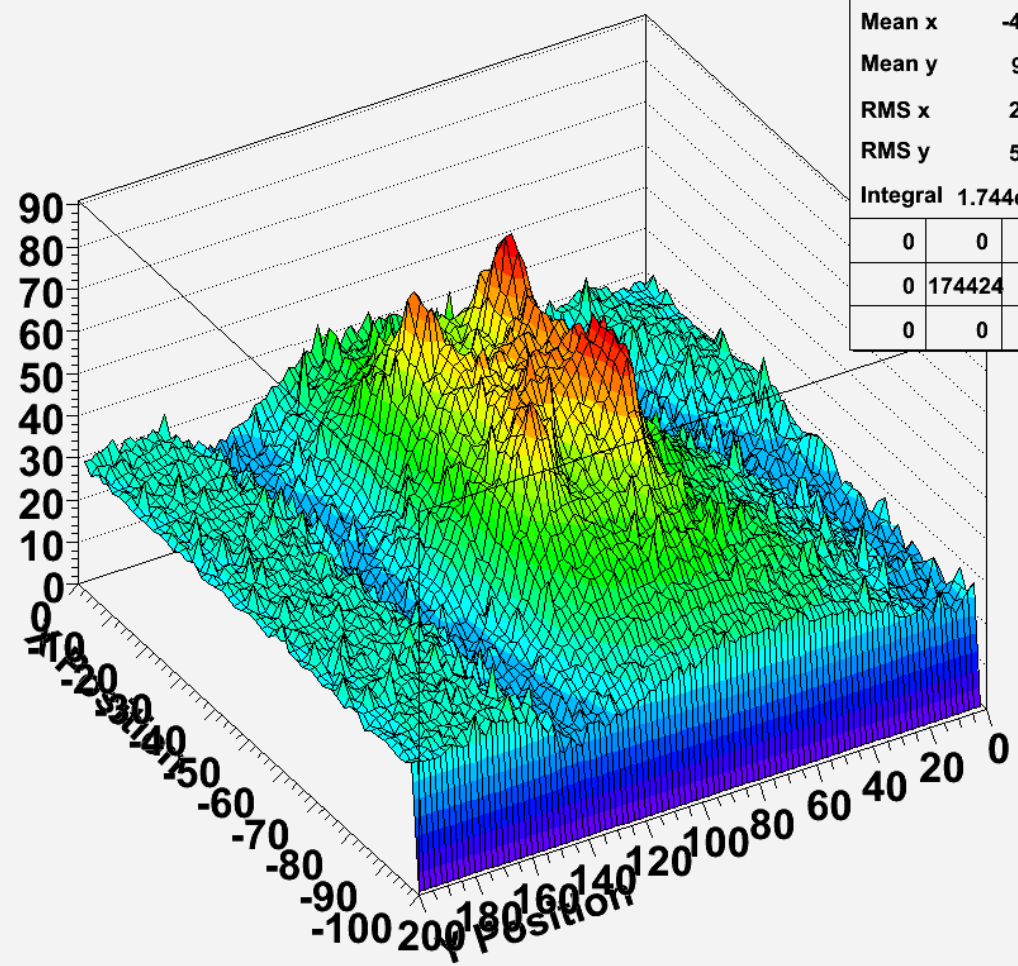(25 samples)

Laser Scans

2um spot
2um steps
Analog readout
Mean Signal
(25 samples)

xymap

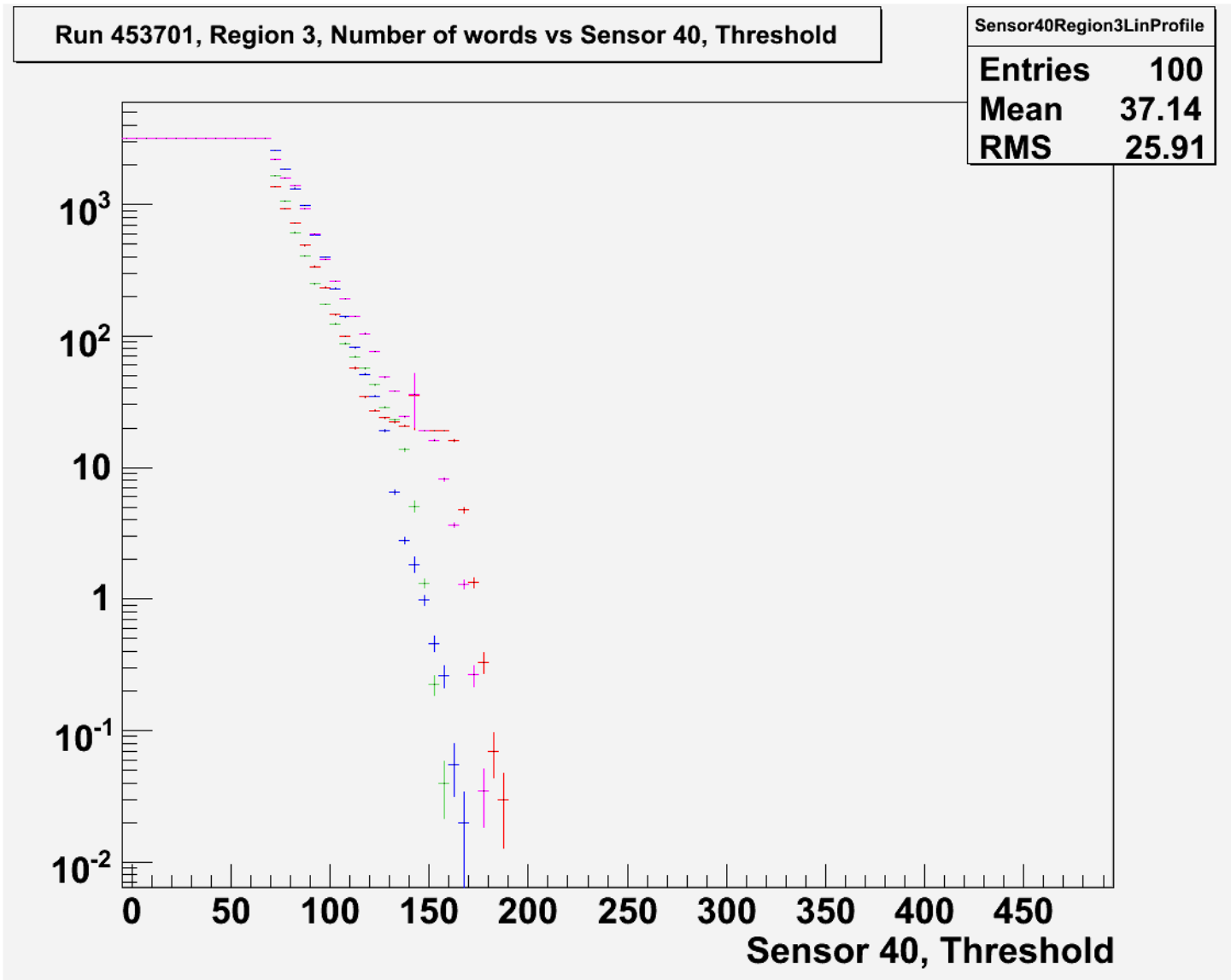| xymap		
Entries		5000
Mean x		-49.04
Mean y		99.81
RMS x		26.93
RMS y		52.02
Integral		1.744e+05
0	0	0
0	174424	2947
0	0	0

TPAC1.1 Status

- Poor device yeild (short circuit)
  - Typ 40% working, from 60 probed devices, but the 12u+DPW split is worst ~20%
- Poor bonding yeild
  - typ 40/250 fails per chip
- Reported problems to foundry
  - Will report back after some investigation
  - Follow-up run (std + hi-res wafers) on hold until these investigations report back

- Functionality
  - Configuration load
    - Errors – under investigation
  - Data corruption (override mode)
    - Fixed at RAL, but some low-level problems still reported at IC
    - Will swap boards and investigate further
  - Design feature
    - Duplicated row-addresses   → *more details on later slides*
  - Test structures
    - Monostables ok
    - Laser scans   → *more details on later slides*
    - 55Fe   → *more details on later slides/Marcel*
  - Threshold Scan   → *more details on later slides*

TPAC1.1 Design error

- Row addresses
  - Should run 0→167
  - Actually run 0→83,0→83
- Ambiguity in location of a hit
- Caused by copying chosen pixel sub-array to whole sensor

- Matt & Paul's suggested workaround
  - Artificially store one hit per row
    - Trivial to implement, one additional initialisation clock cycle before the bunch train begins
  - All rows participate in (sequential) readout
    - Hence we know where real hits sit in the datastream → array
  - Reduced number of available memories to 18 per row
  - Real-time processing (software?) to strip and correct data so data files stored are back-compatible format with false data removed.
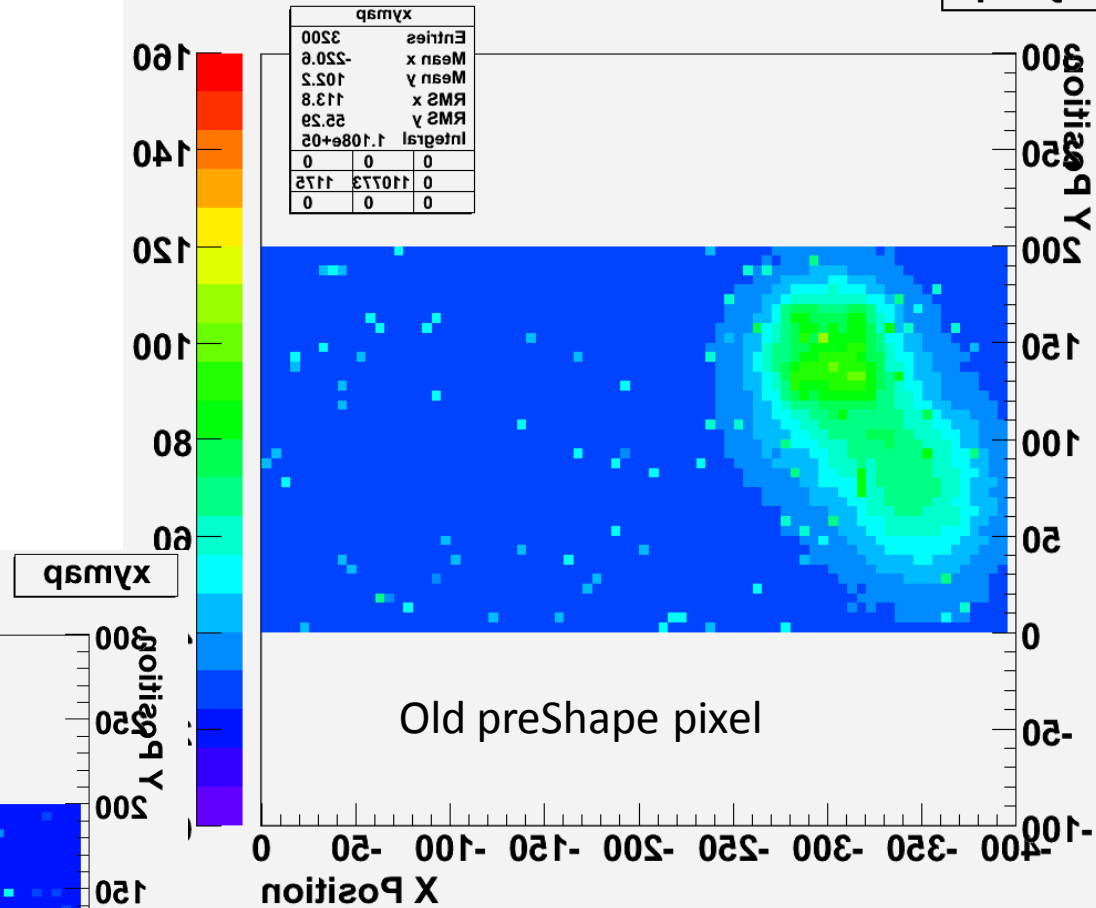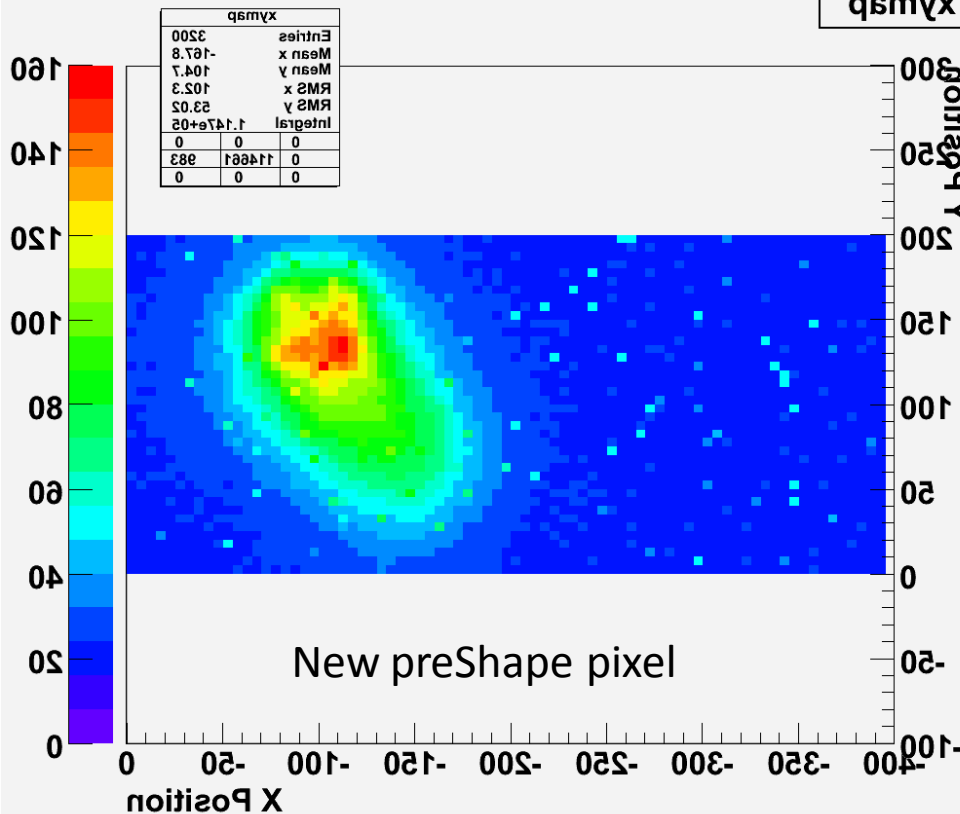
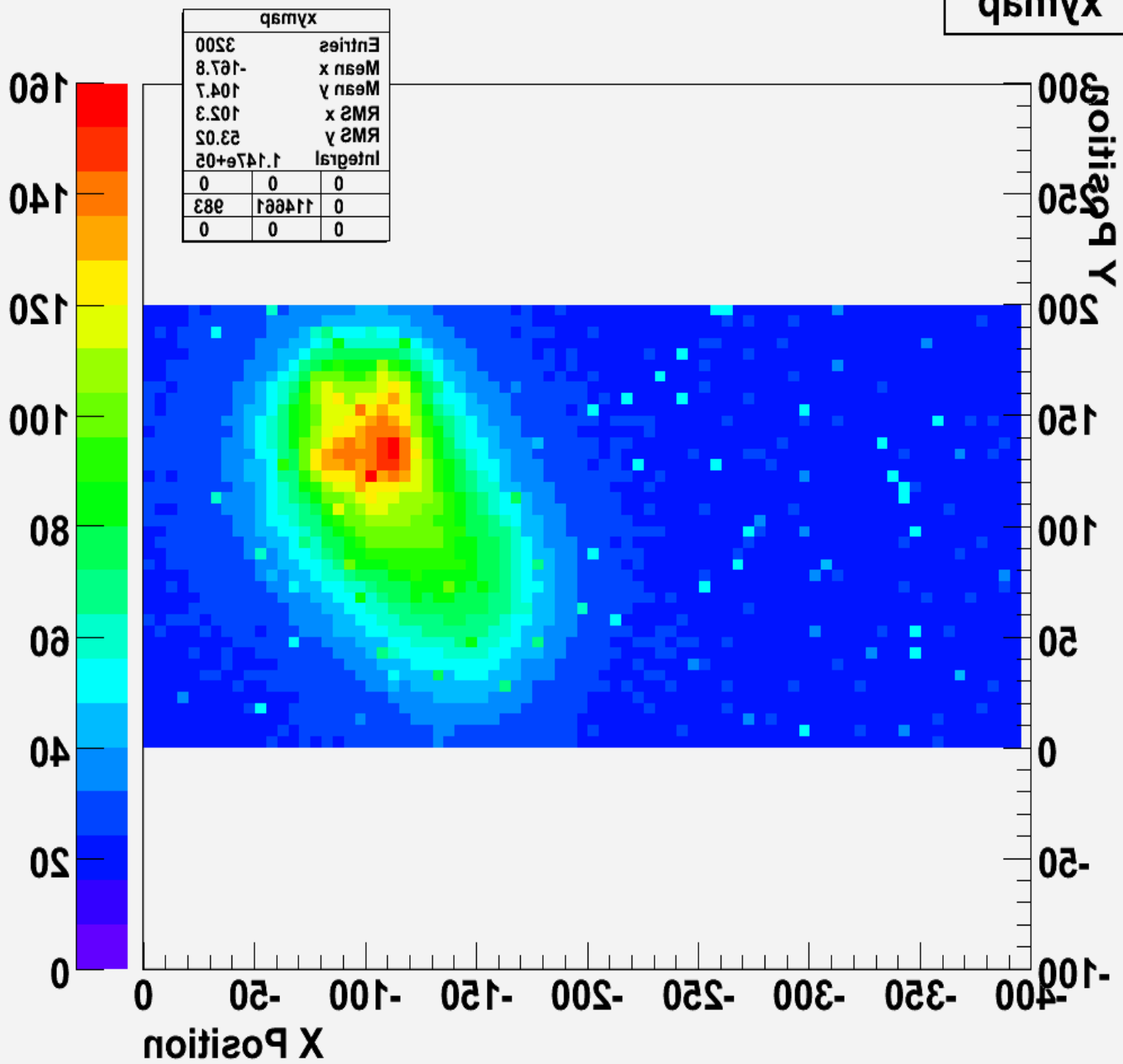# First look: TPAC1.1 Threshold scan

TPAC1.1
Laser Scans
First look!

Old preShape pixel

New preShape pixel

5um spot
5um steps
Analog readout
Mean Signal
(20 samples)

TPAC1.1
Laser
Scans

xymap

xymap	
Entries	3200
Mean x	-167.8
Mean y	104.7
RMS x	102.3
RMS y	53.02
Integral	1.147e+05

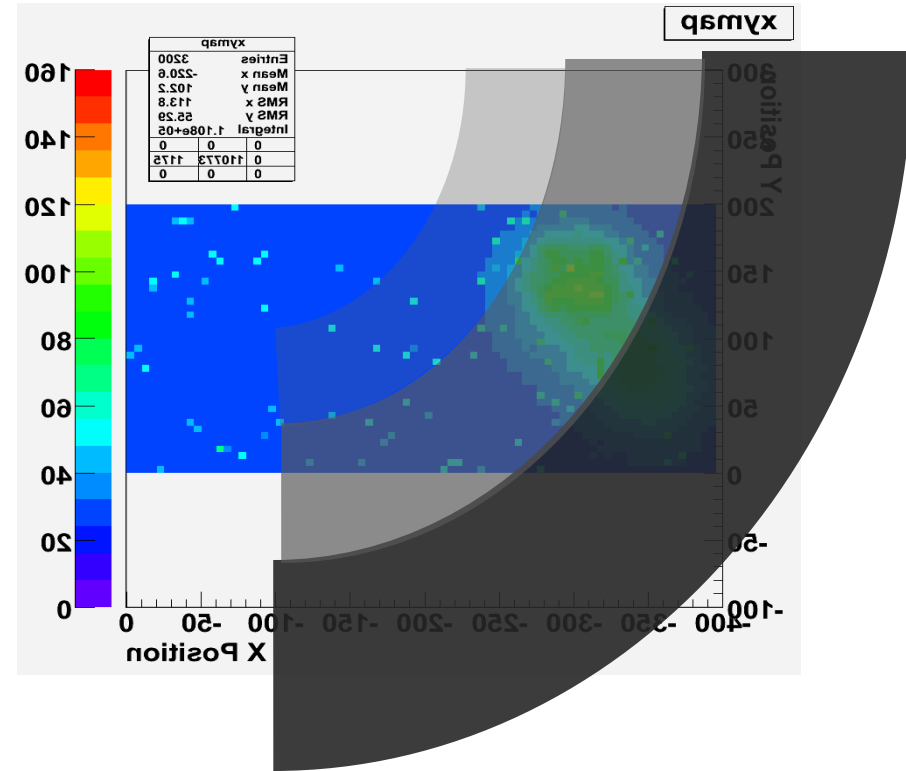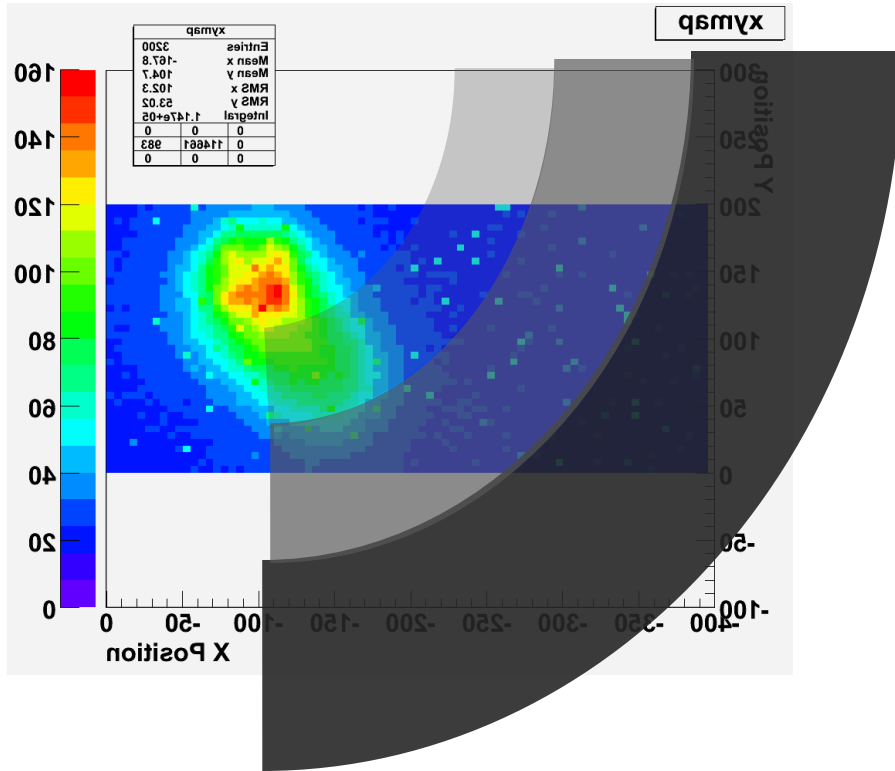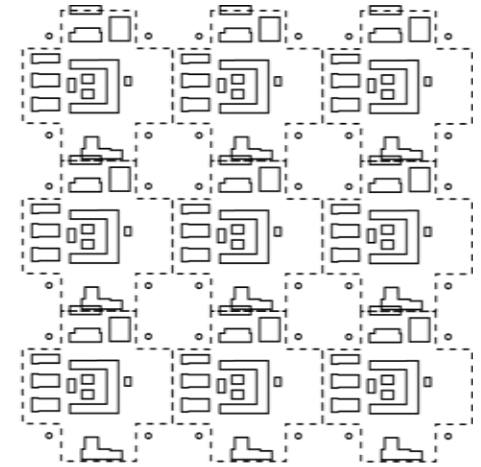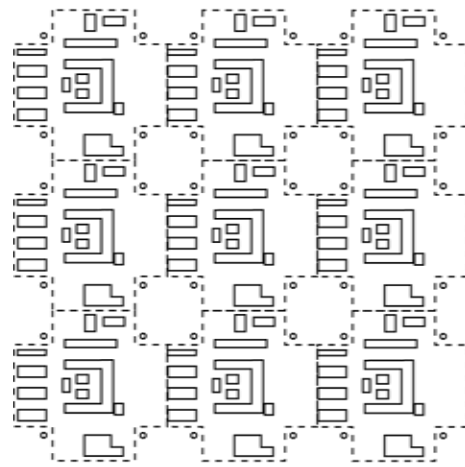| 0	0	0
0	114661	983
0	0	0

PADS
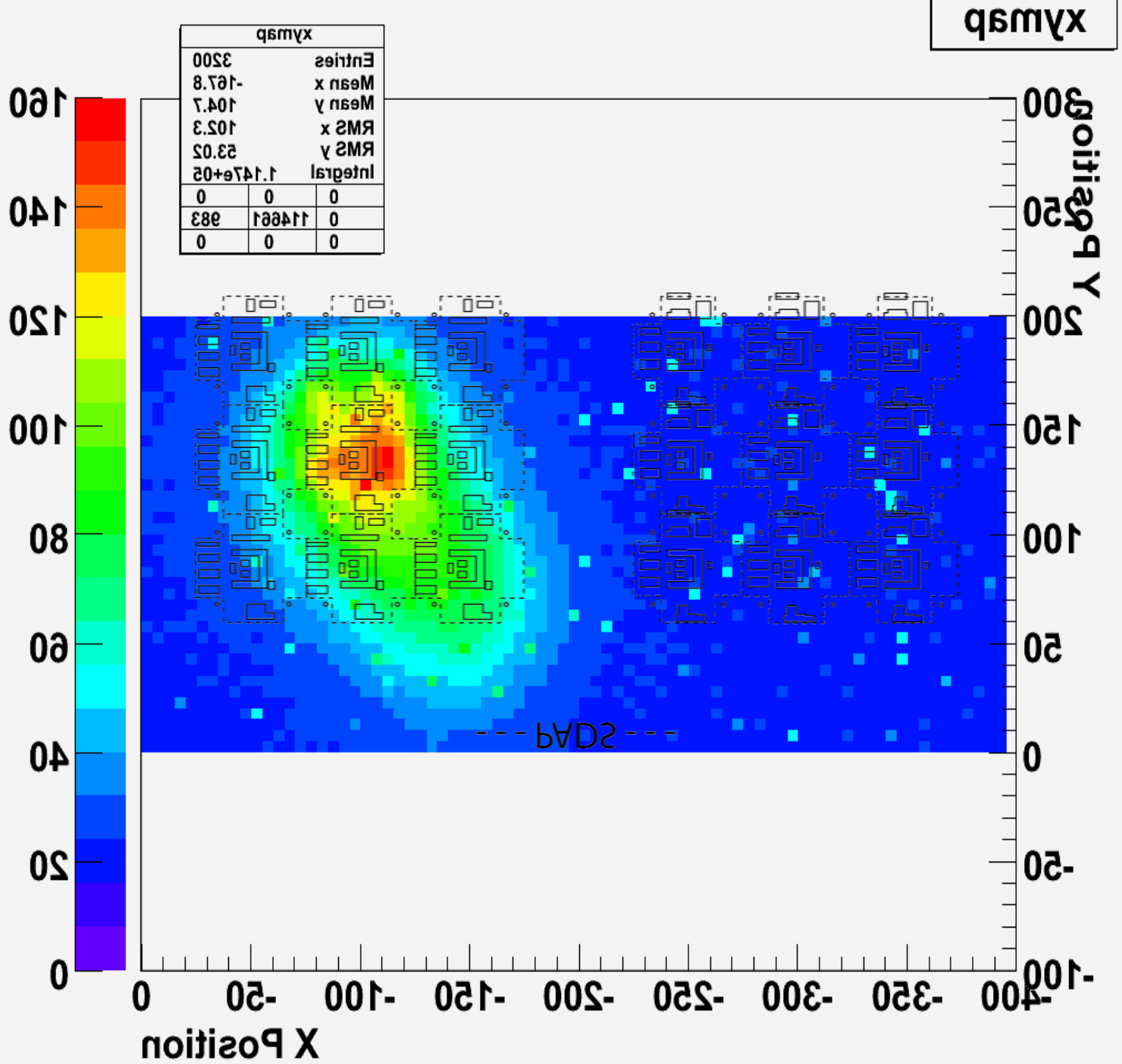
X Position

Y Position

TPAC1.1
Laser
Scans
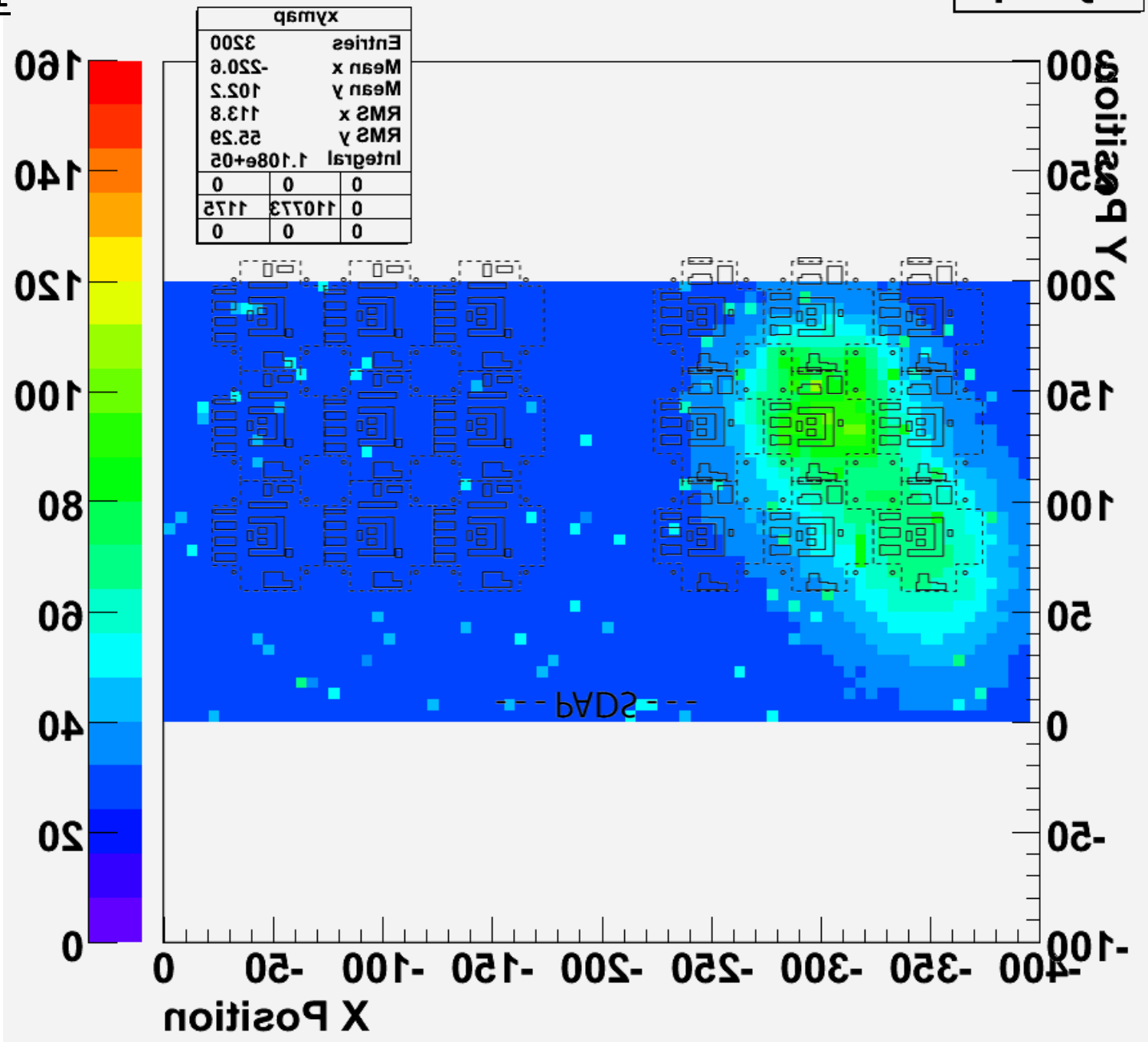
Explanation?

- PCB hole seen to be misaligned (camera on laser microscope used to check known positions of pixels)

- Next: Try another sensor!

Summary

PCB	Sensor	Status
37	5u +DPW	At IC (→ RAL today) Problems with config load
40	5u +DPW	At RAL (JC) Ok (apart from config load) Currently being used for debug (soldered probes etc)
32	12u +DPW	At RAL Two dead columns Being used for analog test pixels (laser, 55Fe)
35	5u +DPW	At RAL Severe data corruption – to be investigated
36	5u +DPW	At RAL (→ IC today) ok (apart from config load)
31	12u +DPW	Bonding
32	12u +DPW	Bonding
38	N/A	Power-ground short (from first round of bonding) Awaiting rework