# HVCMOS ASIC DESIGN

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HVCMOS Advantages

- HVCMOS sensors have the following properties:

  - Integration of readout electronics into the sensor chip

    - This reduces the amount of material in the tracking volume of detectors, increasing the position resolution for low momenta particles by reducing scattering.

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  - Reduced cost as only require standard commercial processes for manufacture

    - HVCMOS processes are used extensively in the automotive industry
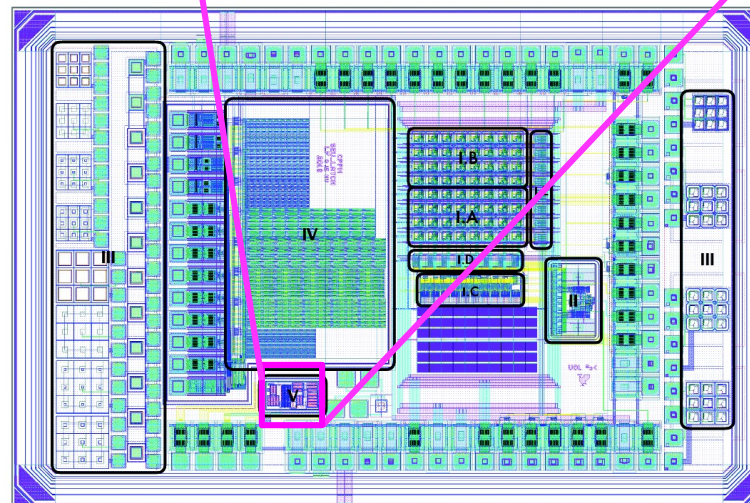
  - Reduced turn around time

  - Radiation tolerant
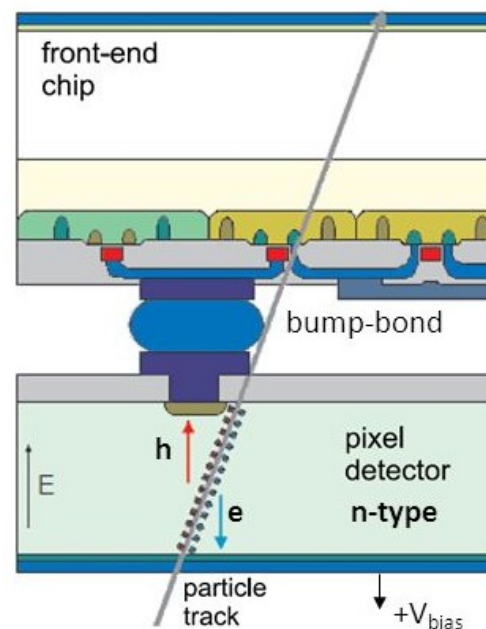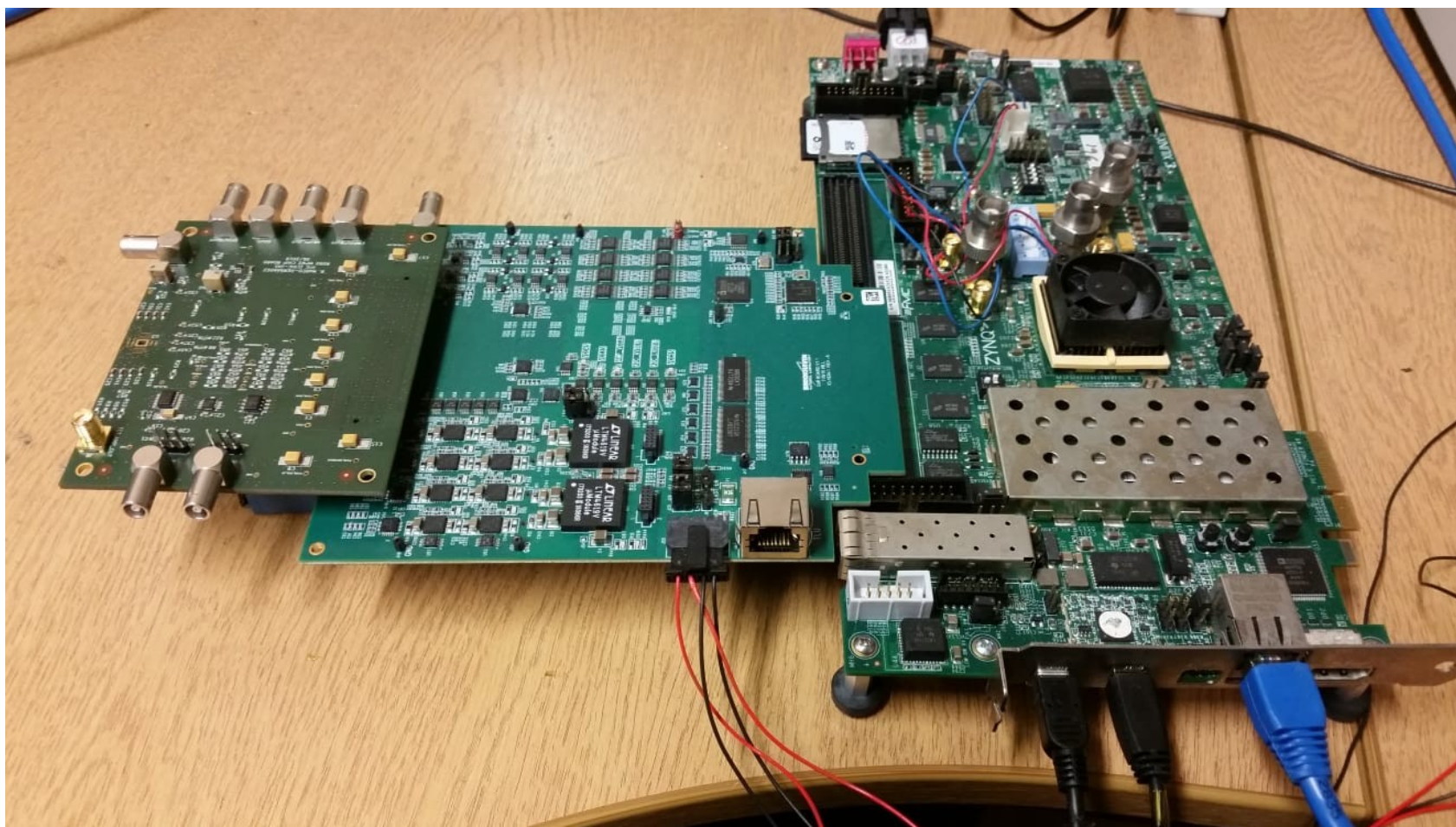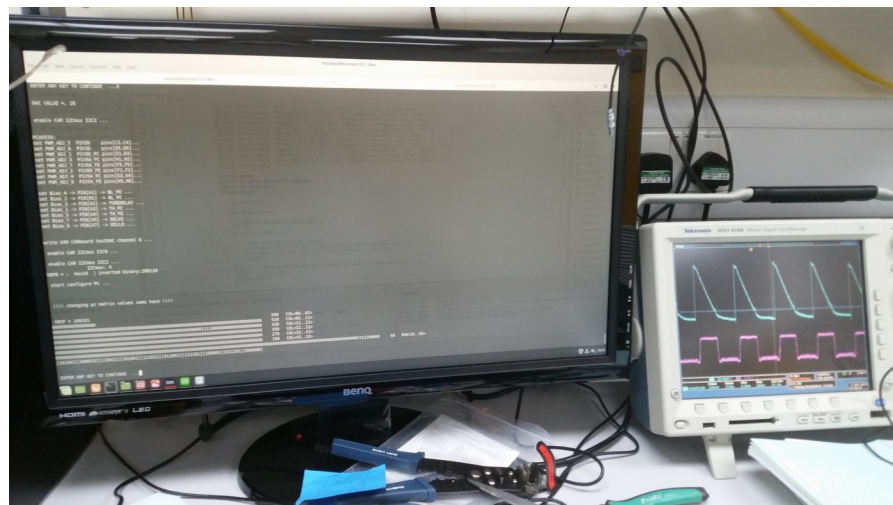

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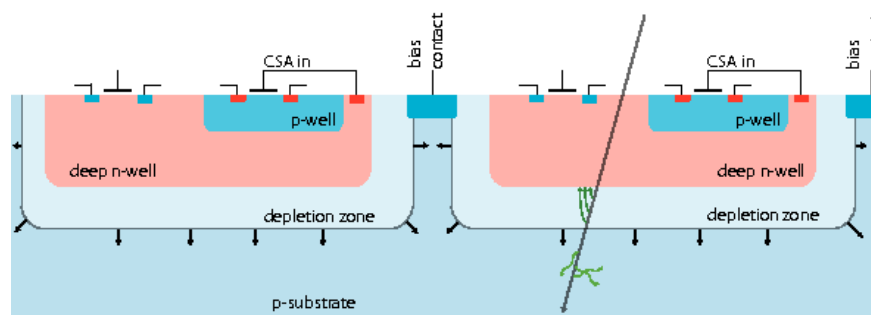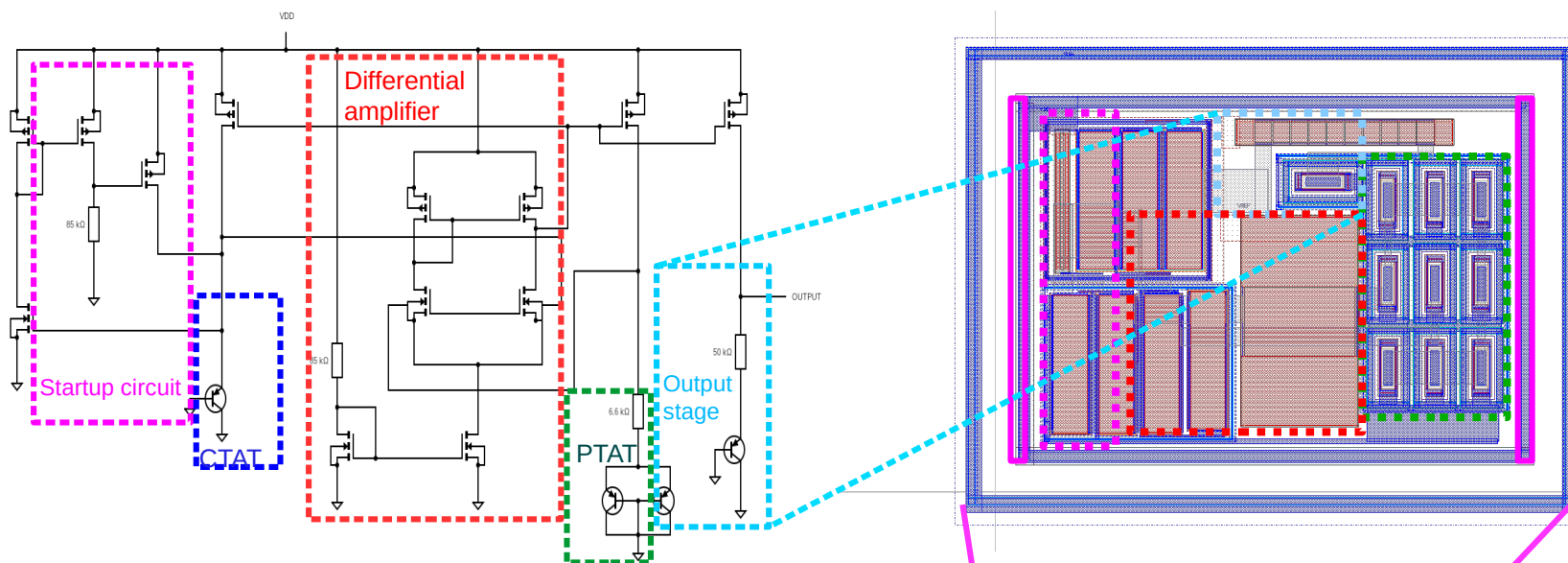
I	PIXEL Matrix
II	Analog Buffer
III	Test Structures
IV	SEU Tollerant Memory
V	Bandgap

RD50-MPW2 – Evaluation Preparations

The readout system for RD50-MPW2 has been assembled awaiting delivery of MPW2.

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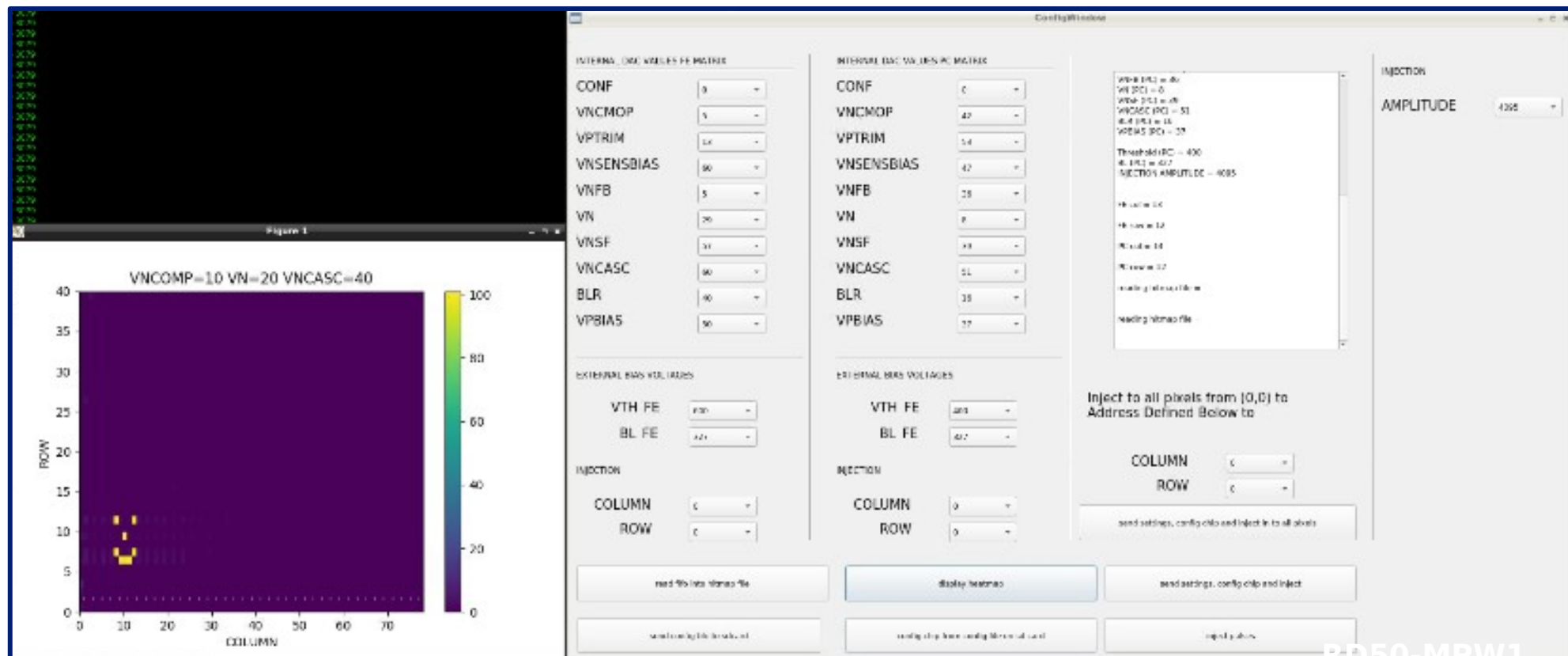LIVERPOOL

FGPA board
Caribou
Chip board
RD50-MPW1

The Data Acquisition System (DAQ) is composed of:

- A Xilinx ZC706 FPGA board

- The Caribou board

- A custom Chip board

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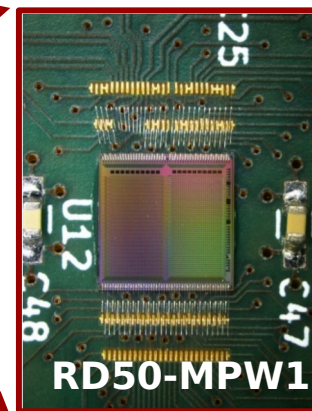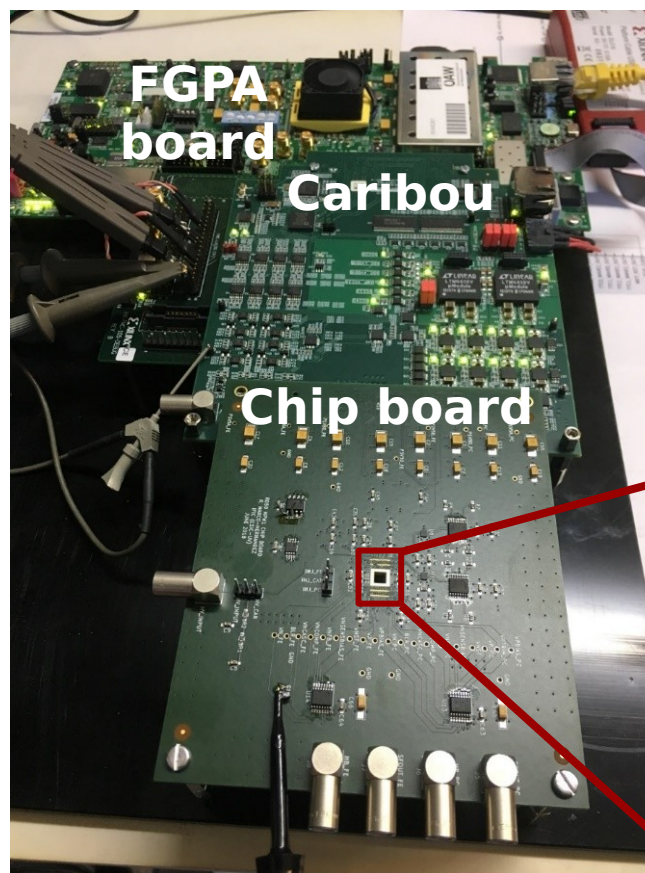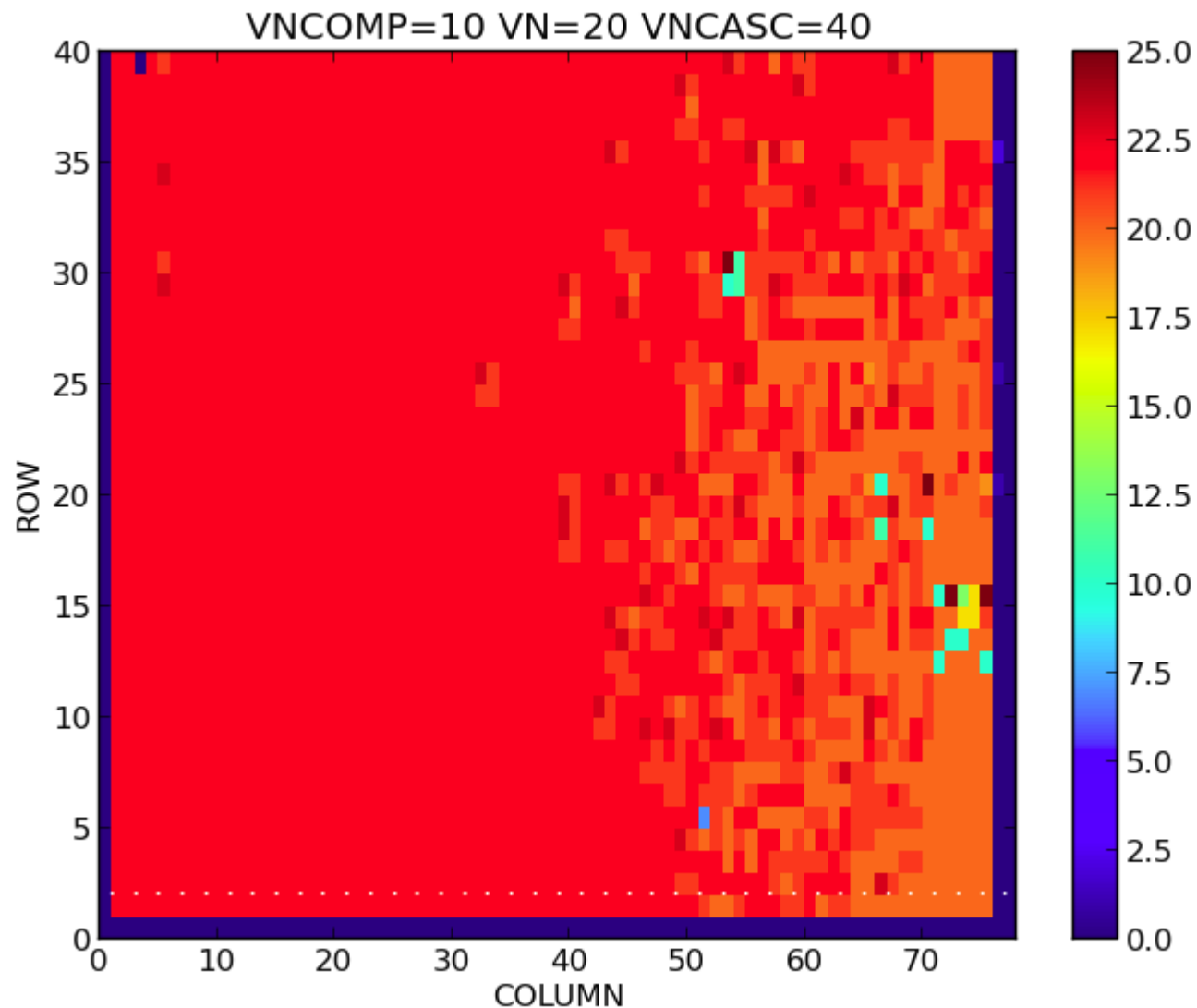

- GUI developed to configure and readout the RD50-MPW1

- Each pixel in the matrix has a test charge injected into it 20 times

- The number of hits in each pixel are then counted and displayed as a colour scale

- An ideal response would be a single flat color with no variation

VNCOMP=10 VN=20 VNCASC=40

- By keeping the threshold fixed and plotting multiple hitmaps for various amplitudes of injection.

- We are able to extract a measure of the noise of any paticular pixel.

- This can be done by plotting number of hits received against amplitude of injection to generate an S-Curve
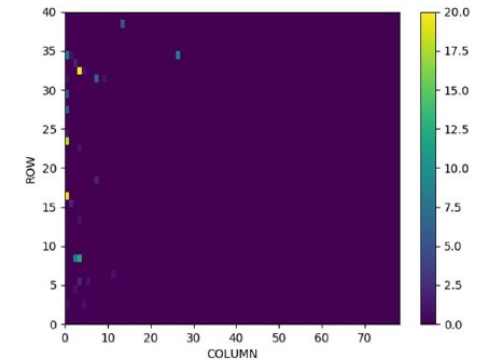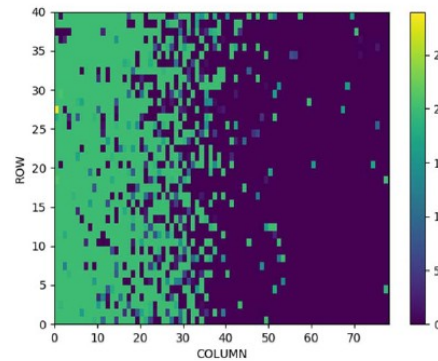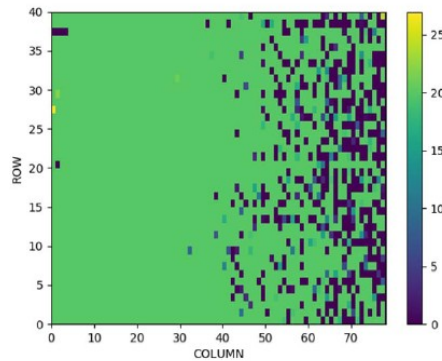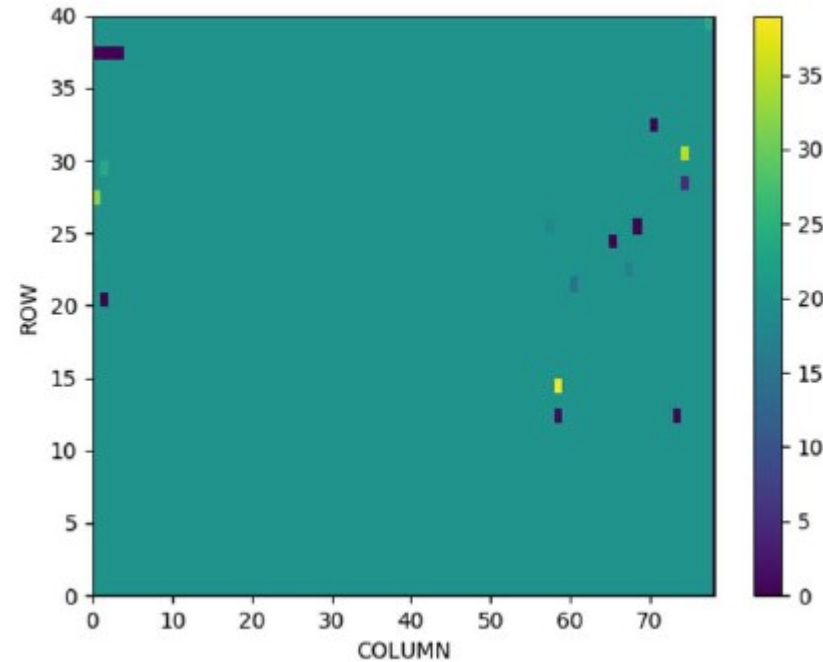
- Here 1000 injections are performed for one pixel and the number of hits observed are plotted against changing injection amplitude

- The width of the S-Curve is proportional to the total noise for a given pixel

- If normalised to 1 and plotted for varying threshold instead of amplitude the efficiency of each pixel can be plotted as a function of thesholds voltage.

S-CURVE (1,4)

noise = 49.699399 mV

VT50 Point = 1.318838 mV
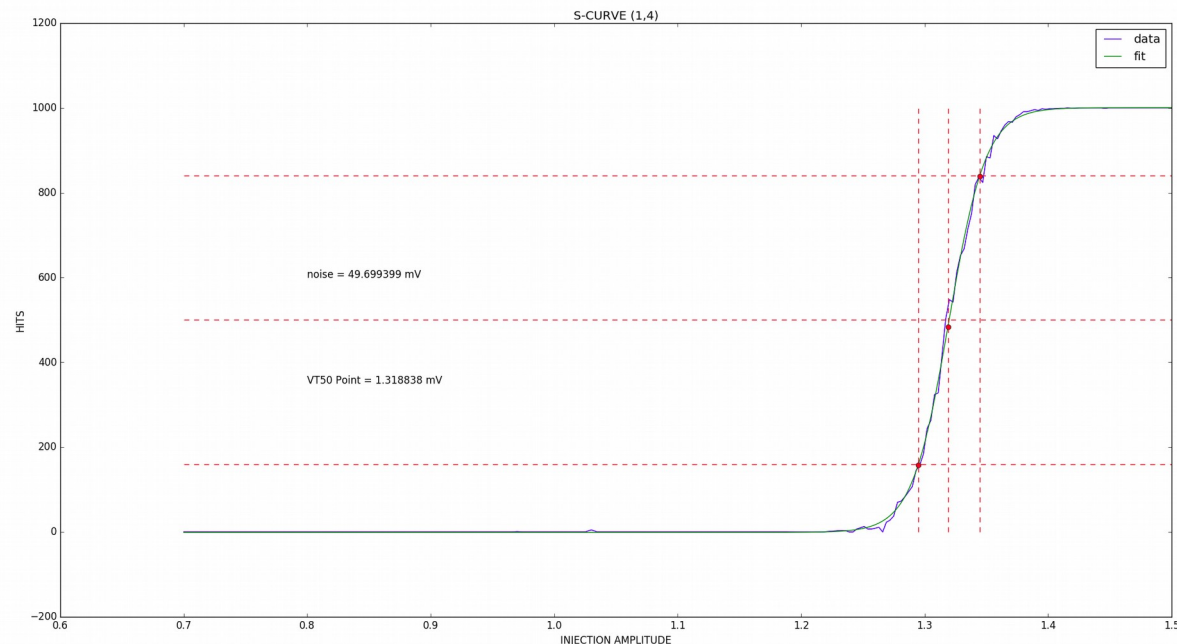
- These plots provide valuable information not only for characterisation and optimisation of the existing device.

- But also to feedback into later itterations of the by highlighting areas of inefficiency of high noise allowing for comparison with simulation.

RD50-MPW1 – Status

o Currently being characterised
o DAQ debugging in progress
o Hitmaps generated
o Pixels being characterised – including s-curves

RD50-MPW2 - Status

o Expected delivery in January 2020
o Readout System Assembled