First Results on Laser test at Oxford

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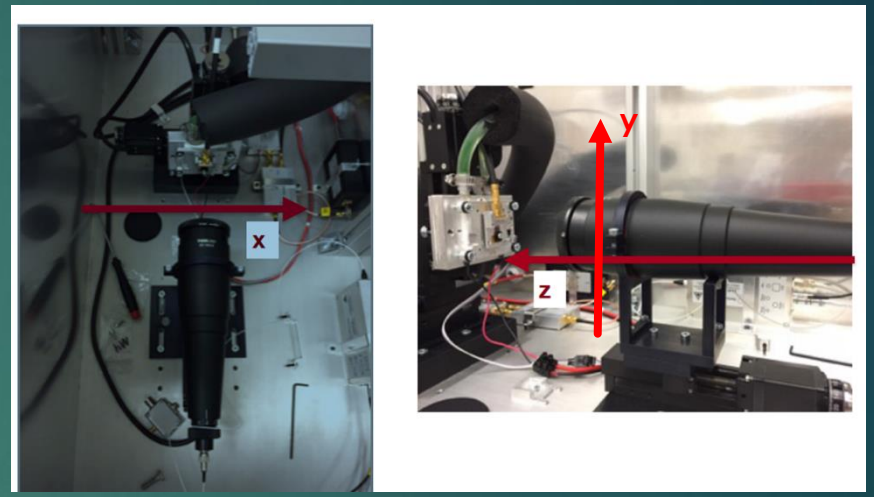
The laser in Oxford

- From Particulars
- 640 or 1060 nm of wavelength
  - Currently using 640nm
- Used in pulse mode
- 3D Motion stage:
  - Horizontal (x)
  - Vertical (y)
  - Focus axis (z)

Find the pixel

Find the focus position

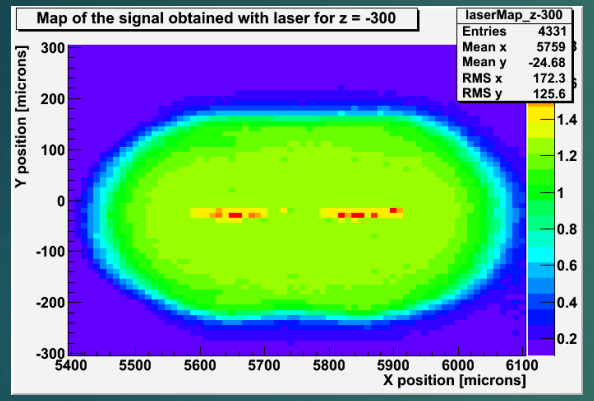


- Routine written in Labview for scanning on x,y,z.
  - Thanks to Jiang Jya (summer student)

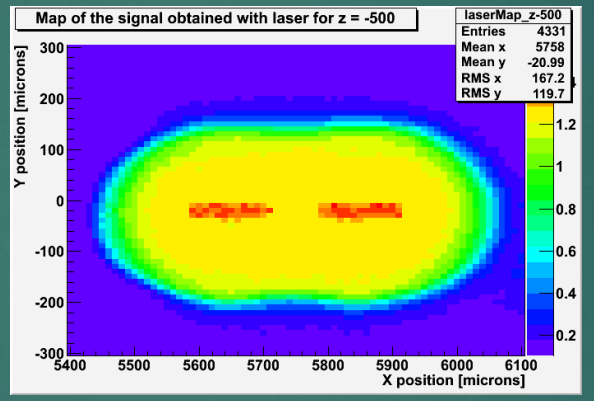
Signals on MB01

Thanks to K. Arndt for the mechanical mounting system

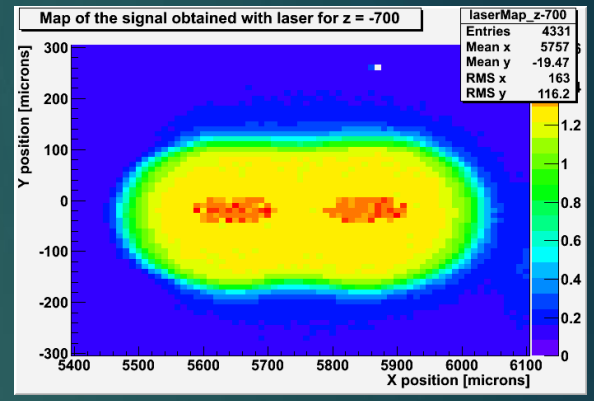
- First used on MB01, HVStrip1 not irradiated
- Chip positioned with surface perpendicular to the laser (frontal position), steps of 10µm
- Signal obtained from pixel (5,0) at different z values
- On plots: average signal in V, 10 pulses collected per bin



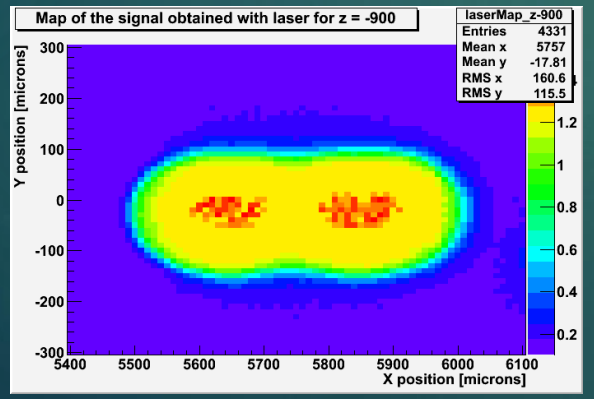
Z = -300 µm



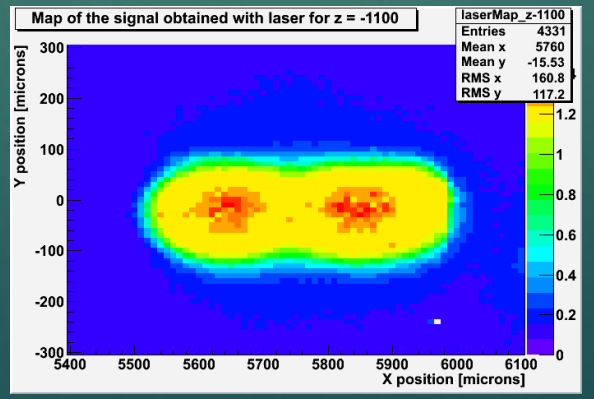
Z = -500 µm



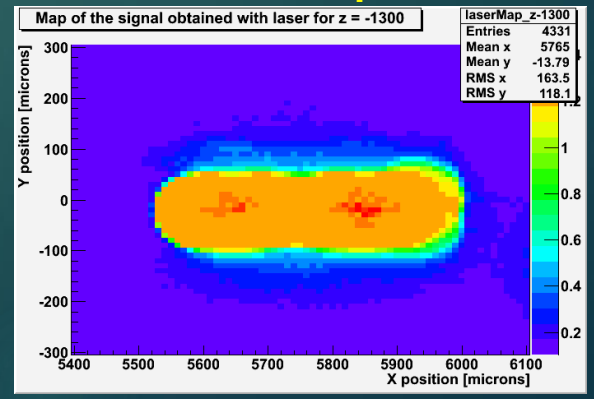
Z = -700 µm



Z = -900 µm



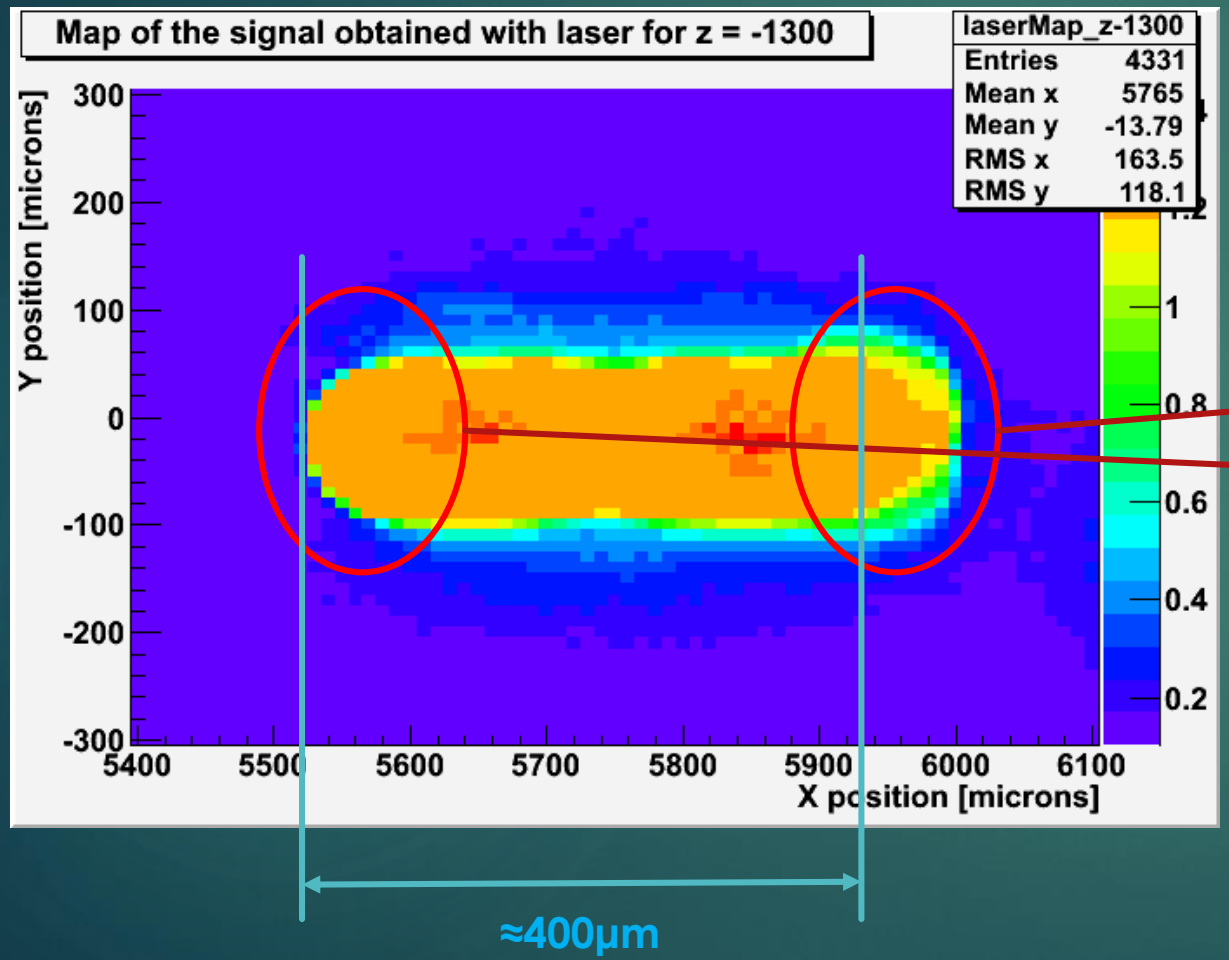
Z = -1100 µm



Z = -1300 µm

Signals on MB01: notes

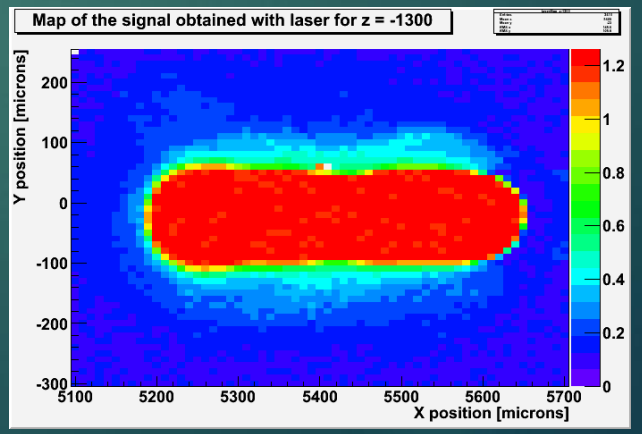
Z = -1300 μm : good resolution



Expected size: 40x400 μm²

It's larger: charge sharing?

Right edge is larger and smoother than left one. Pixel (5,1) is on the left: no charge sharing with it?



Pixel (5,1): note is on the left.
The response looks better but here we average on only one signal.

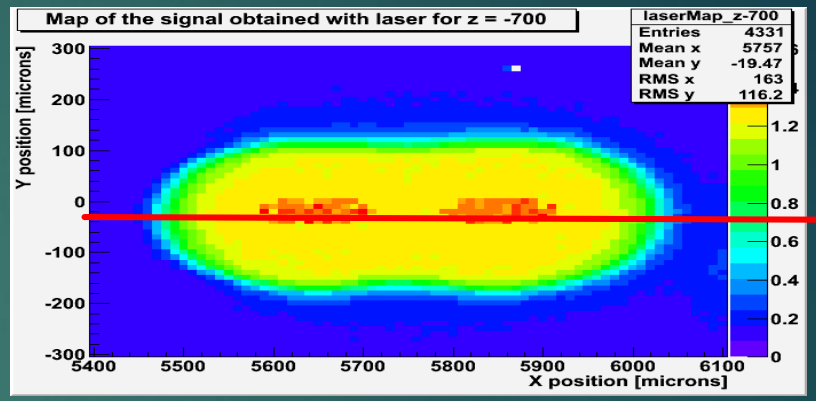
Best focus

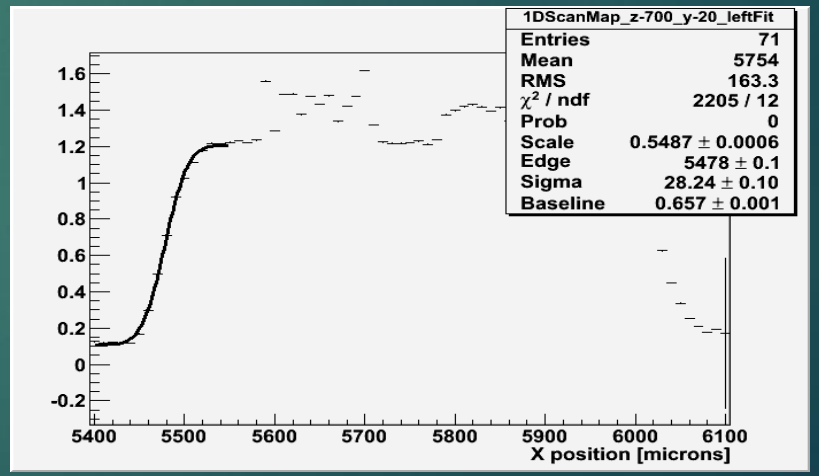
- Reproduce signal as function of only one coordinate

Coordinate x chosen as on the left there shouldn't be charge sharing

Value chosen in the middle of the pixel, where charge sharing on y is minimum

- Look at the edge of the pixel
- Fit it with a error function



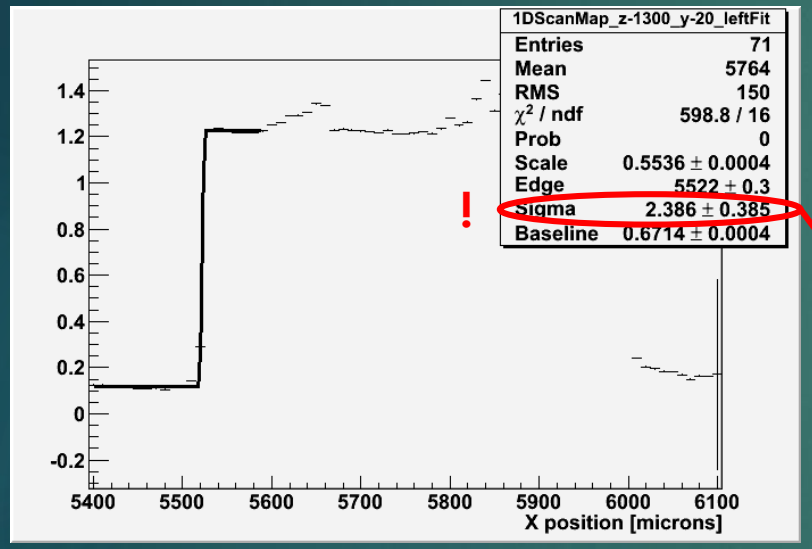


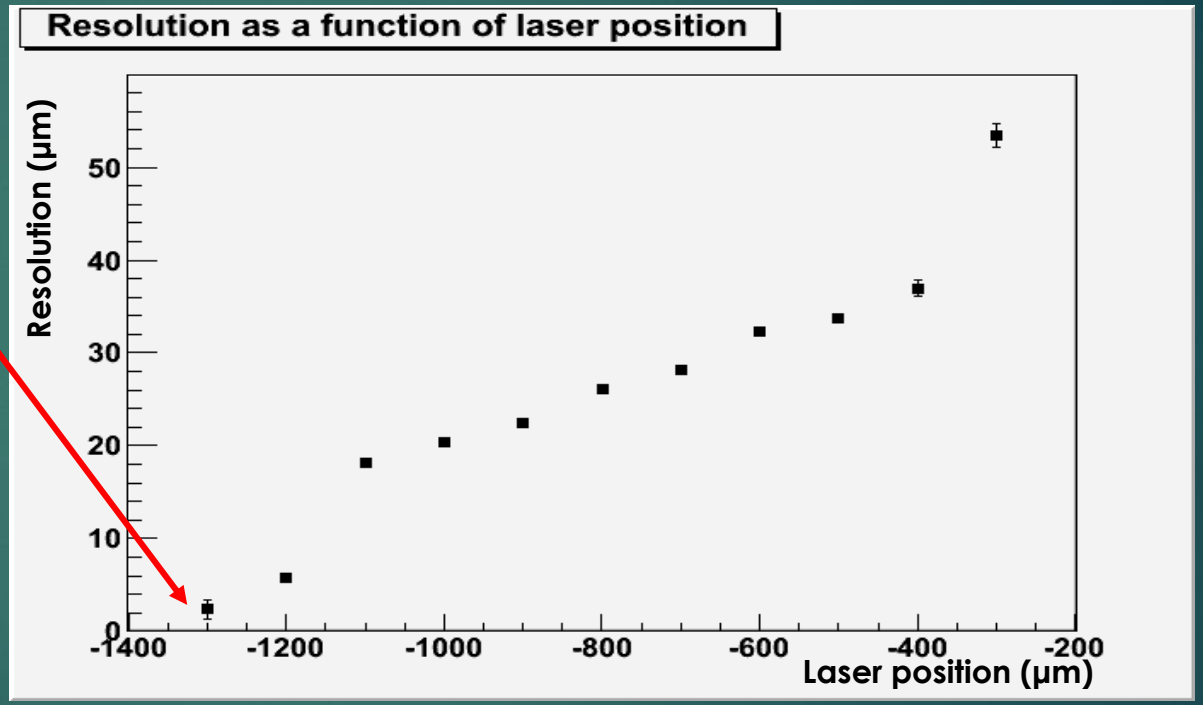
The resulting shape is the shape of the pixel smeared by charge sharing and laser resolution.

Our choice should minimize the first contribution

Best focus

- Plot the value of Sigma as a function of z to find the best position





- Great resolution at about -1300 μm
- Probably not even a minimum: investigation at -1400μm being performed
- Also, laser step can be decreased to improve fit

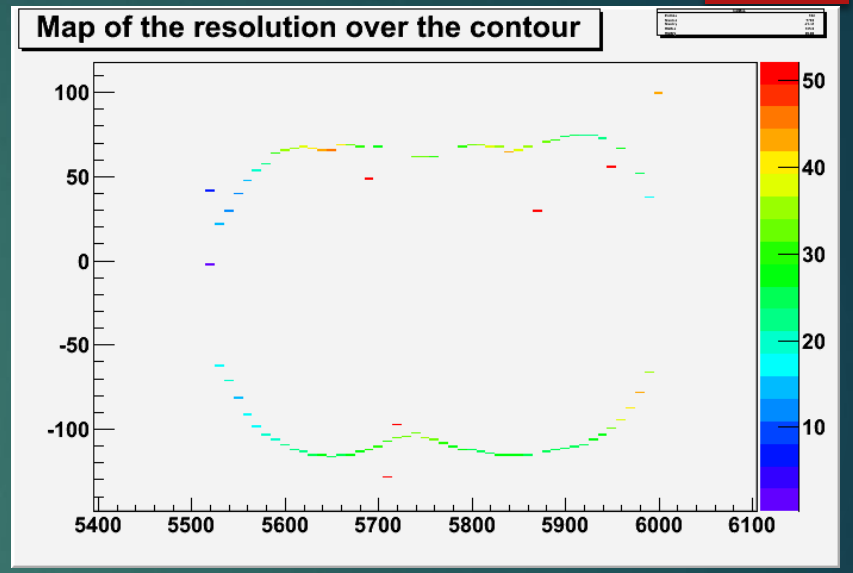
Effective shape

- Fix a coordinate
- Fit the 1D plot with error function on both right and left
- Find the edge value
  - The center of the error function
- Fill the edge value with the Sigma value

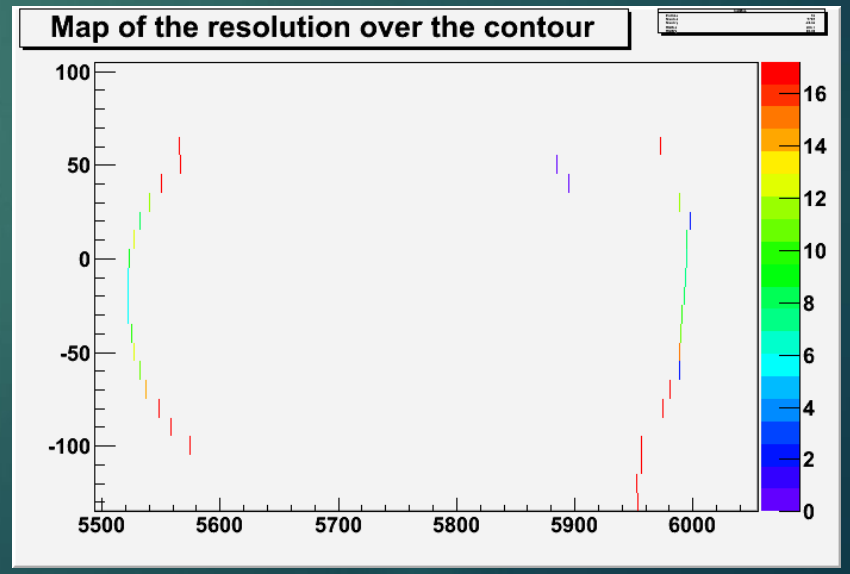
The shape of the figure obtained can be regarded as an effective shape, the shape once the distribution has been deconvoluted from the smearing effects.

The value in each bin gives the idea of the sharing itself

Some fluctuations due to non-convergence of fit: work in progress for optimizing it!



Fixed x



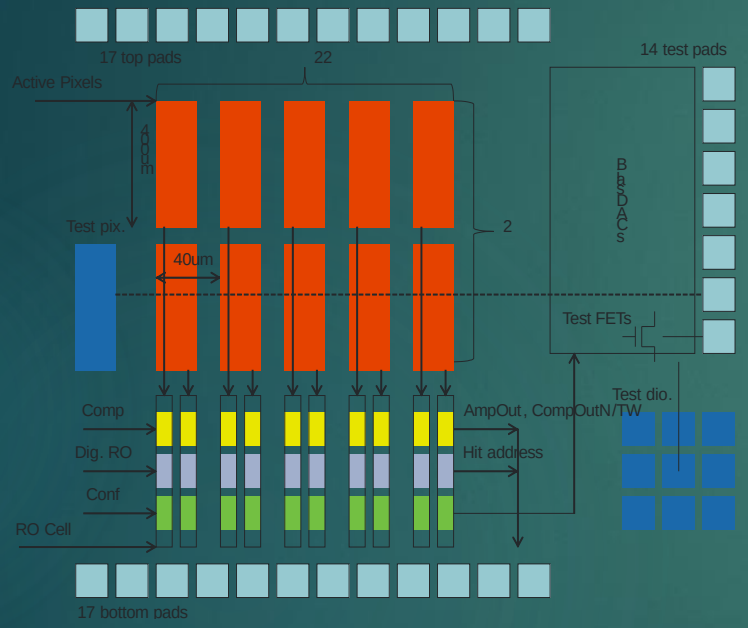
Fixed y

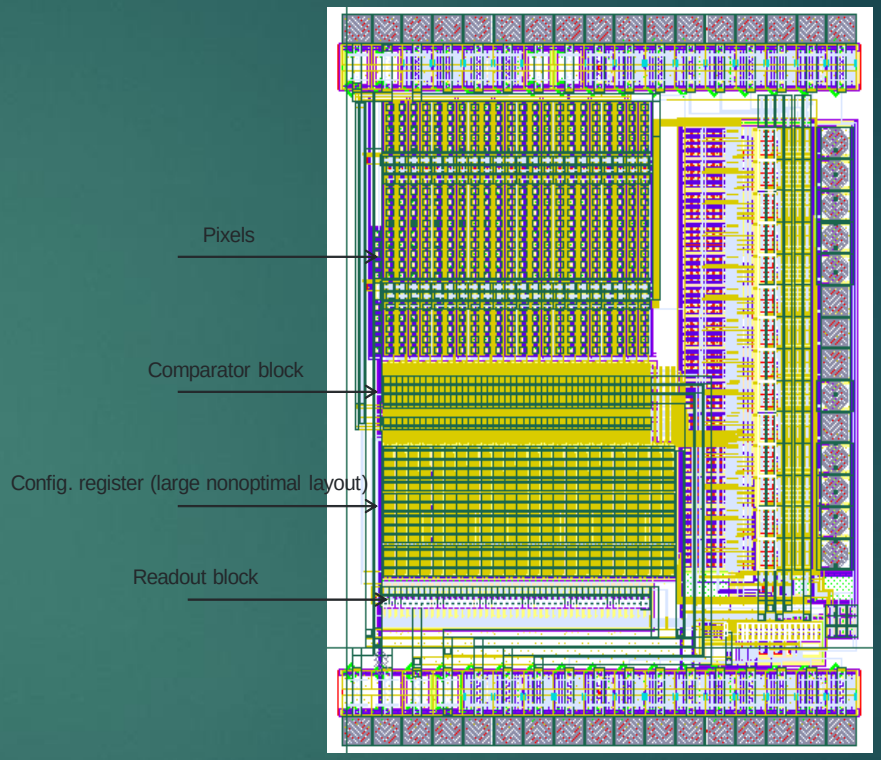
Conclusion

- We have a running laser system perfectly working
- Routines written and functioning
- Work being performed on:
  - Laser resolution minimization
  - Effective shape
- Studies that can be improved:
  - Signal collection
  - Charge sharing

Backup

Pixel schematics





Single Pixel: