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**Metrology of the fiber optic arrays of a dosimeter for radiotherapy applications.**

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supervised by

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**RADART group**

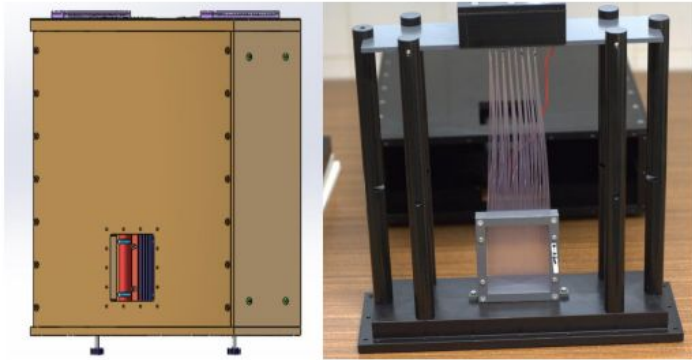


6 de Setembro 2024

# Introduction

Develop a dosimeter based on Scintillating Optical Fibres (SPOFs) for radiobiology

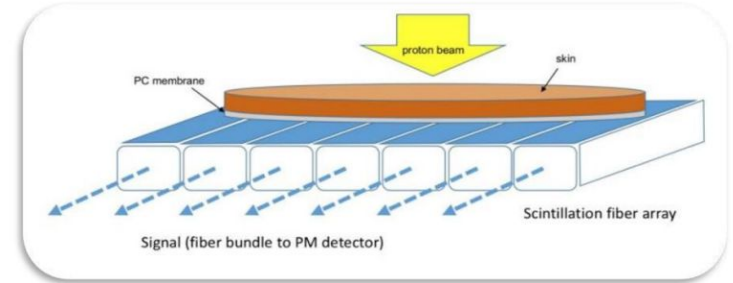
## Present



Detector composed of 64 SPOFs  
Read out performed by  
MultiAnode PhotoMultiplier

Irradiation Box designed and  
produced

## Future

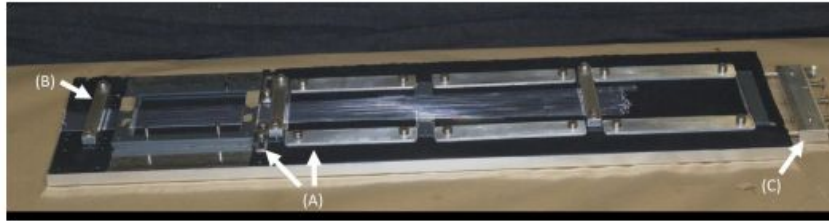


Proton beam interacts with a membrane over  
optical fibers that detect the generated signal.

# Methodology

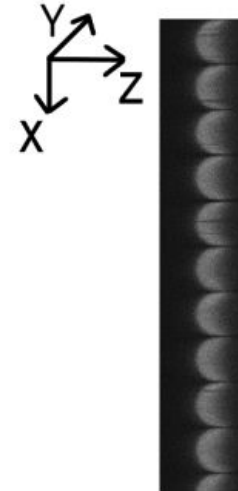
Protocol developed to ensure the quality of fibre array production

## Array construction

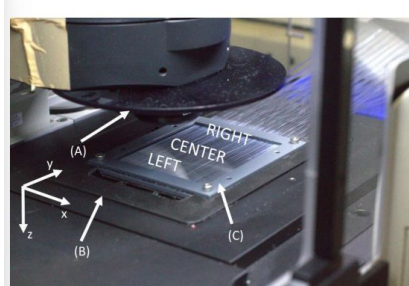


Fibers fixing and alignment board:  
A – Limiters for fibers juxtaposition;  
B – Bar for fiber alignment;  
C – Fiber stretching mechanism

## Measurement

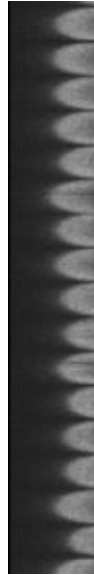
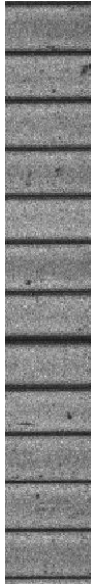


## Microscopy setup

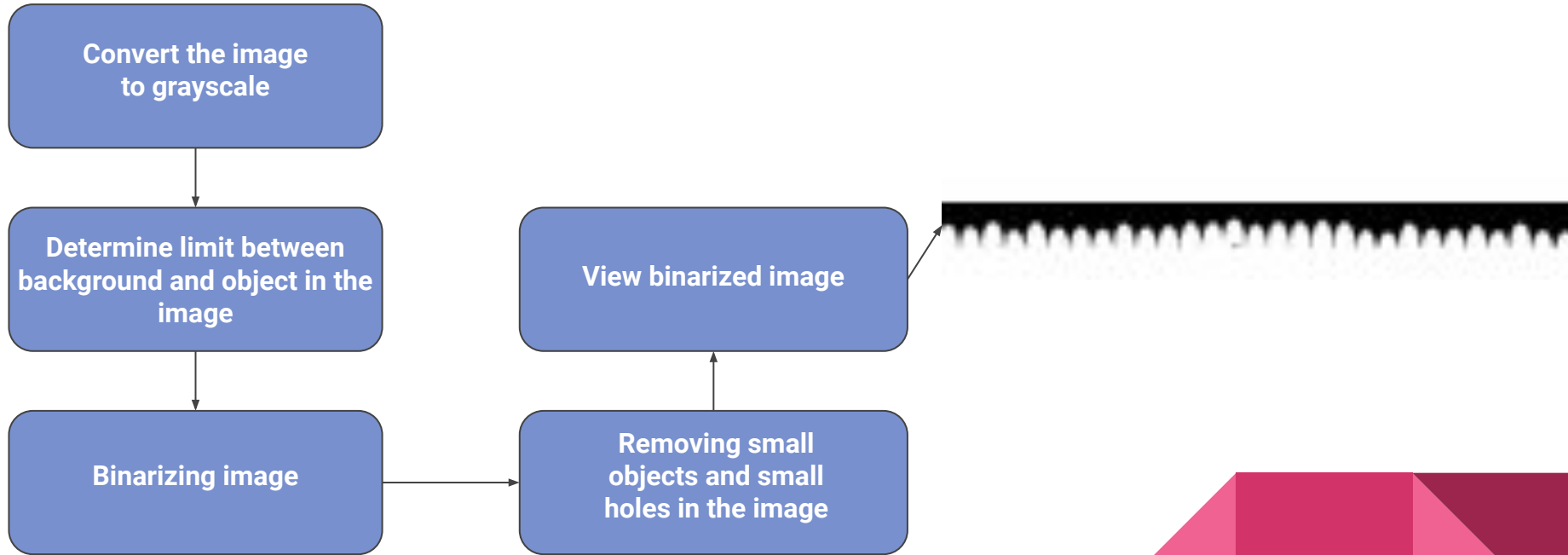


A - microscope's light source;  
B - Microscope's platina;  
C - Optical fiber array

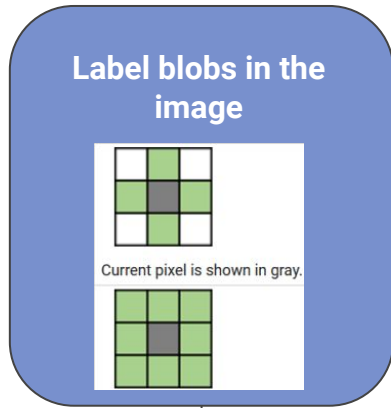
# Imagej - Image processing



# Python Processing Clustering Algorithm



# Python Processing Clustering Algorithm



Measuring blob properties

Calculate and store centers

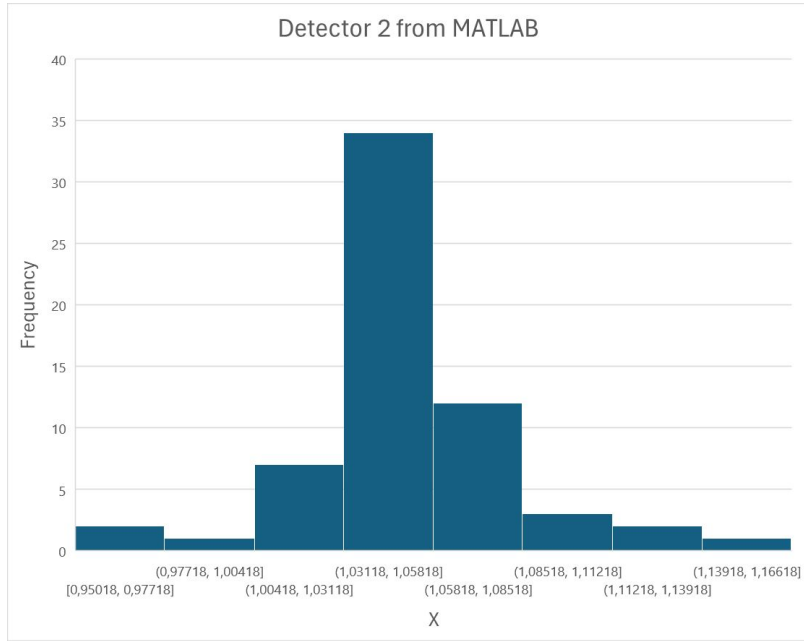


Converter distances to pixels to millimeters

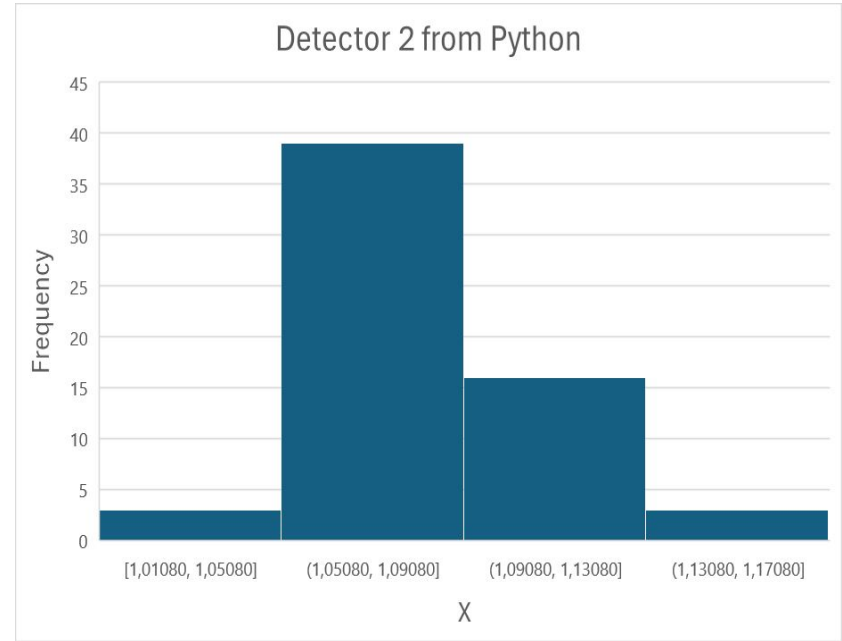
Calculate difference in distances

Display list of distances in X and Y

# Results

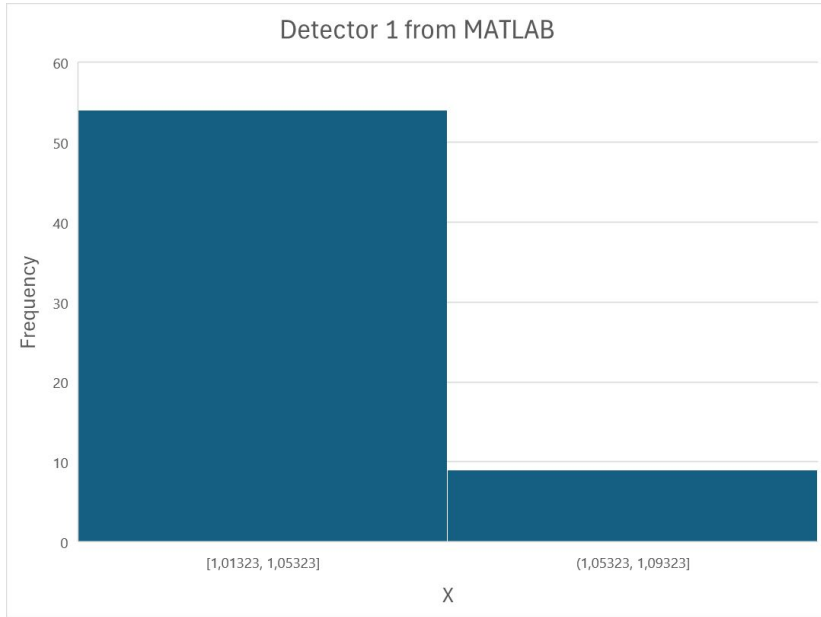


Mean: 1,0488 mm  
Standard deviation: 0,0305 mm

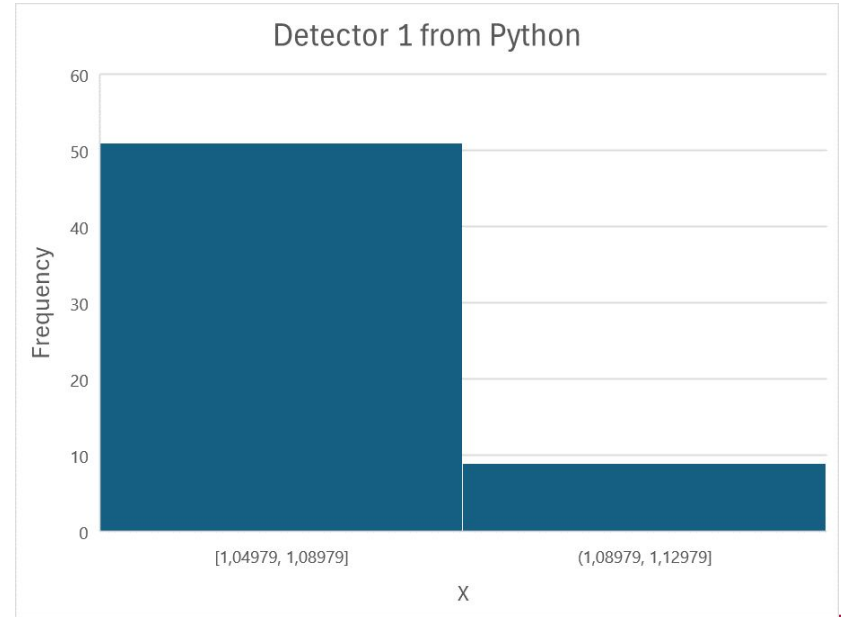


Mean: 1,0855 mm  
Standard deviation: 0,0232 mm

# Results



Mean: 1,0397 mm  
Standard deviation: 0,0156 mm



Mean: 1,0769 mm  
Standard deviation: 0,0159 mm



# Conclusions

- Code migration to Python brought significant improvements, allowing for more robust and efficient processing of images.
- Being able to put the entire image into Python has advantages when it comes to data analysis. It is possible to have absolute positions in x axis.
- There are still some problems in the clustering that do not allow for correct identification of all optical fibers.

*Thank you!*