

# IDENTIFYING AND SHIELDING OF IONIZING RADIATION USING HYBRID PIXEL DETECTOR



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# MOTIVATION AND OBJECTIVES

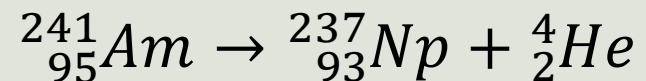
## Motivation:

- Ionizing radiation is radiation with sufficient energy to ionize matter that it interacts with. Ionizing radiation cannot be seen, tasted, felt nor sensed by the human body, and therefore any excessive exposures to this type of radiation can result in serious health effects.
- To avoid such excessive exposures, it is therefore important to carry out researches and experiments like TimePixel to establish best radiation shielding materials to be used to shield us against this source of radiation.

## Objectives:

- To identify the material that best absorbs different particles resulting from Am-241 when it undergoes radioactive decay.

Alfa decay - Americium:



# INTRODUCTION

## Absorption of particles:

- Absorption of particles, in this context refers to placing an absorber (metals) material between a radiation source and a detector. The amount of absorbed particles depend on the type of radiation, type of absorber material and the activity of the source.
- **Alphas** – a thin sheet of paper is usually sufficient to absorb these particles.
- **Beta particles** – these are more penetrating than alphas. For example, up to 10 mm of Perspex may be required for complete absorption of ~ 4 MeV beta particles.

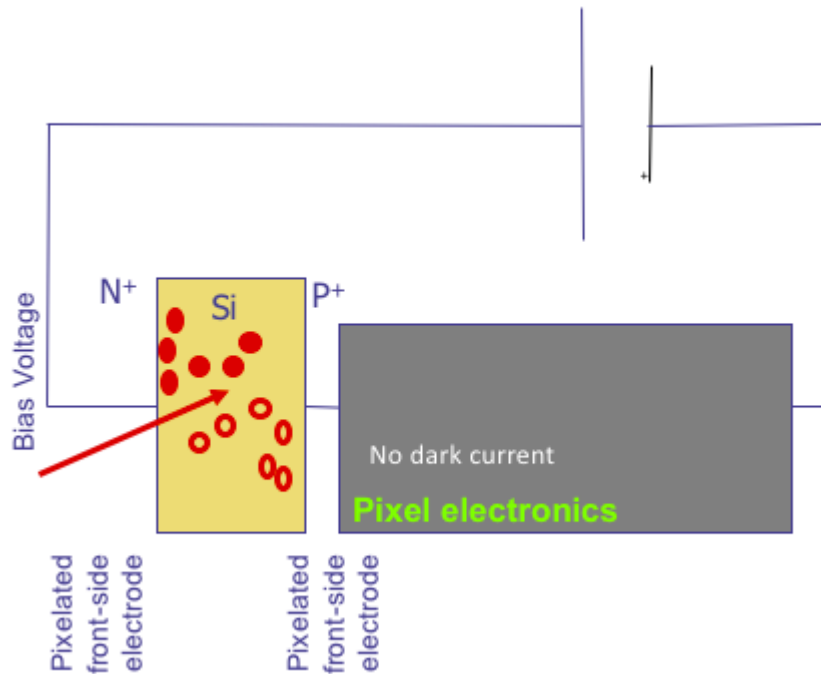
## Gamma rays:

- Gammas are attenuated exponentially when they pass through any material and are more penetrating than alphas and betas.
- Transmittance gives the number of particles in percentage emerging from a shield of thickness x, and is given by:

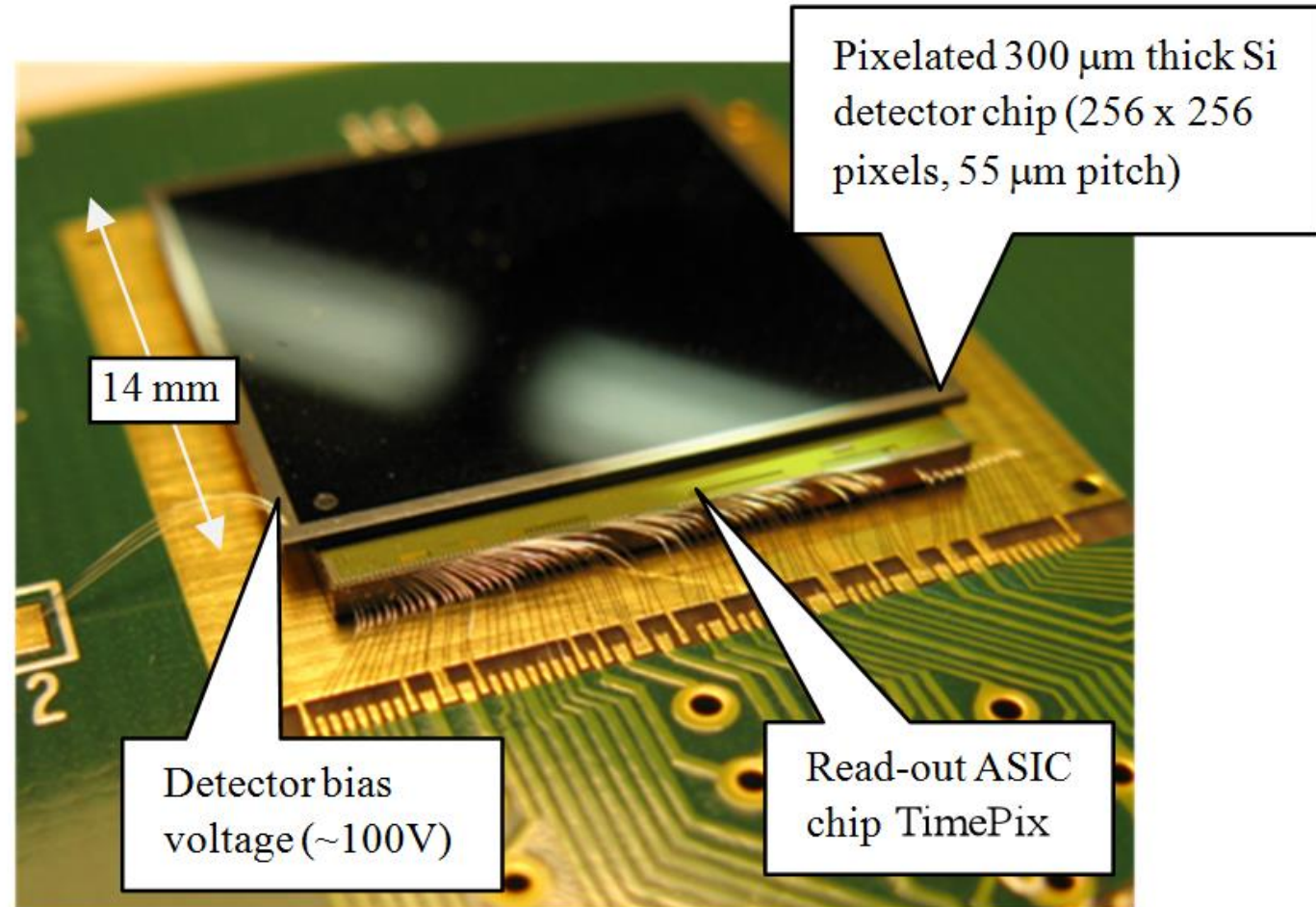
$$T = \frac{N}{N_x} * 100\%$$

# INTRODUCTION CONT...

TimePix was developed as a successor of the Medipix detectors at CERN

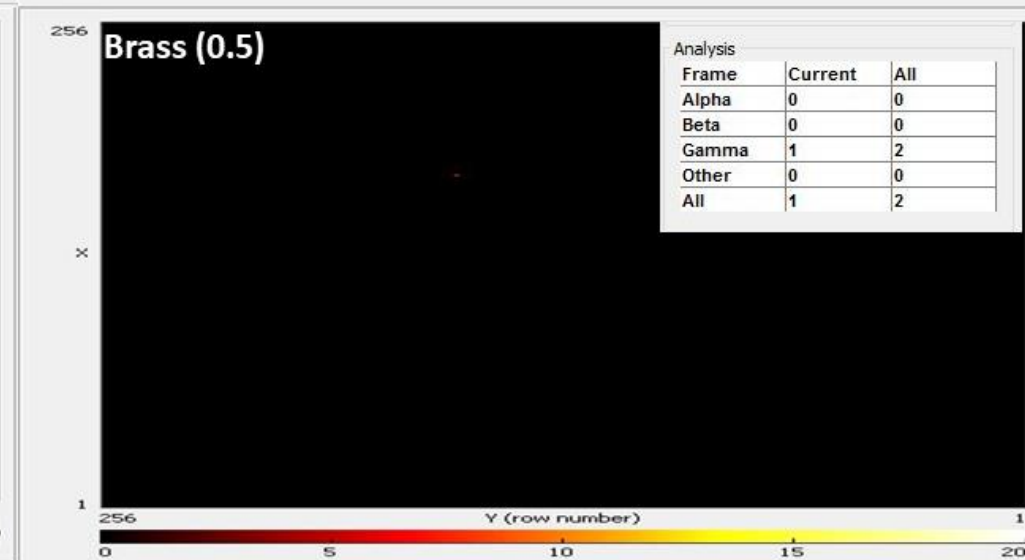
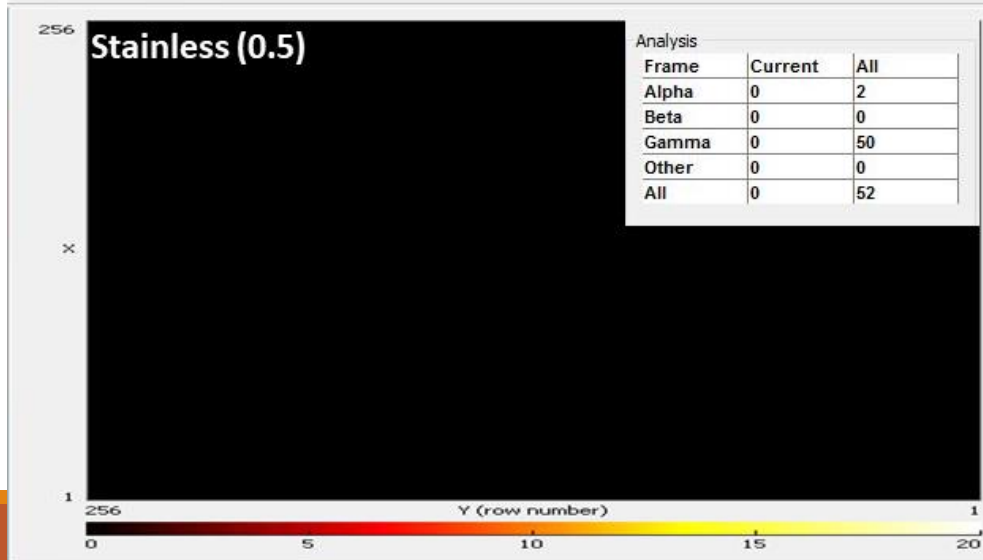
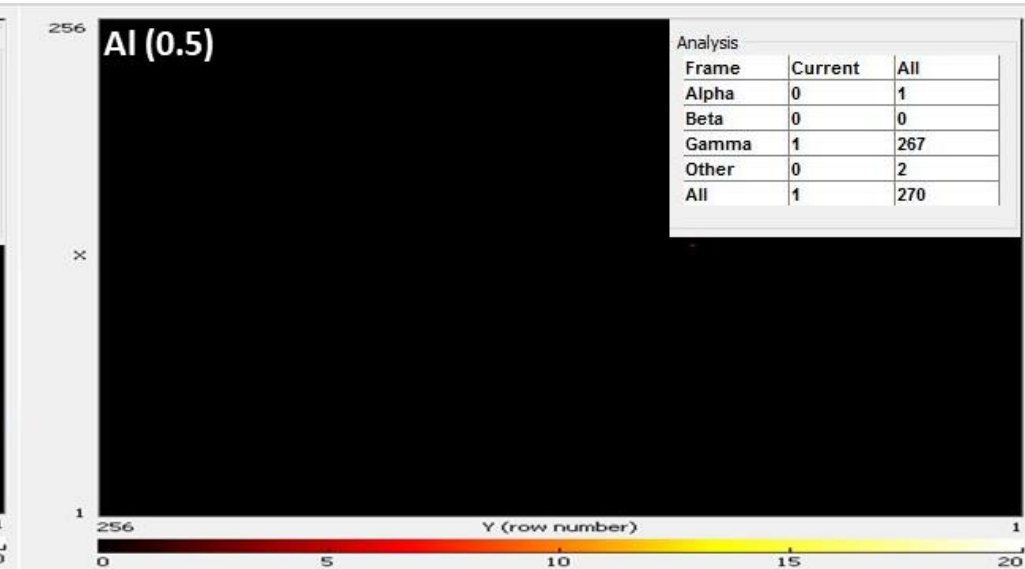
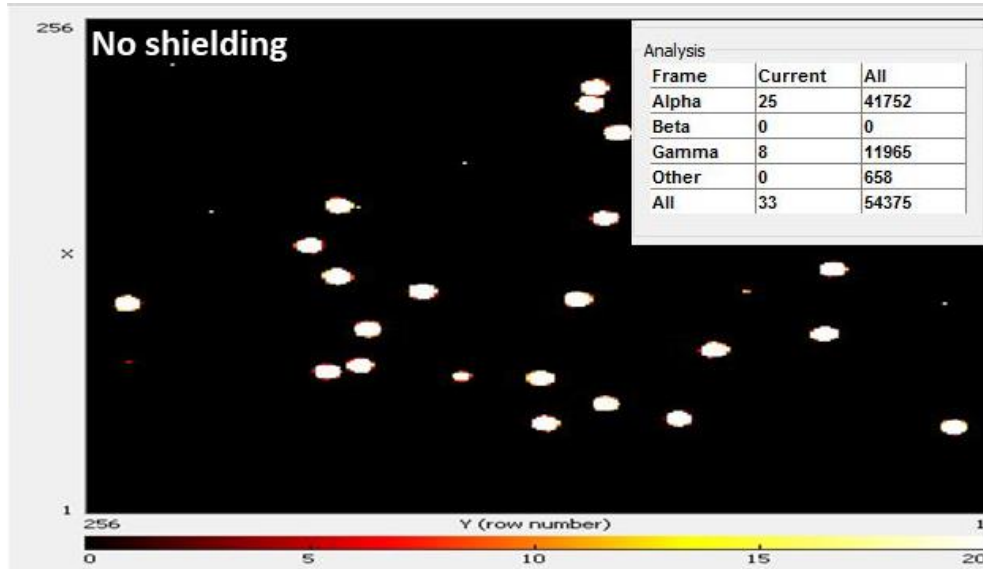


<http://medipix.web.cern.ch/medipix>



# RESULT AND DISCUSSION

We used the Am-241 radiation source to identify and visualized the tracks



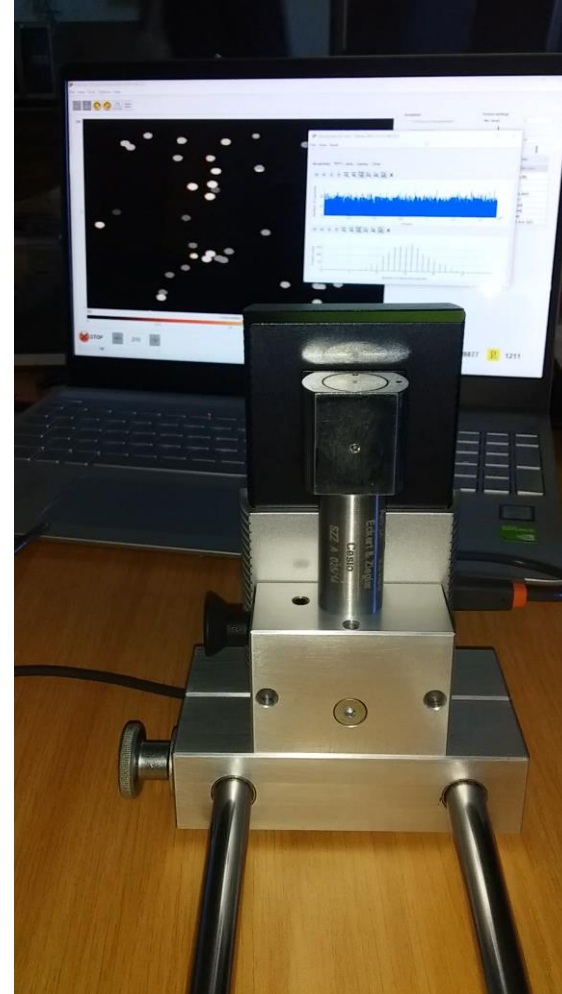
# RESULT AND DISCUSSION

No shielding



Uncollimated source

No shielding



Collimated source

shielding



Shielding the alpha particles with paper

# CONCLUSION

- From the exercise, we discovered that alpha particles have round energy blob
- While the Beta particles appear more elongated tracks
- Paper is able to completely stop alpha particles and brass found to be the best absorbing material.