

# ADMIRAL WP3 Status Report

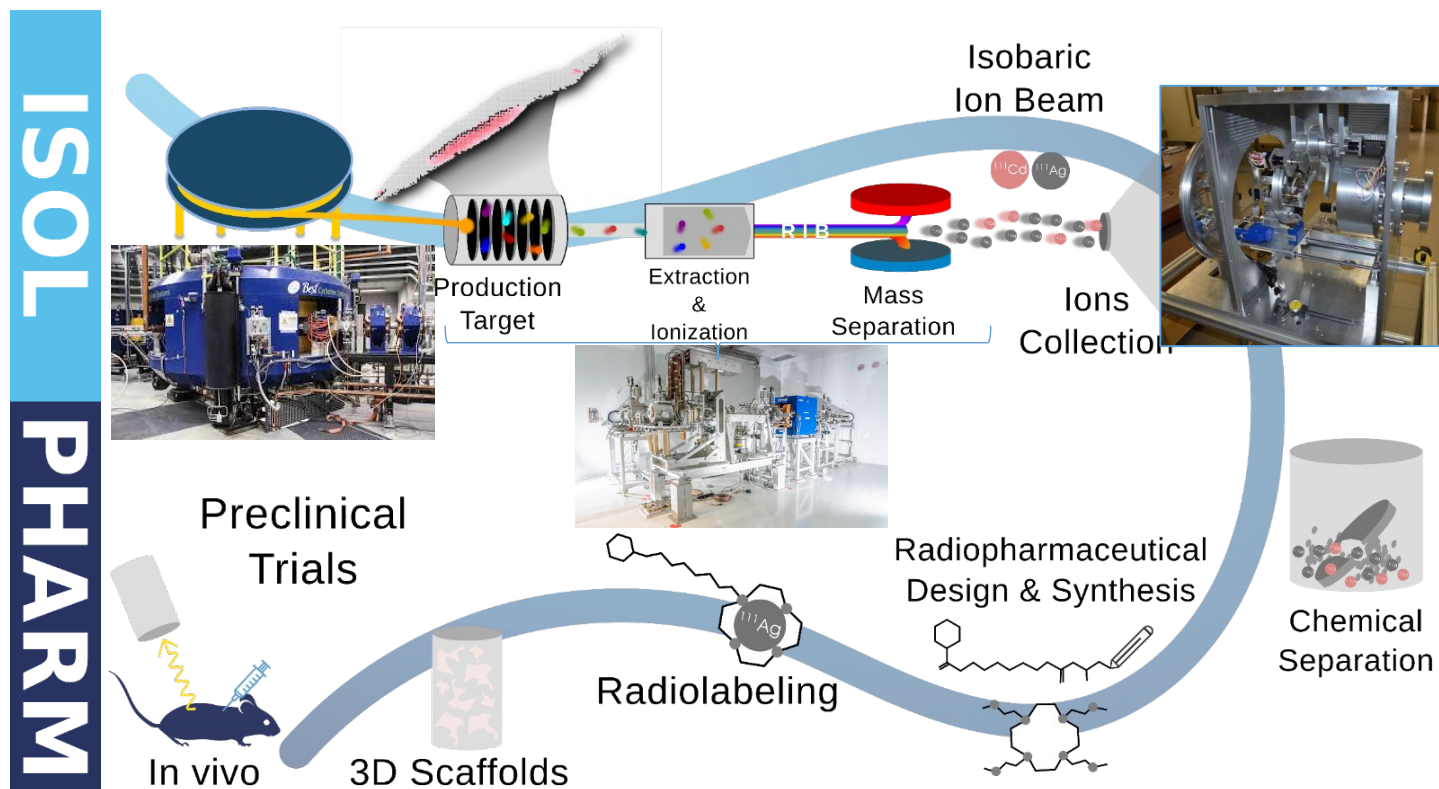
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Bologna / Legnaro

Riunione Gruppo 5 BO - 10/06/2024

# The ISOLPHARM Project

- Production and isolation of radioisotopes with high purity
- The ISOLPHARM method is an INFN patent

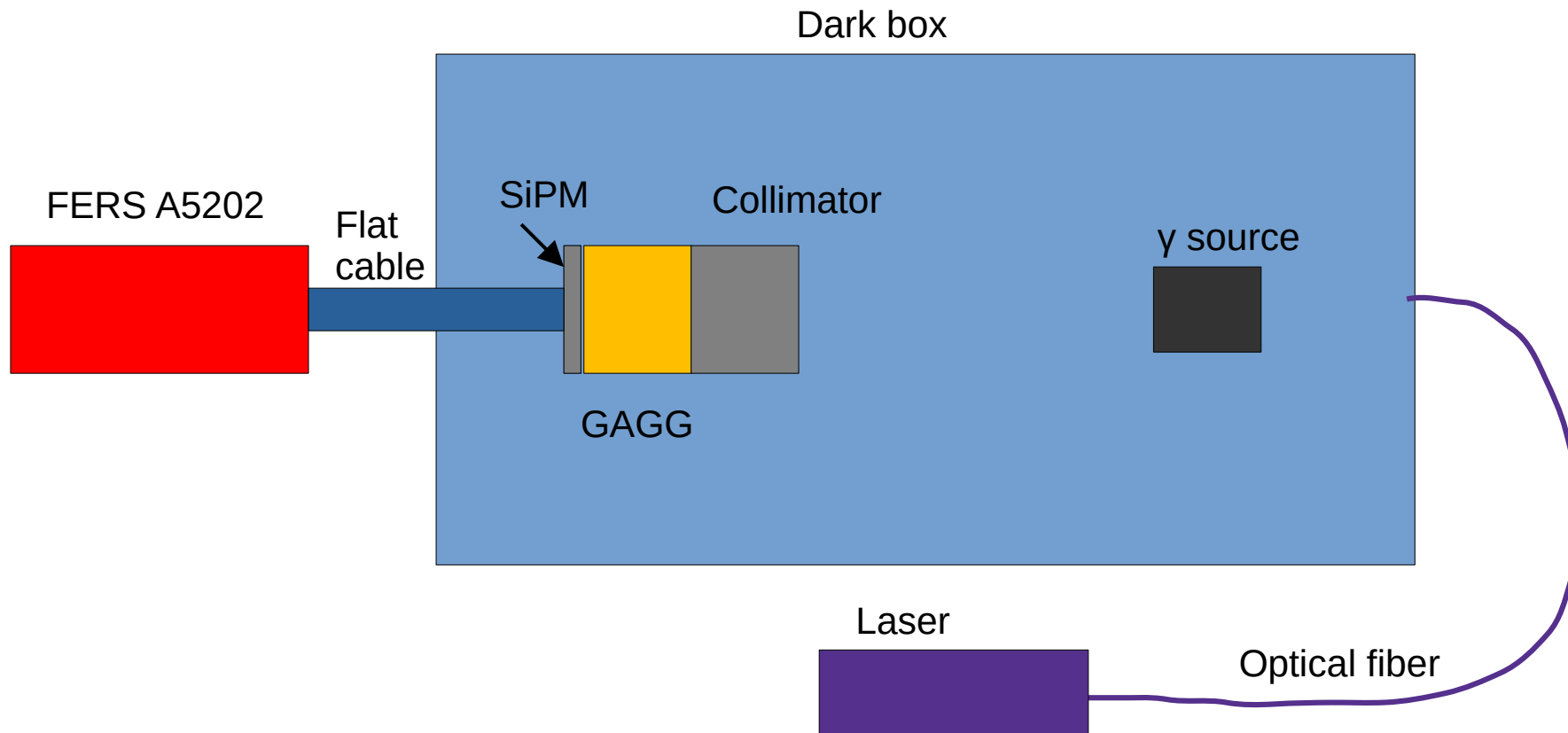


# The ADMIRAL Project (CSN5)

Focus on therapeutic use of Ag-111

- WP1: Radiopharmaceutical production
- WP2:  $\beta$ -imaging
- WP3:  $\gamma$ -imaging -> Design and construction of a prototype of a gamma camera for Ag-111 ( $E_{\gamma}=342$  keV)
- WP4: Targeted radiobiology

# Experimental setup



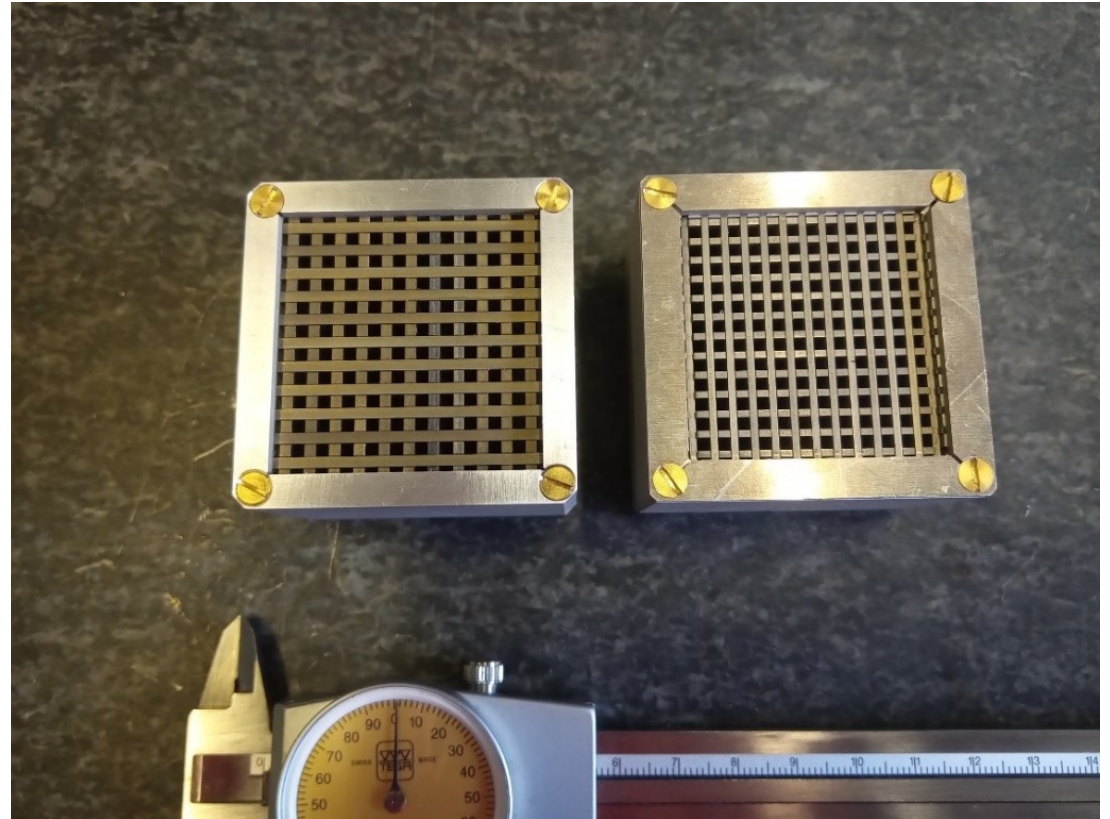
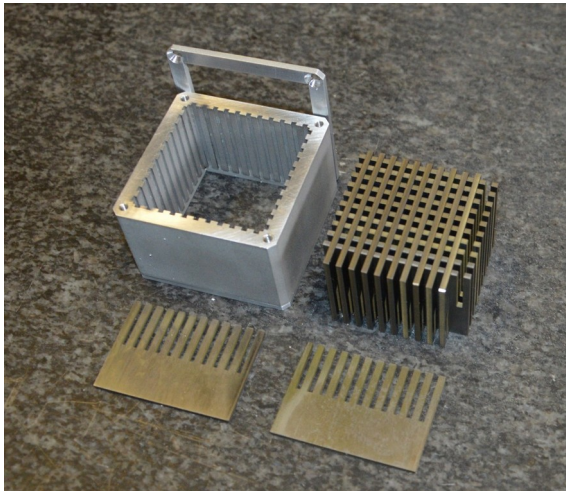
Full detector simulation implemented in Geant4 (D. Serafini, LNL)



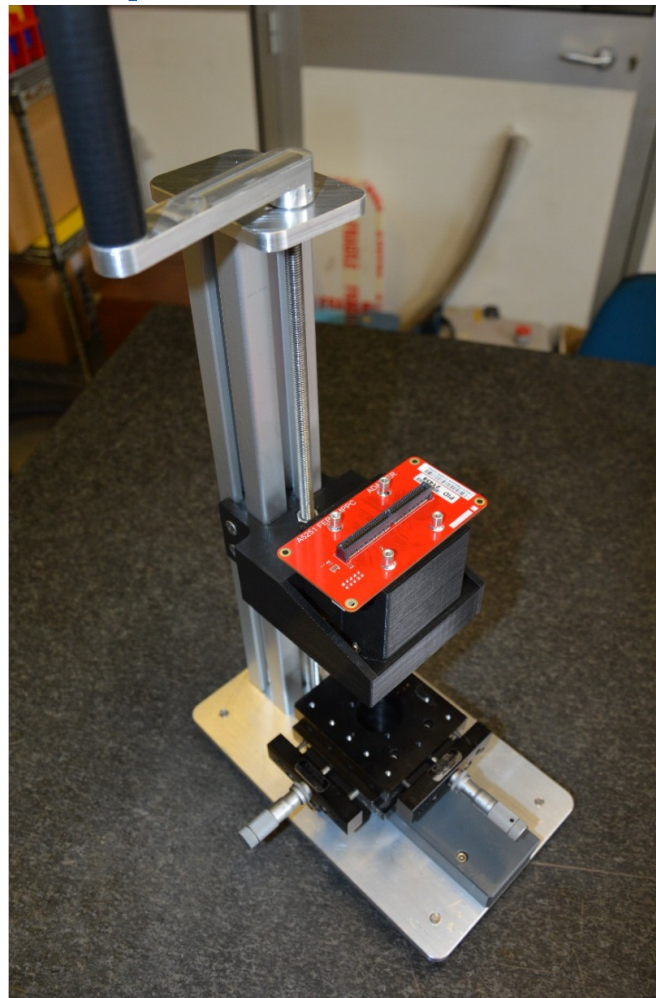
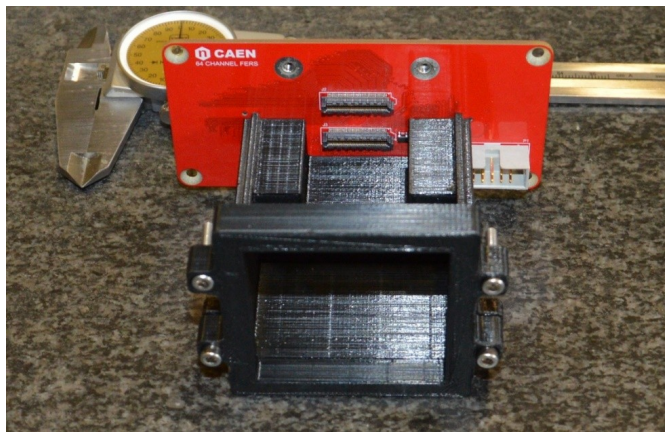
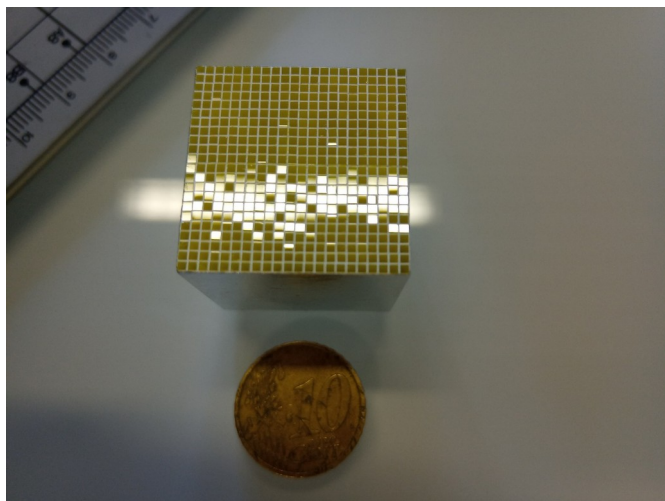
# Construction of Tungsten collimators

Two collimators:

- Square holes, 1 mm septa, 2x2 mm holes
- Square holes, 1.6 mm septa, 2x2 mm holes



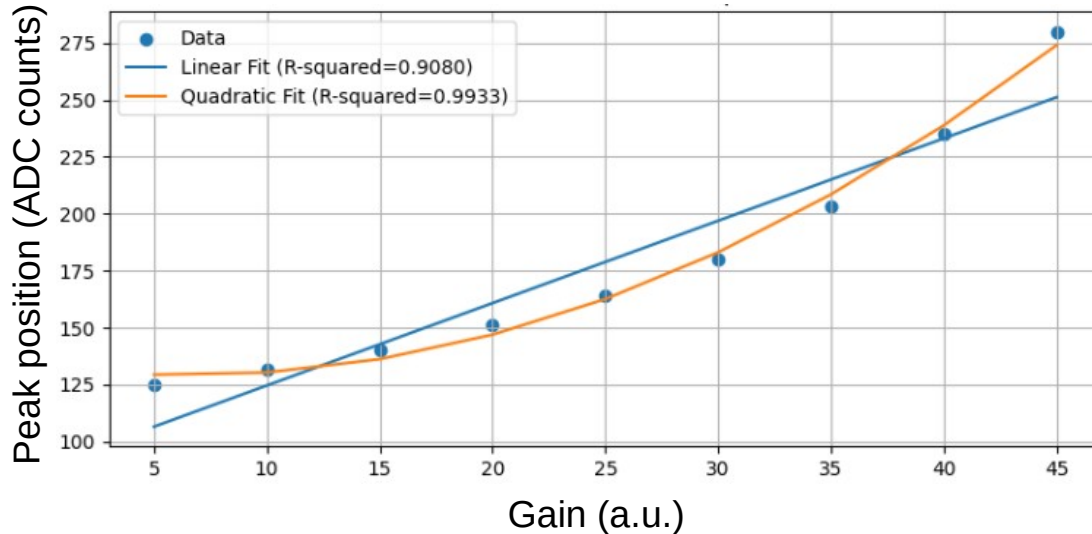
# Support with adapter



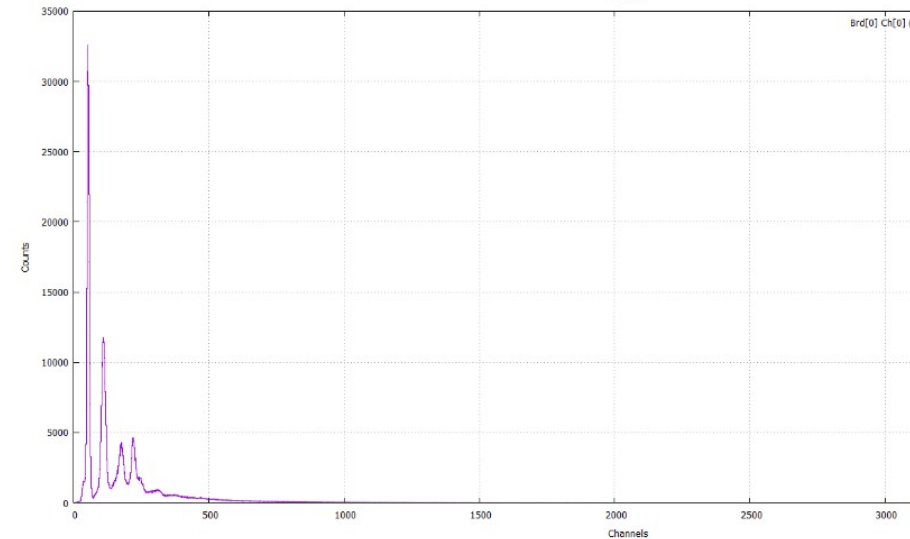
# Tests with light source

- Testing FERS A5202 acquisition parameters (gain, threshold, hold delay)
- Gain equalization using light flat field (50 ns laser pulses from optical fiber far from the SiPM)

Example of gain characterization for a single channel



HG acquisition with highly attenuated laser

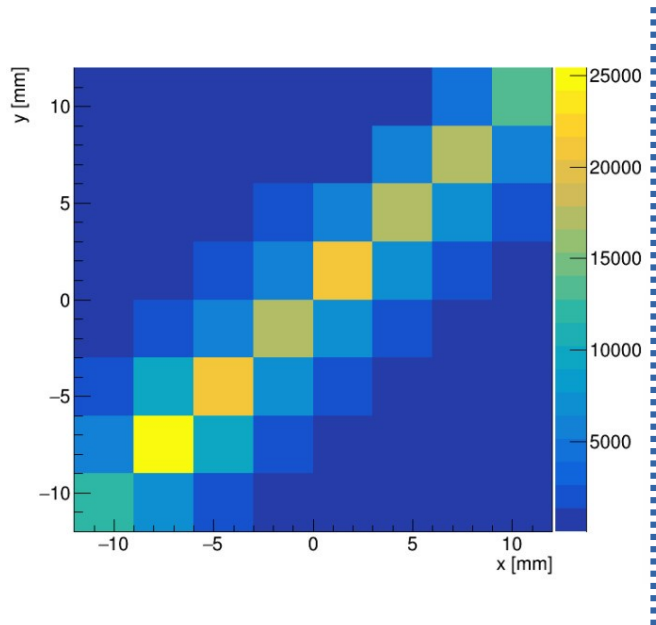




# Tests with scintillator

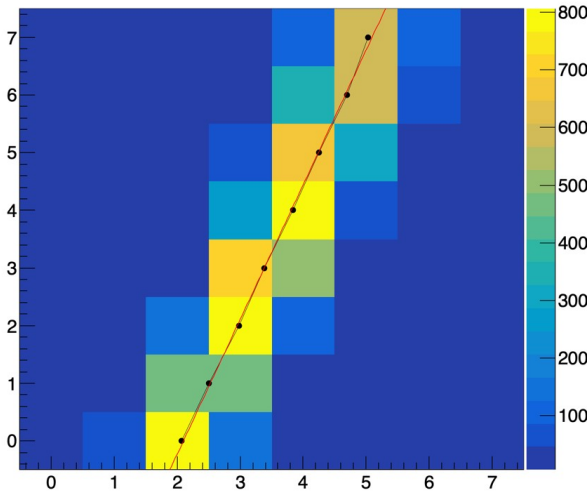
- Cosmic muons clearly visible

Simulation

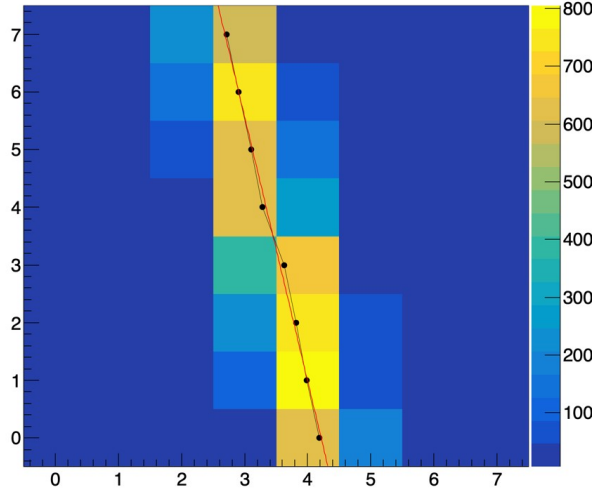


Detector

mu\_0\_Map



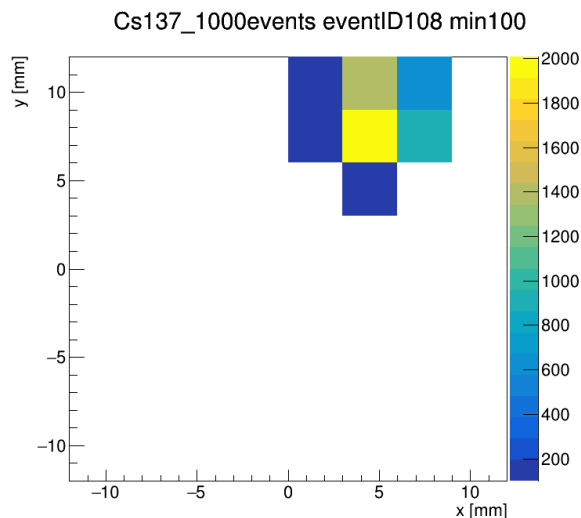
mu\_17\_Map



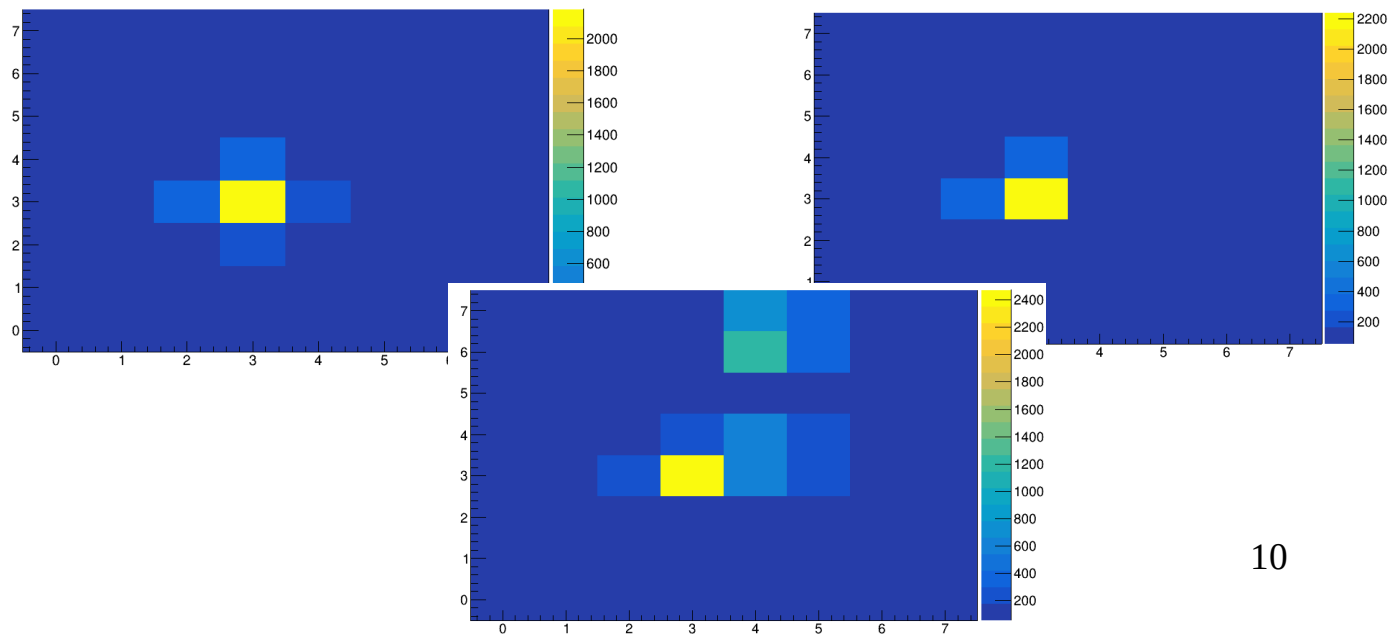
# Tests with scintillator

- Using Cs137 source ( $E_\gamma=662$  keV)
- Light collected in a few SiPM channels
- Working on channel equalization / energy calibration (ongoing)

## Simulation



## Detector



# Work plan summary for 2023/24

- Geant4 simulation of the system
- Performance study and evaluation of readout system -> FERS A5200 chosen as readout system
- SiPM matrix characterization
- Production of collimators with supports and adapters (INFN-BO)
- Stricter interplay with simulation to compare with real data for the “full understanding” of the system
- Use radioactive sources for system calibration (Cs-137, Ba-133)
- First tests with Ag-111 source (October)

Done

In progress

# Planning for 2025

- Characterization and test of the gamma camera
  - Finalization of the gamma camera prototype
  - Light-tight portable device
  - Some modifications of the design may be required after tests done in 2024
- Aim for in-vivo tests on small animals
- Request of continued support by officina meccanica (1 MU)