

Preliminary Measurements on Irradiated 3D Ultra Thin Strips Detectors

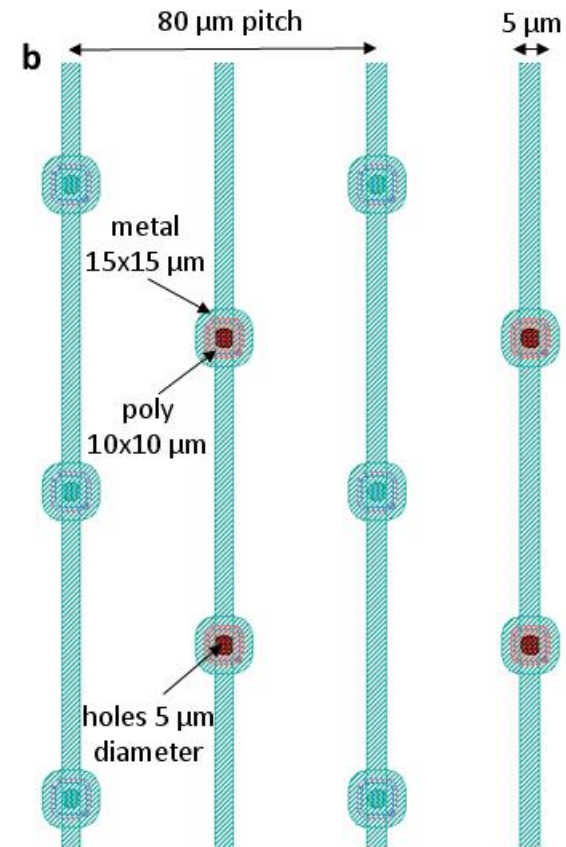
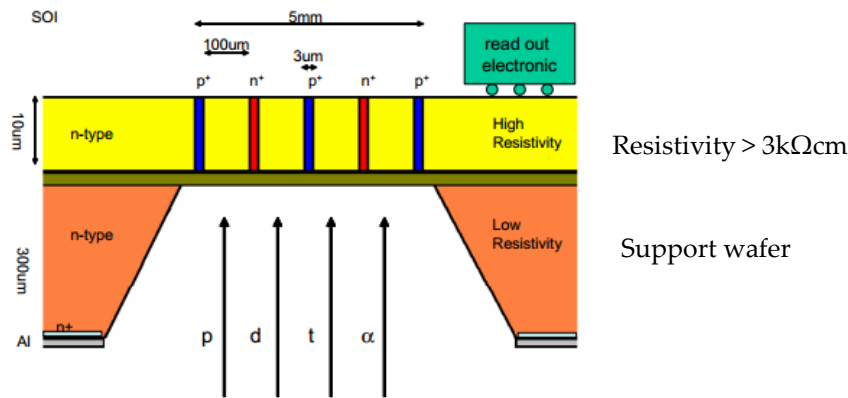
Virginia Greco - IMB-CNM, Barcelona (Spain)

Sergi Esteban, Celeste Fleta, Manuel Lozano,
Giulio Pellegrini, David Quirion

23rd RD50 Workshop
CERN - November 13 ~ 15, 2013

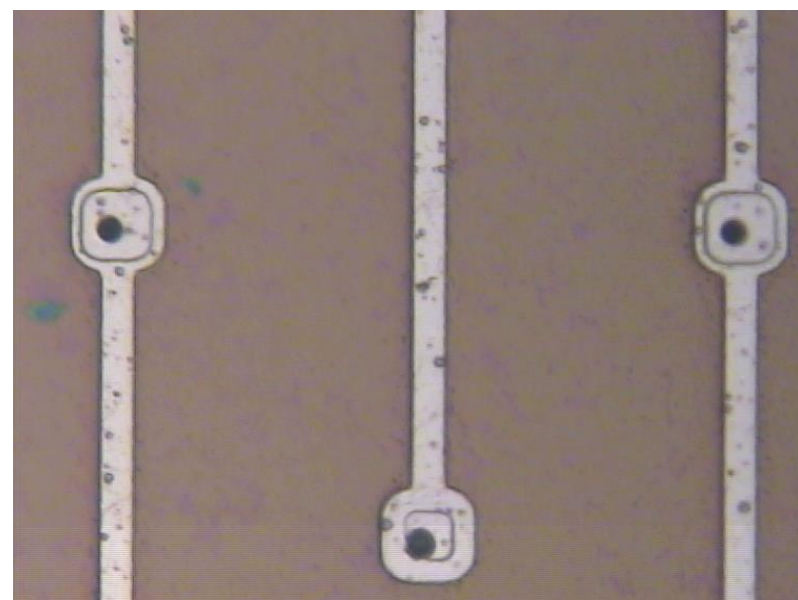
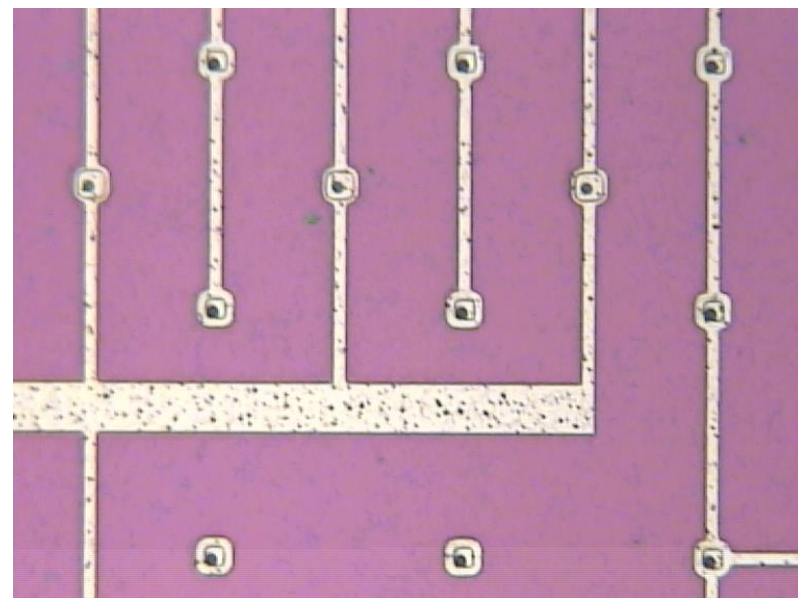
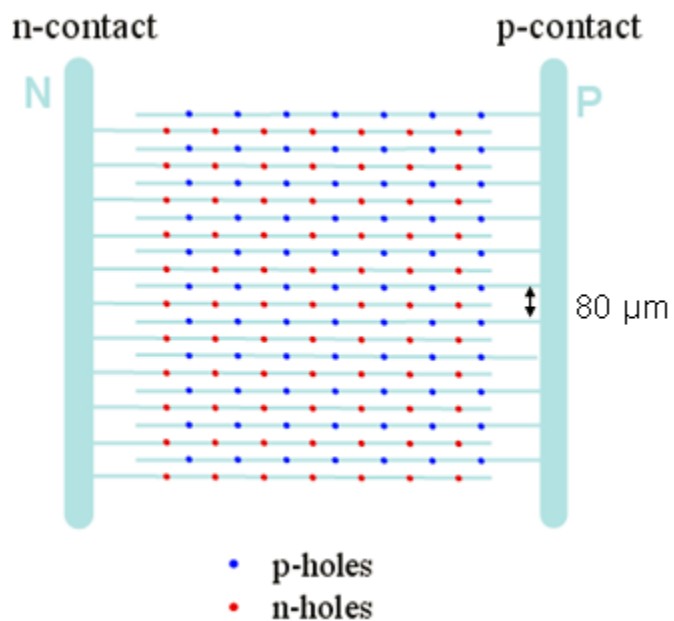


Geometry of the U3DTHIN Detectors

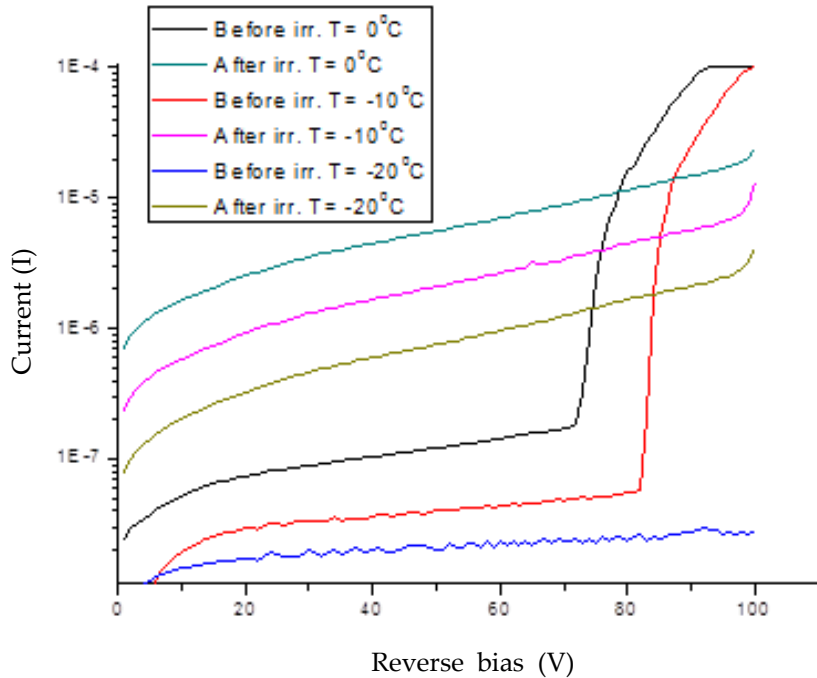


- 3D strips, SOI wafer, p-on-n
- 80 μm pitch
- 10 μm bulk thickness
- 5 μm hole diameter
- 5 μm metal strips (minimize non-active area)

Some pics

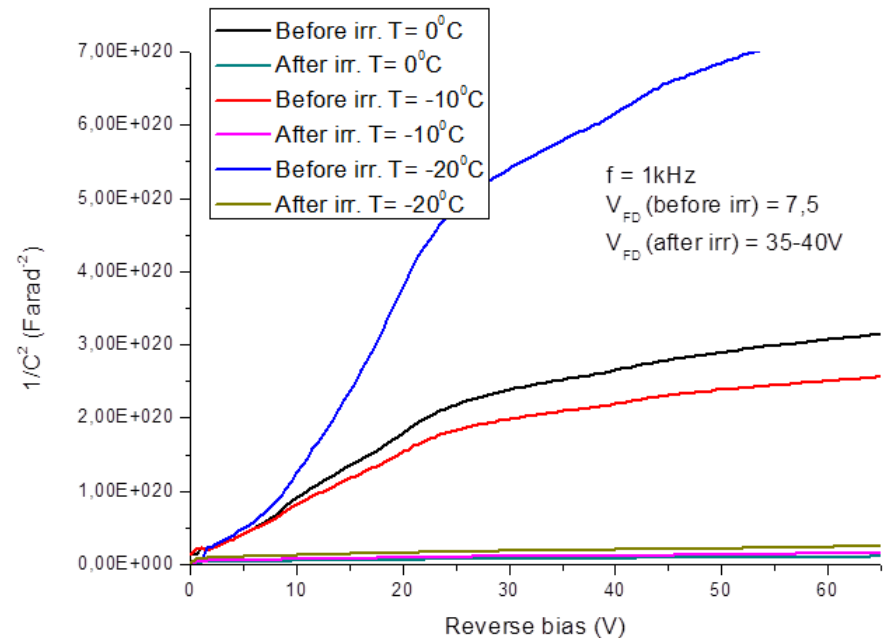


I-V & C-V Curves



● I-V curves before and after irradiation to 10^{16} cm^{-2} 1MeV n equiv. (at different T)

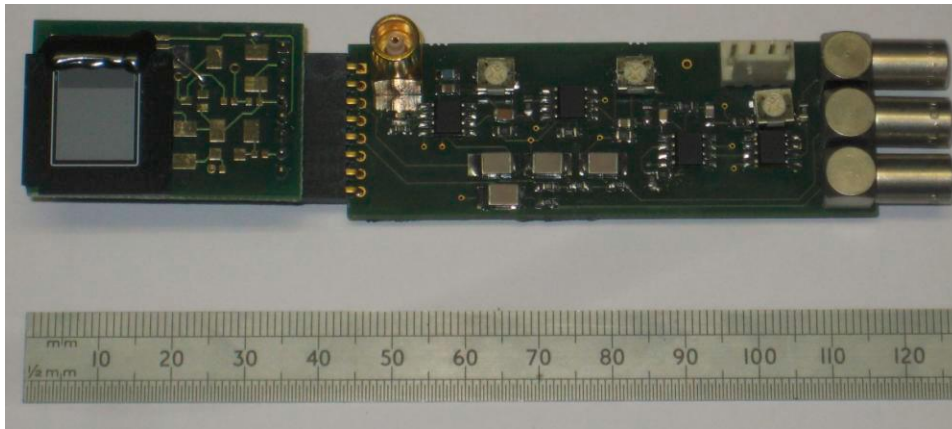
● C-V curves before and after irradiation to 10^{16} cm^{-2} 1MeV n equiv. (at different T; f=1kHz)



Charge Collection Measurements

- Charge collection measurements performed by analyzing the spectra of an alpha source (1.376kBq activity):
 - **Pu-239** ($E=5244.50\text{keV}$), **Am-241** ($E=5637.81\text{keV}$), **Cu-244** ($E=5901.61\text{keV}$).

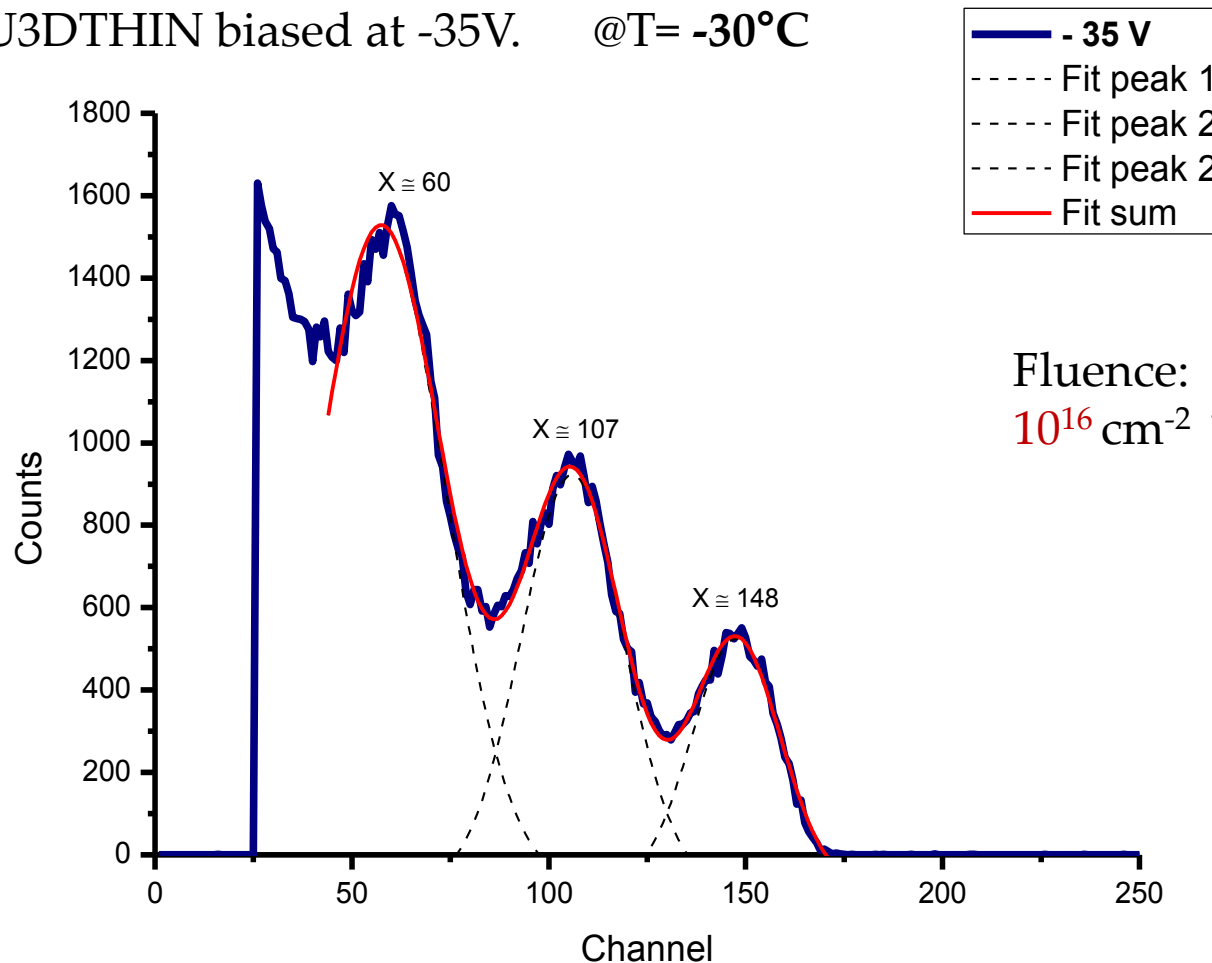
Read-out electronics



Alpha Measurements on Irradiated U3DTHIN

Source at 2.4cm from detector

U3DTHIN biased at -35V. @T= -30°C

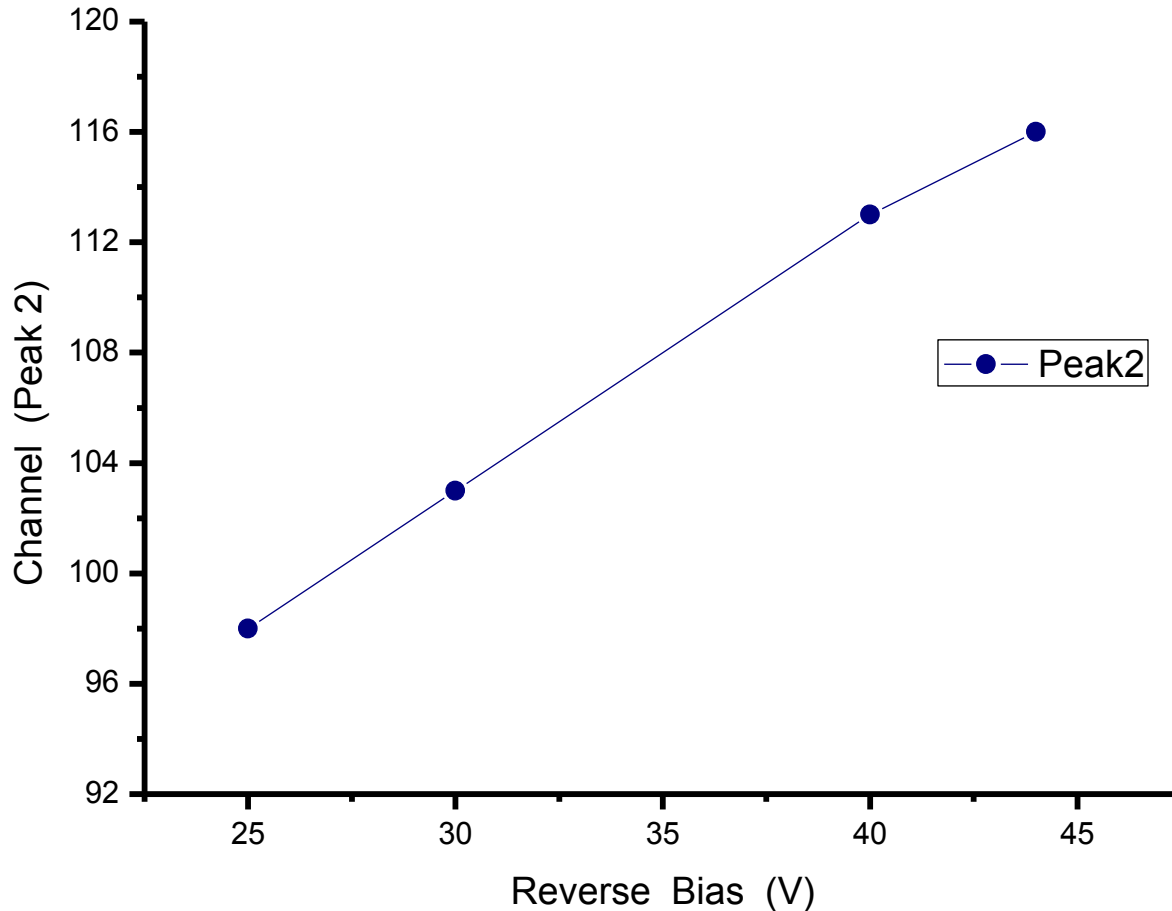


Fluence:
 10^{16} cm^{-2} 1MeV n equiv.

Preliminary

Displacement of alpha peak

Source at 2.4cm from detector
@T= -30°C



Rev. Bias	Peak 1	Peak 2	Peak 3
-25V	55	98	140
-35V	62	103	148
-40V	65	113	157
-44V	60	116	158

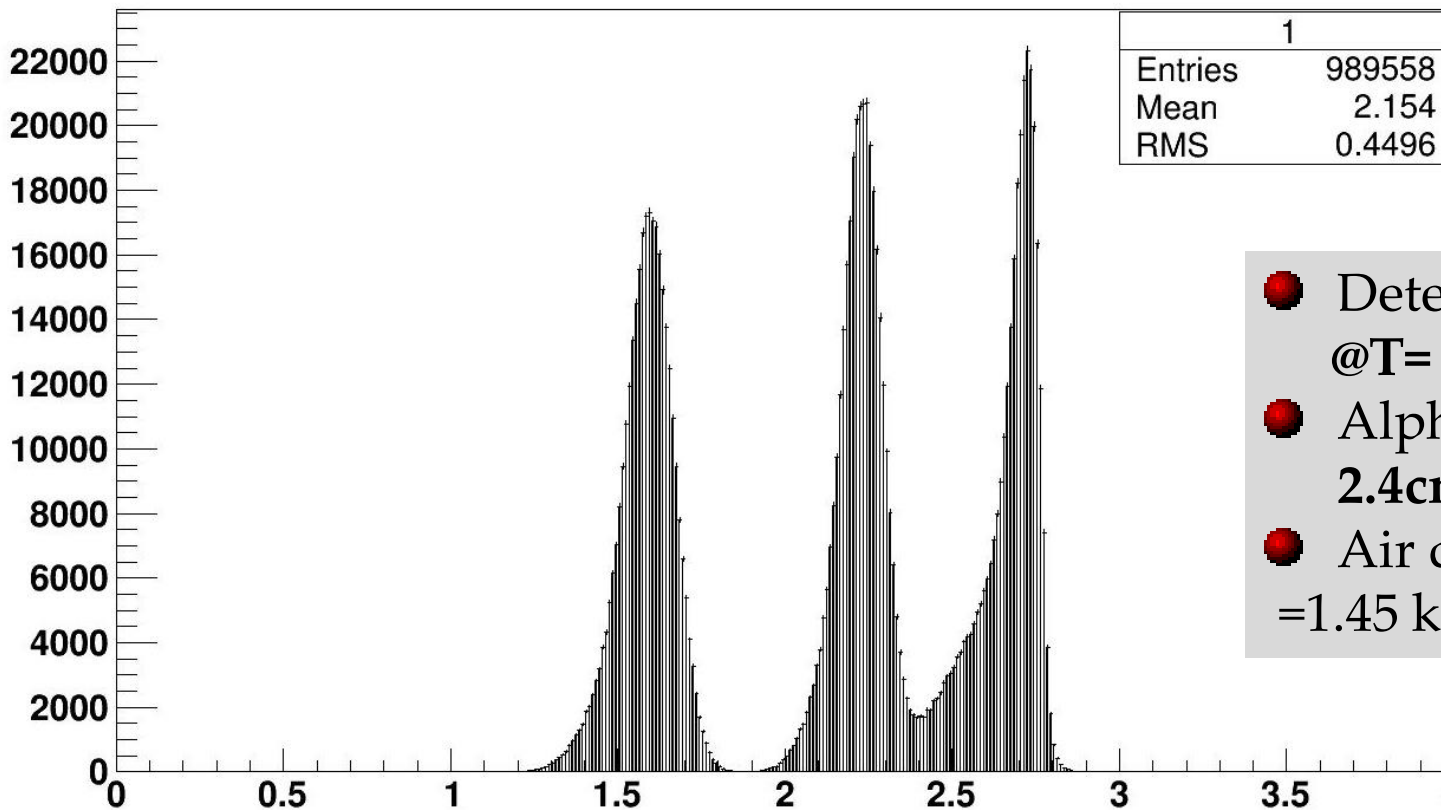
Fluence:
 10^{16} cm^{-2} 1MeV n equiv.

Preliminary

Simulation of Alpha Particles Charge Collection

➡ To be used for calibration

Energy deposited in Silicon



- Detector in air
@T= -30°C
- Alpha source at
2.4cm from detector
- Air density at -30°C
=1.45 kg/m³

Preliminary

Future Work

These are very preliminary results; we need to perform farther studies:

- Energy channel calibration
- Measurements of irradiated U3DTHIN at higher temperature
- Measurements on detectors irradiated to different fluences