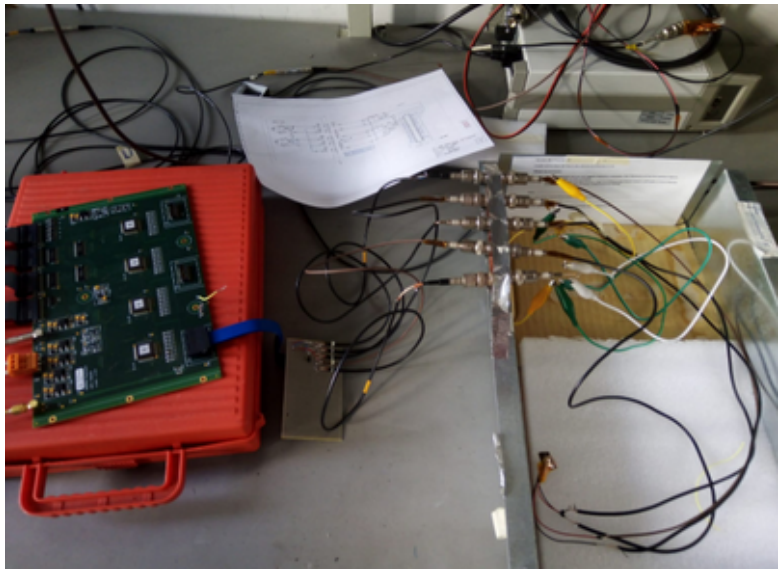
LABEC

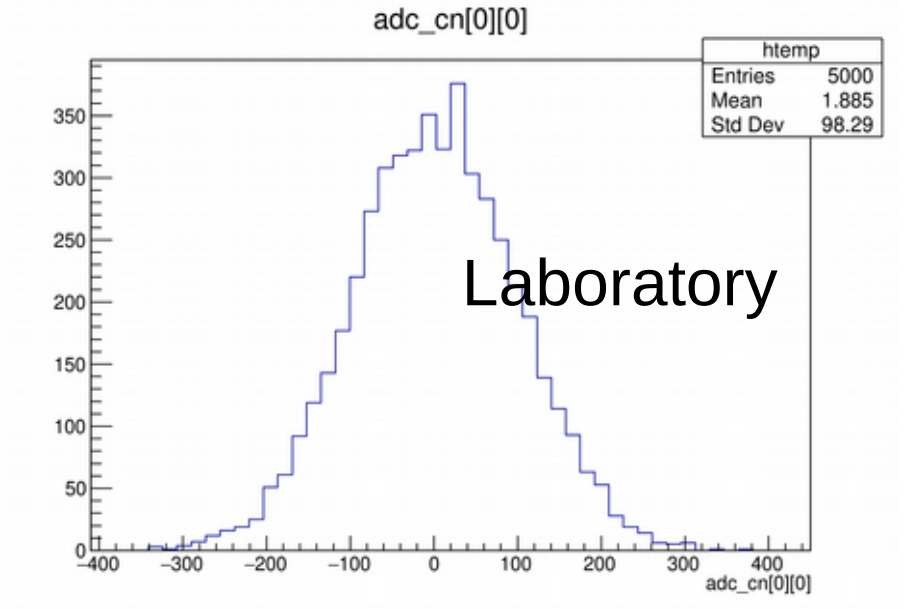
# Noise Problem

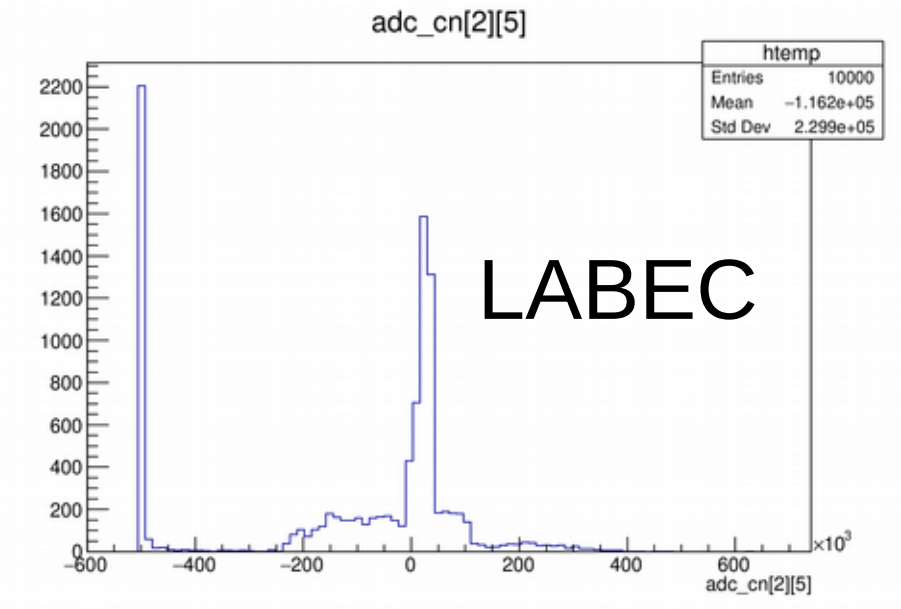


For the test, Pietro made board and cables to connect to the scattering chamber.

Two jumpers were implemented to switch cable shielding between ground, pseudoground and ground filtered to pseudoground.

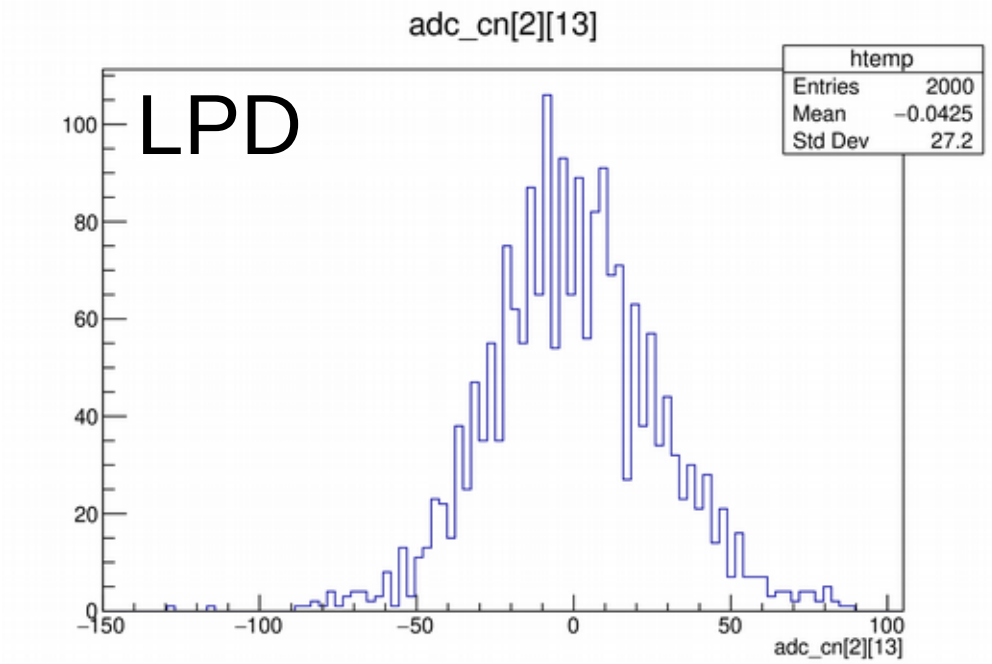
The last one was the best configuration in laboratory, but all of them failed at LABEC.

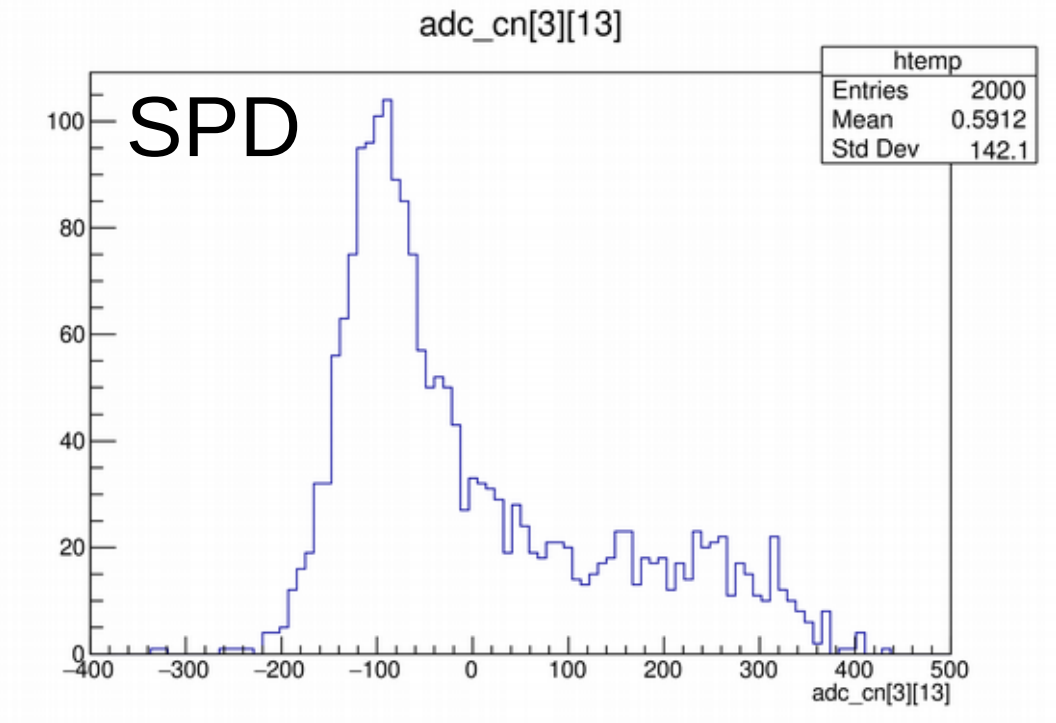


# Possible Solution

To reduce noise problem we tried to put all electronics (TROC+HiDRA) inside the scattering chamber, using Scolopendra instead of cables.




But we were discouraged to put electronics in vacuum because of the risk of outgassing and thermal heating...

# Alternative Solutions

(1) Find a miracle to reduce noise with cables

(2) Test the boards for outgassing before test

(3) Try a different read-out electronics

(old HiDRA board, Amptek, QDC?)

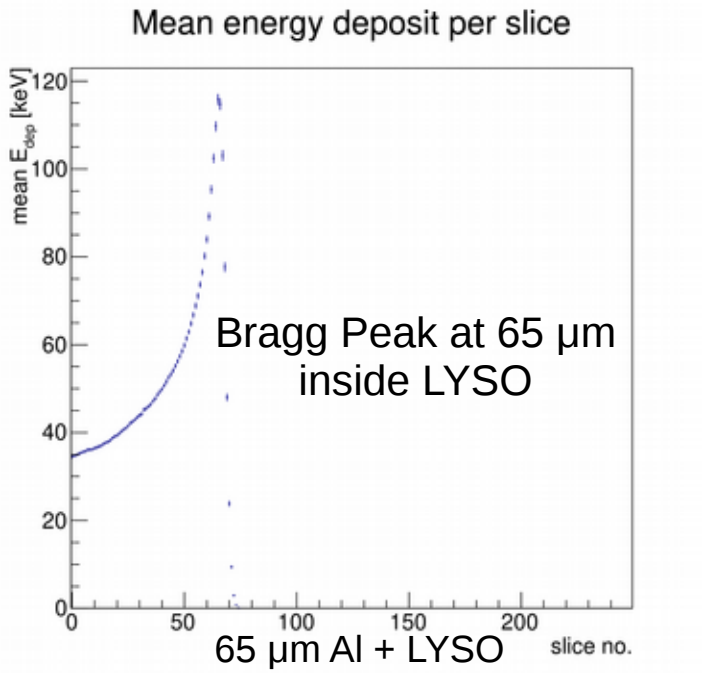
# Beam Parameters

- Energy = 2 MeV (avoid activation)
- Trigger... from deflector (300 ns delay in 6m)
- Current = $10^4$-$10^5$ protons/mm$^2$ μs (at maximum)
- Slit = 0.25 mm$^2$-1 cm$^2$
- Duration = 1-5 μs
- Rate... below 100 Hz
    - Using predeflector+deflector we can reduce multiplicity

- $S_{LPD}^{SAT}$ [ADC] = 700000 ADC
- $G_{LPD}$ = 110 ADC / 30 MeV
- $S_{LPD}^{SAT}$ [GeV] = 190 GeV
- obtainable with T = 1 μs and A = 10 mm$^2$
- R [SPS/LPD] = 0.06
- $S_{SPD}^{LPD\text{-}SAT}$ [ADC] = 46000 ADC

# Range of 5 MeV Proton

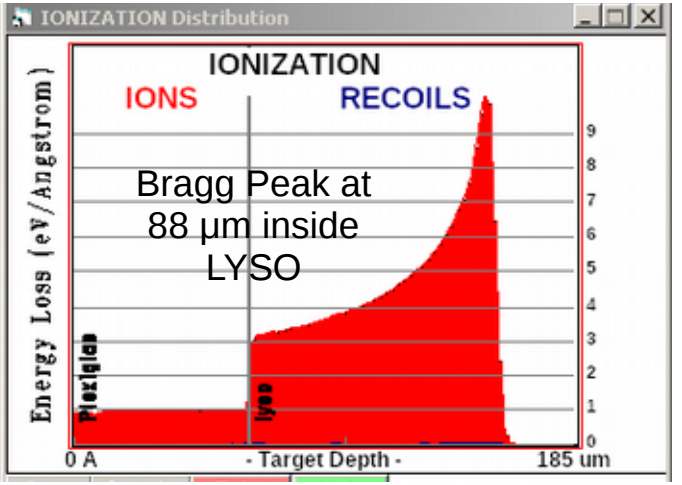
GEANT simulation by Nicola



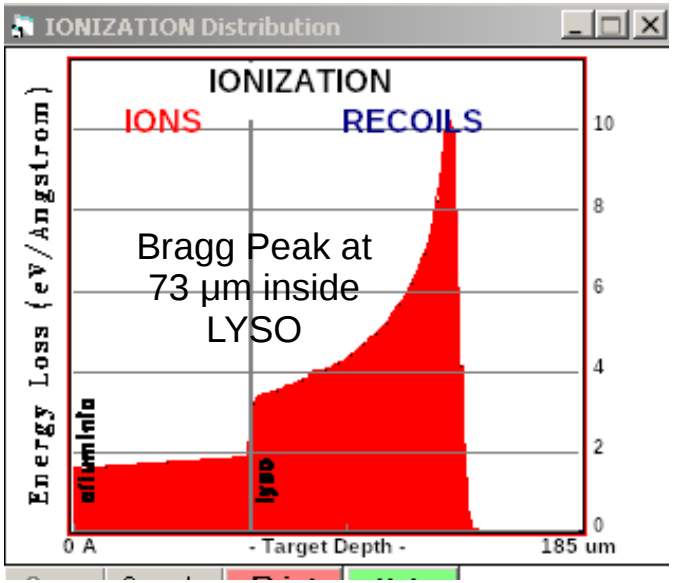

65 µm Al + LYSO

Bragg peak is enough inside the crystal so we DO NOT need to open a window inside the Vikuiti film

SRIM simulation by Pietro



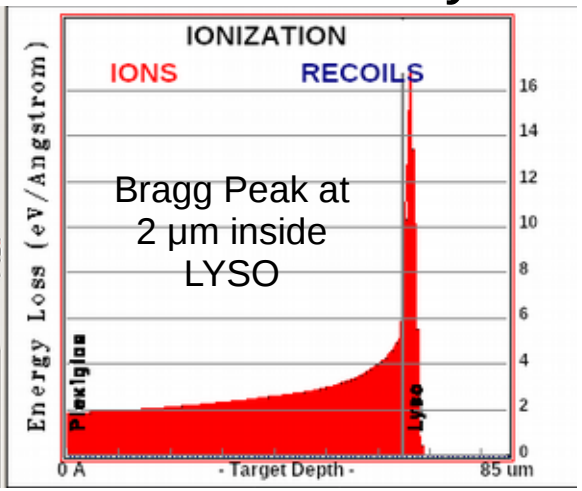

65 µm Plexiglas + LYSO




65 µm Al + LYSO

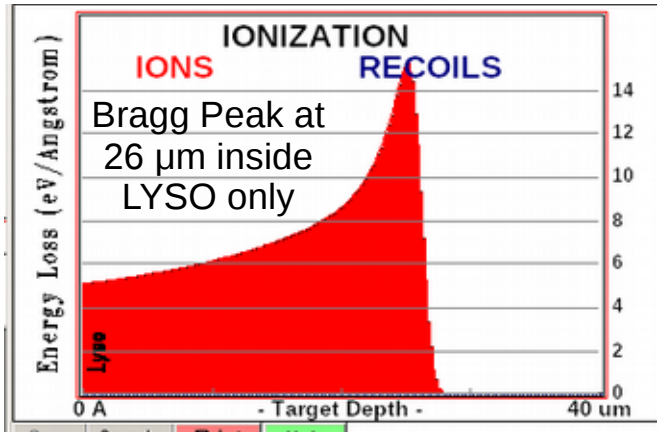
# Range of 2 MeV Proton

SRIM simulation by Pietro



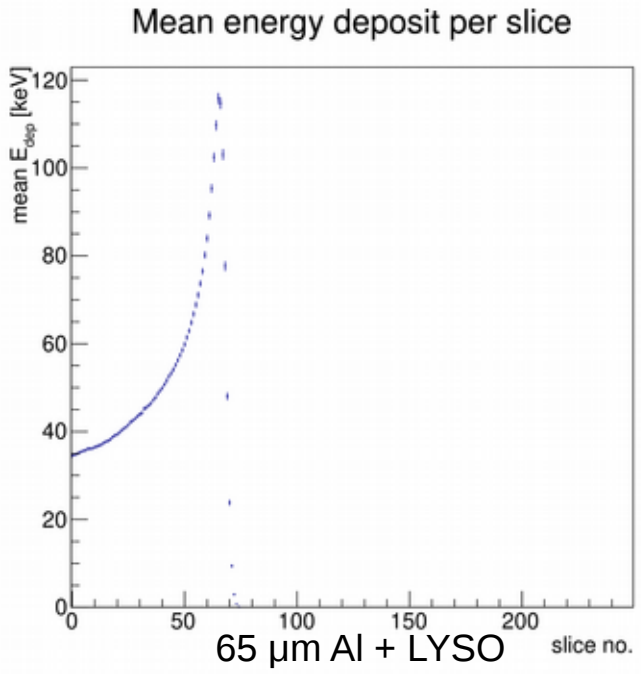

65 µm Plexiglas + LYSO

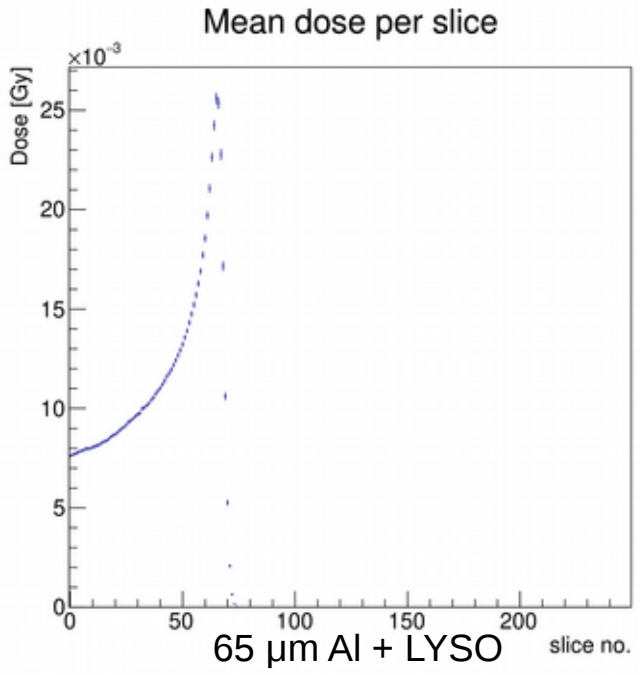
**In case of 2 MeV Proton we DO need to open a window in Vikuiti film**




LYSO only

# Dose of 5 MeV Proton




Assuming:

- $\rho_{LYSO}$ = 7.25 g/cm$^3$
- $A_{Beam}$ = 0.01 cm$^2$
- $N_{beam}$ = $10^4$ cm$^2$

$$\text{Dose} = N_{beam}/(\rho_{LYSO}\, A_{Beam}) * dE/dx$$

Since the radiation hardness of the LYSO crystal is $10^6$ Gy, there should be no radiation damage to the cube