MAGISOL plug-in Set-up Status

Irene Marroquín Alonso

Instituto de Estructura de la Materia (IEM)

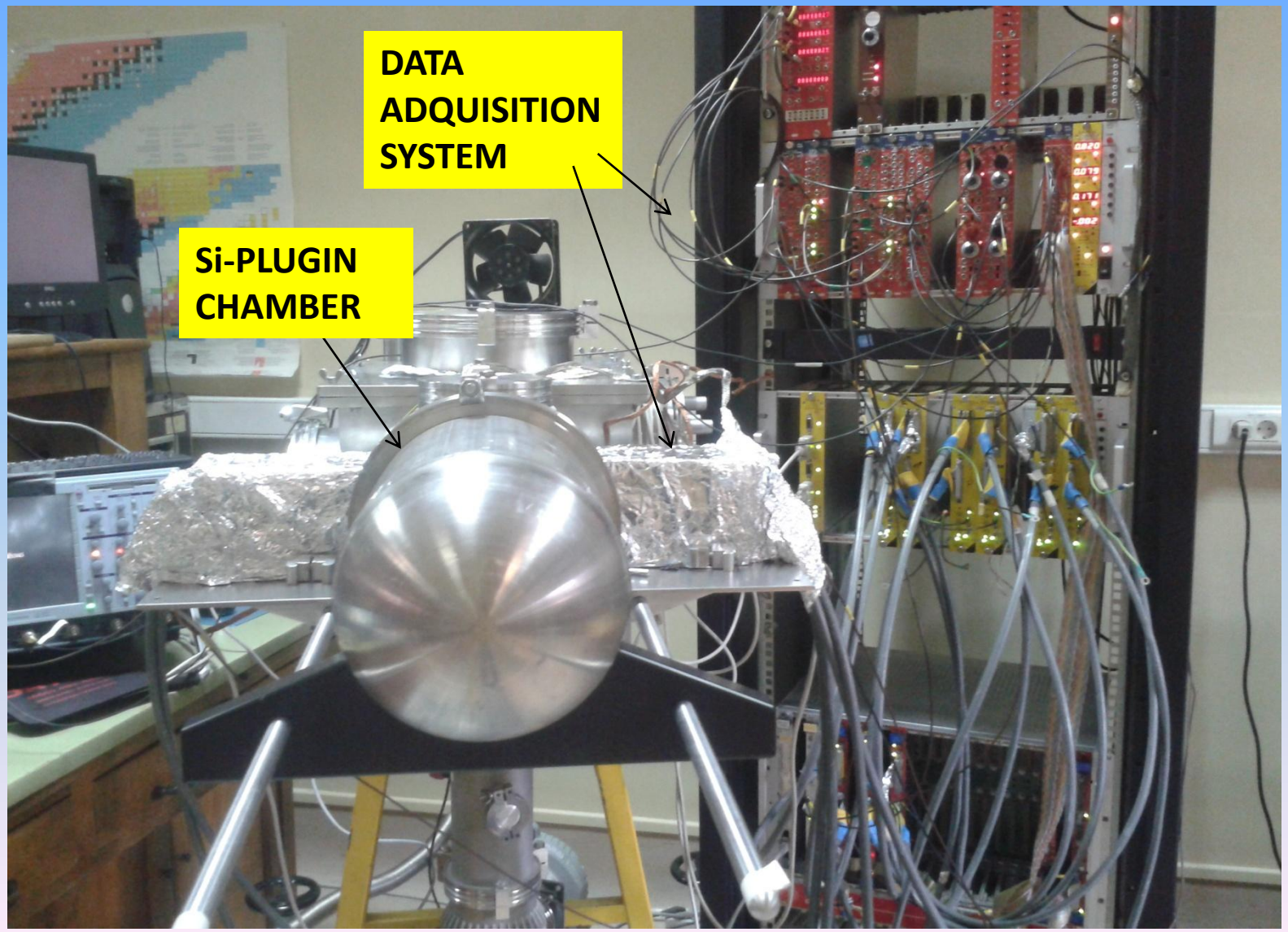
CSIC-Madrid

A.Illana, A.Perea, O. Tengblad

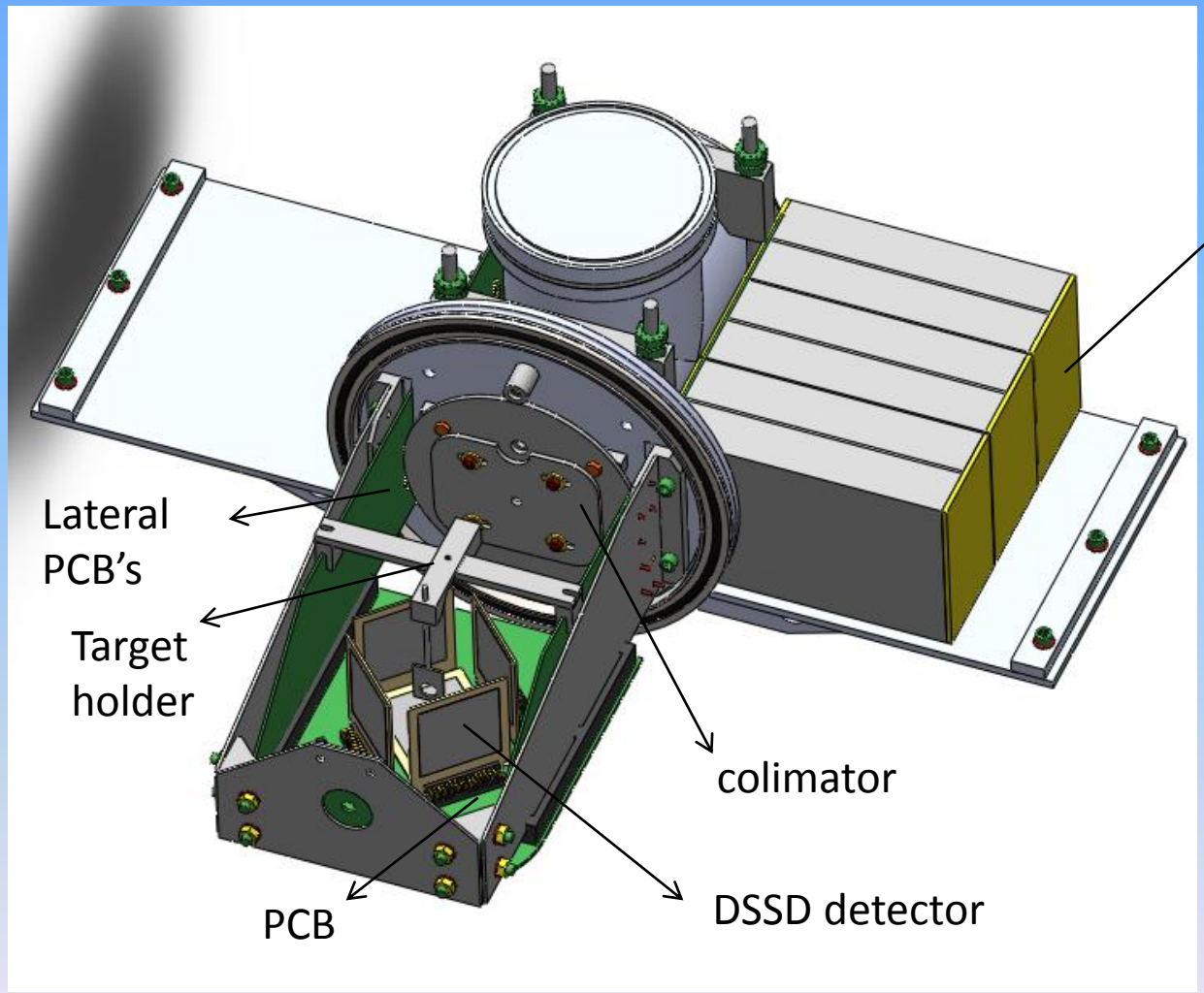
CONTENTS

- EXPERIMENTAL SET-UP
  - MAGISOL Si-PLUGIN CHAMBER
  - DATA ADQUISITION SYSTEM
  - ELECTRONICS SCHEME
- AIMS OF THE WORK
  - NOISE REDUCTION
  - VERIFICATION OF THE ELECTRIC PATHS BETWEEN THE PCB AND THE PREAMPLIFIERS INPUTS
  - CHECK THE DETECTORS IN ALL POSITIONS OF THE PCB WITH THE DAQ
  - DYNAMIC RANGE OF THE PREAMPLIFIERS
  - ENERGY RESOLUTION OF THE DETECTORS
  - CUT OFF
- CONCLUSIONS

EXPERIMENTAL SET-UP



MAGISOL Si-PLUGIN CHAMBER

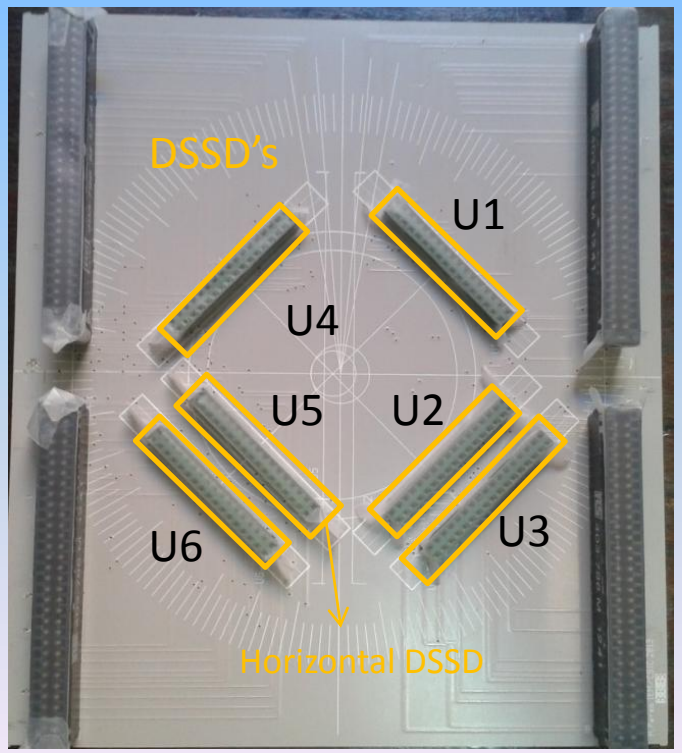


A.Perea

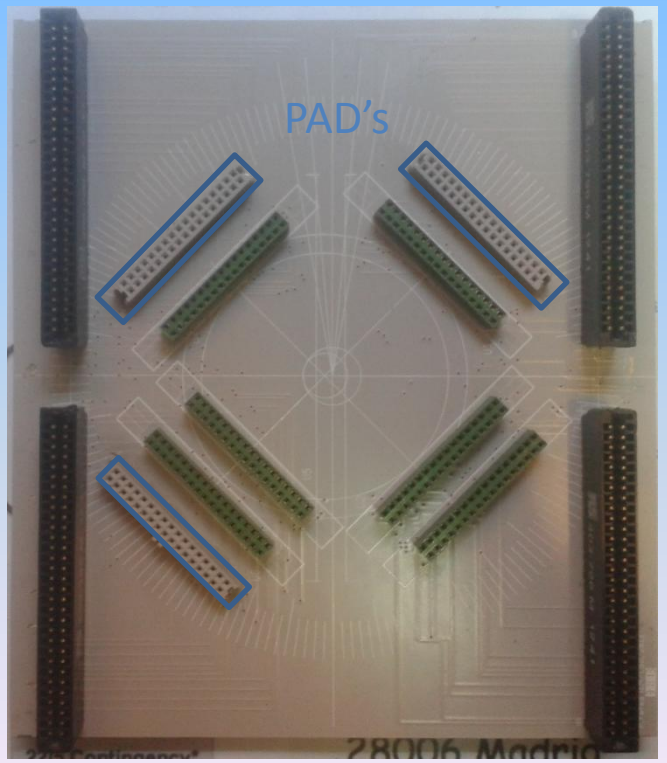
MAGISOL Si-PLUGIN CHAMBER

PCB cards

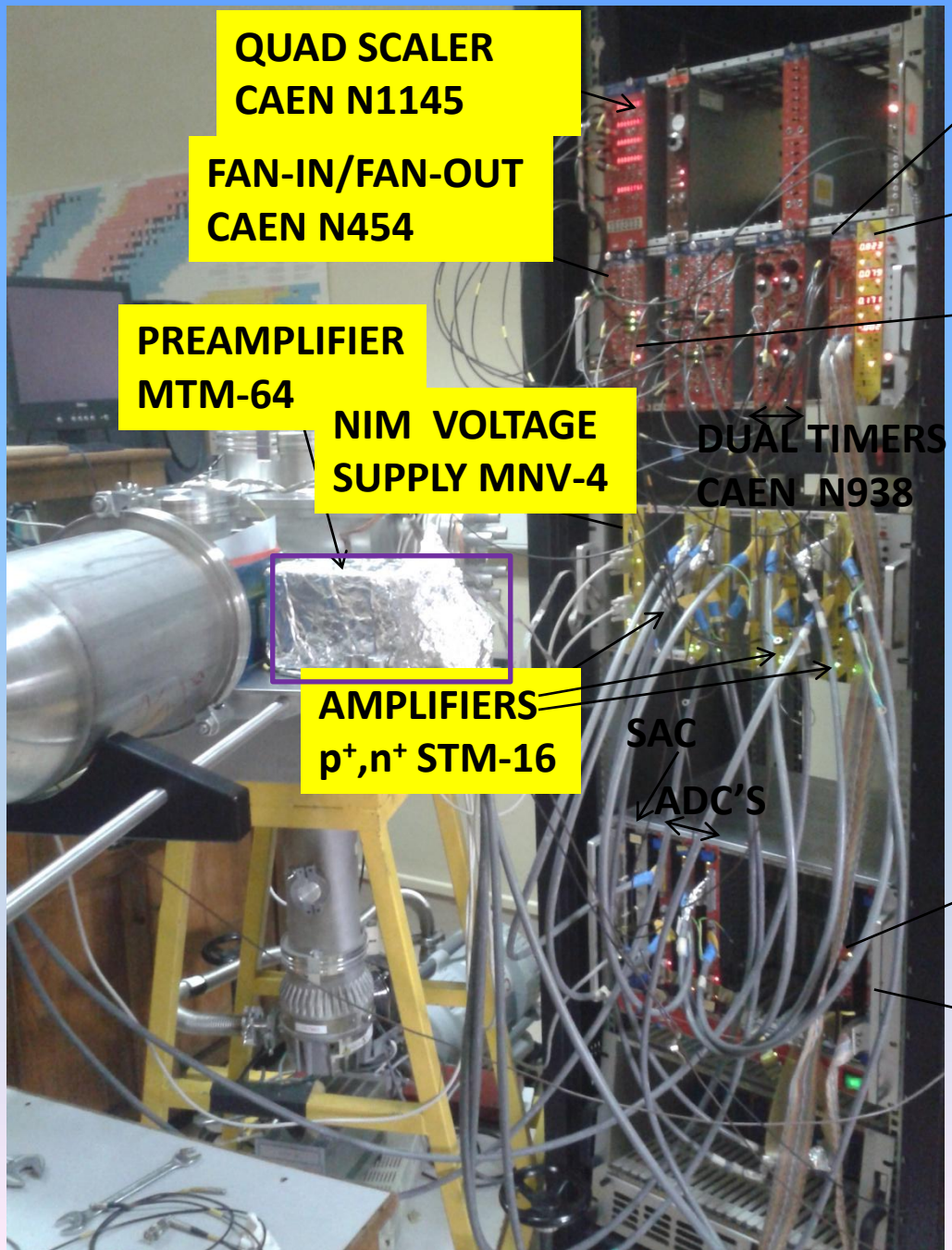
PCB with tracks for 6 DSSD's (1 horizontal, 5 vertical DSSD's)



PCB with 3 added plugins for 3 PAD's



EXPERIMENTAL SET-UP: DATA ADQUISITION



QUAD SCALER
CAEN N1145

FAN-IN/FAN-OUT
CAEN N454

PREAMPLIFIER
MTM-64

NIM VOLTAGE
SUPPLY MNV-4

AMPLIFIERS
p^+,n^+ STM-16

SAC

ADC'S

DUAL TIMERS
CAEN N938

NIM/ECL TRANSLATOR CAEN N638

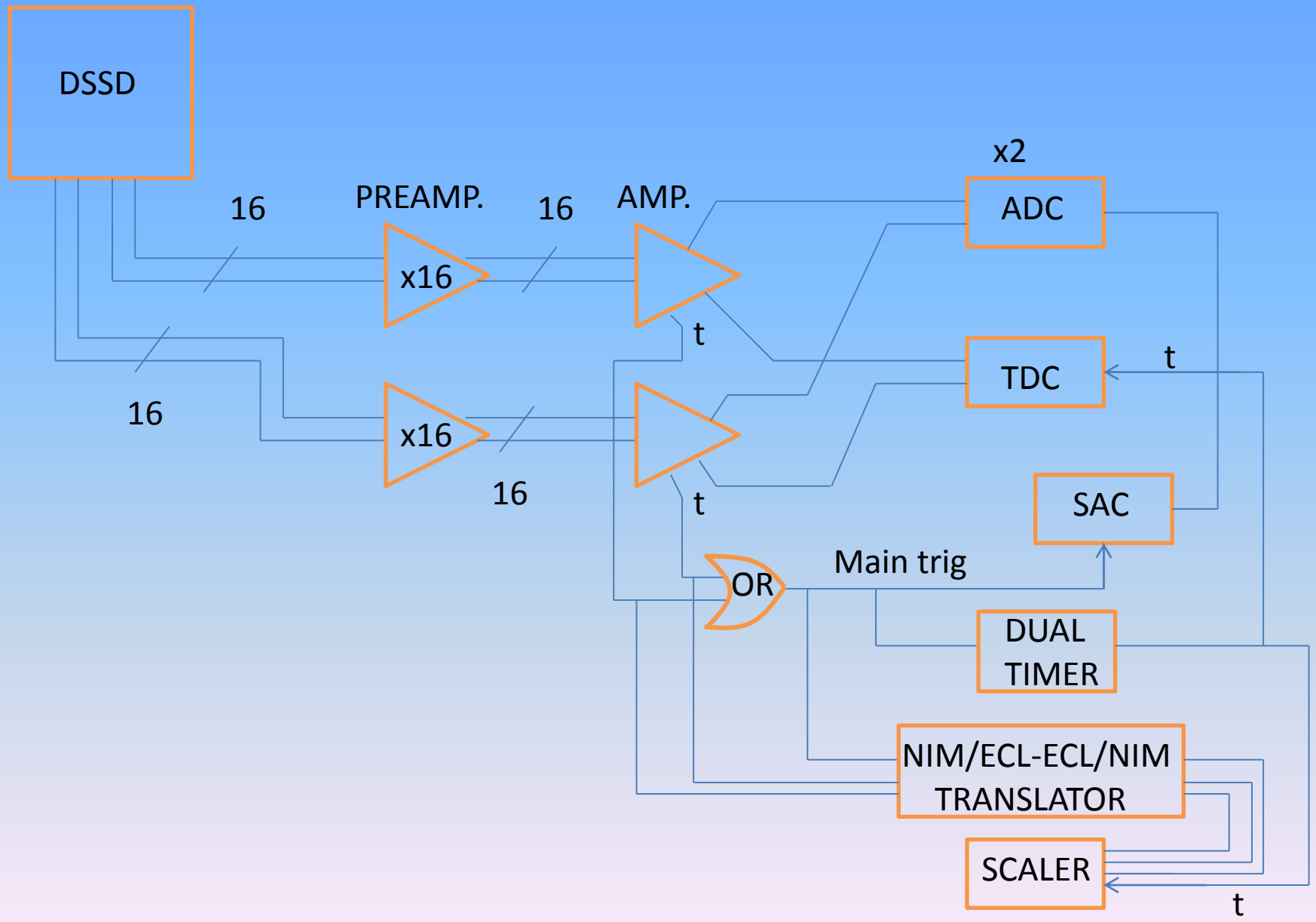
HV SUPPLY
MHV-4

3 FOLD LOGER UNIT
CAEN N485

TDC CAEN V1190

32 CH LATCHING
SCALER
CAEN V830

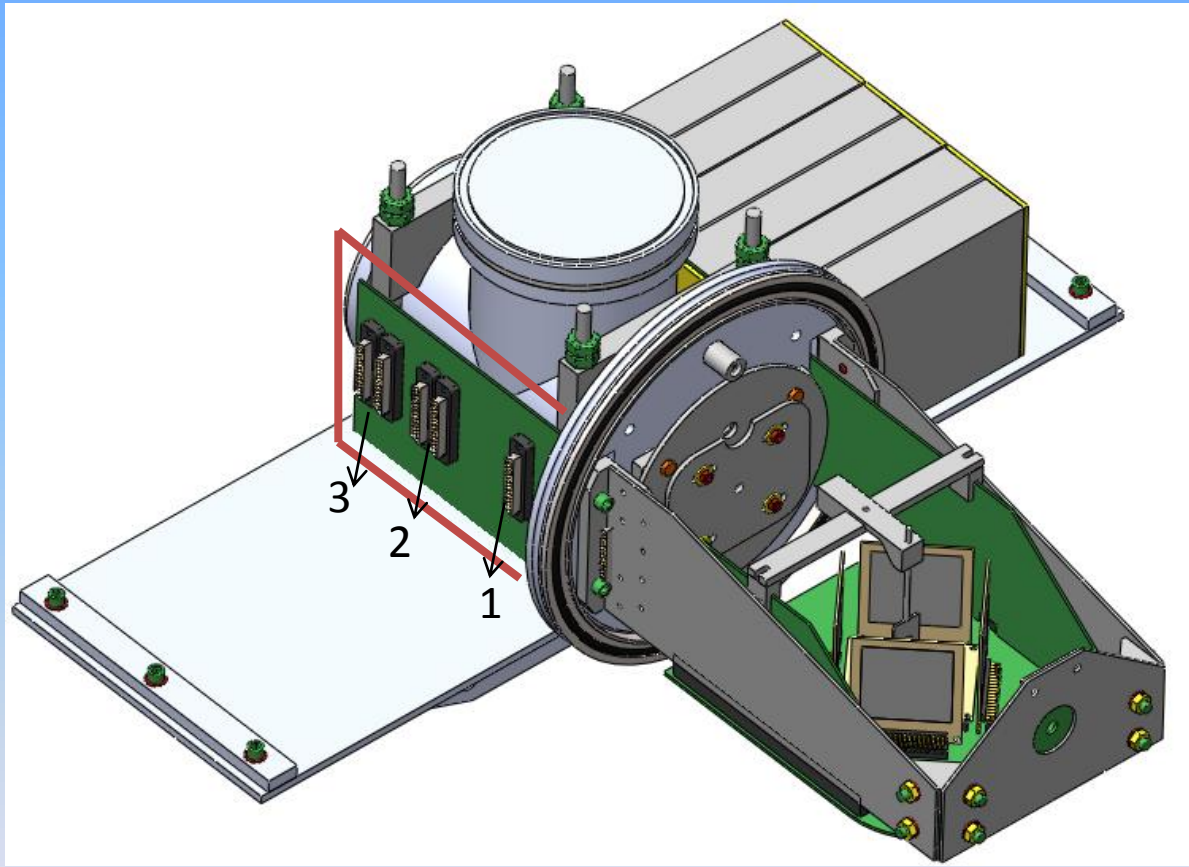
ELECTRONIC SCHEME



AIMS OF THE WORK

- To reduce level noise
- To verify the path between the PCB and the preamplifiers inputs
- To check the detectors in all positions of the PCB with the data adquisition system
- To measure the energy resolution of the detectors
- Dynamic range of the preamplifers
- To check if we can reach low energies (cutoff with pulser)

Reducing level noise



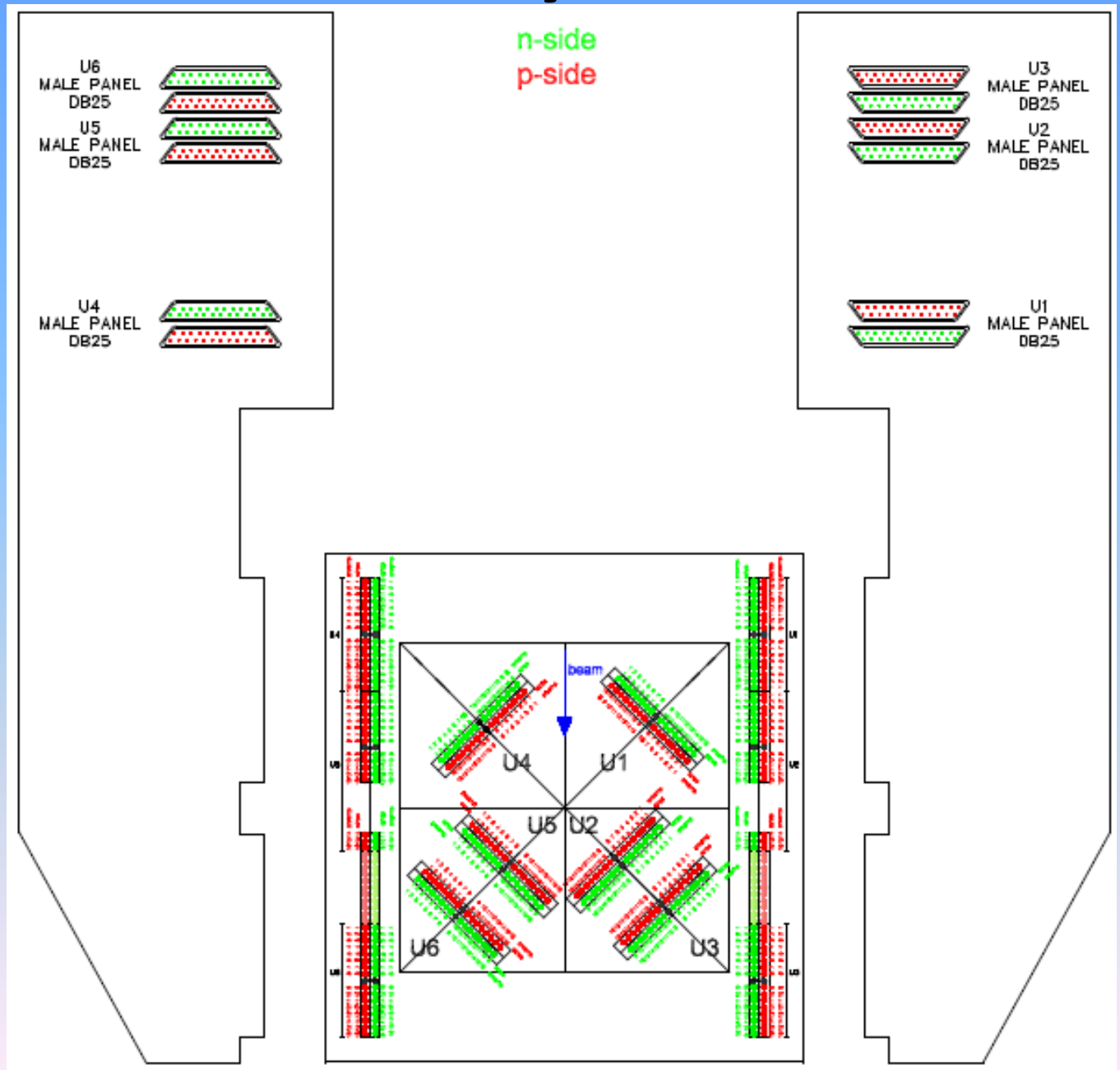
Lateral PCB on the left side has more noise that the lateral PCB in the right side

The third position on the lateral PCB in the left side has more noise than the other positions

↓

We are able to reduce level noise and to get similar resolutions in all positions (right side and left side).

Verify electronic tracks

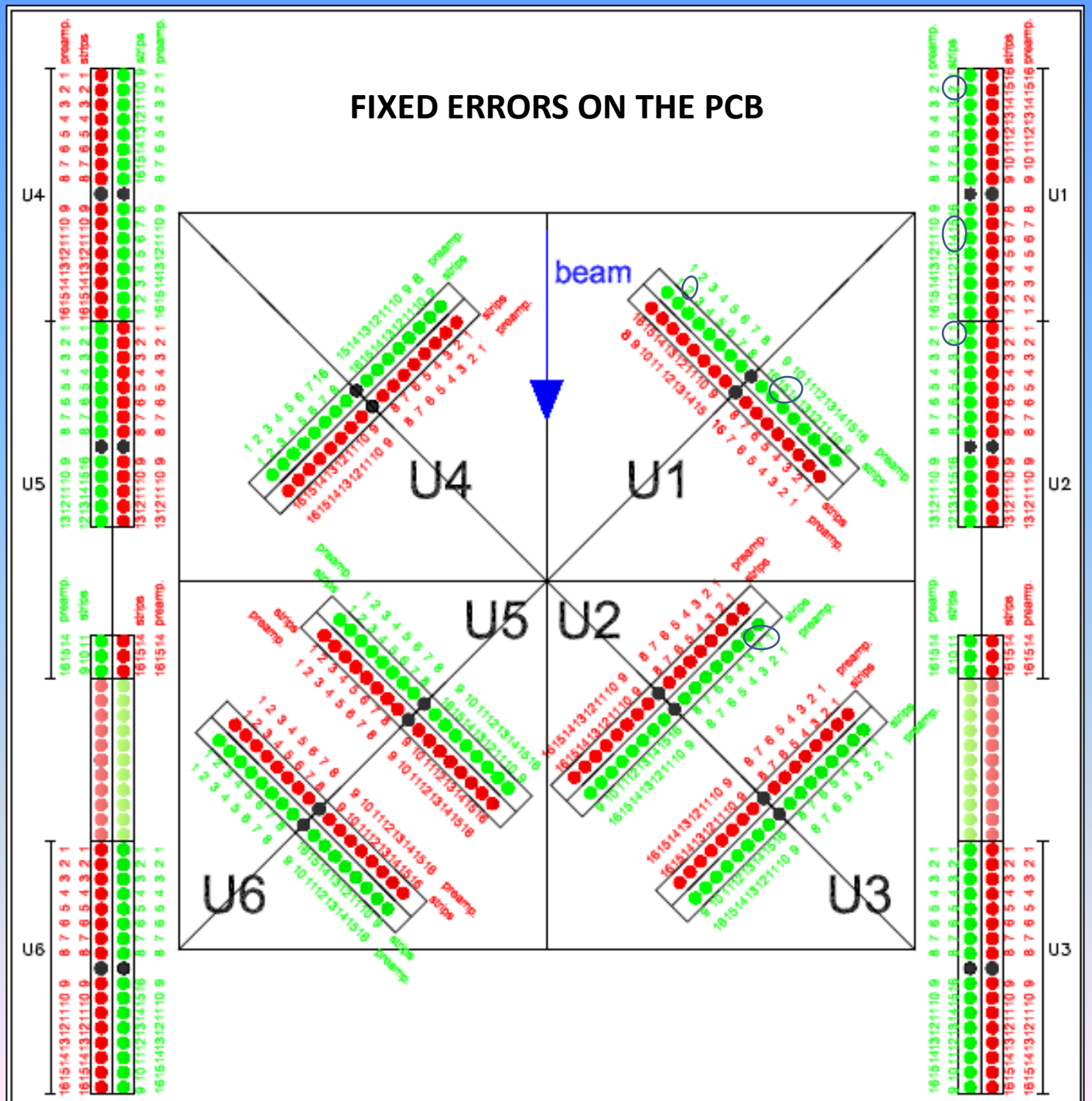


Verify the path between the PCB and the preamplifiers inputs

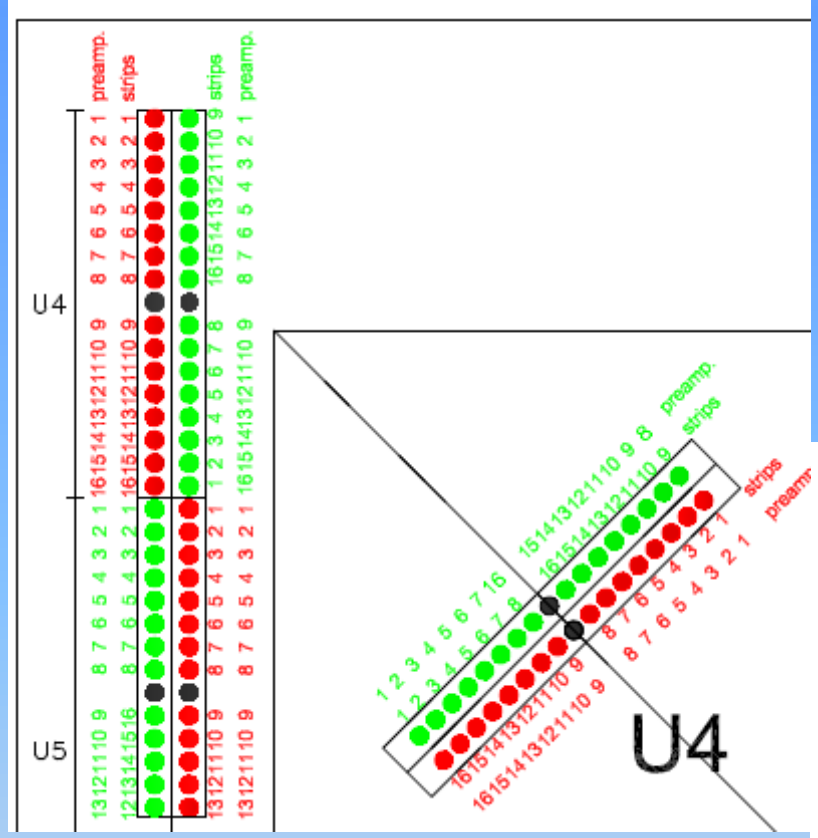
- Checking with a voltimeter track by track

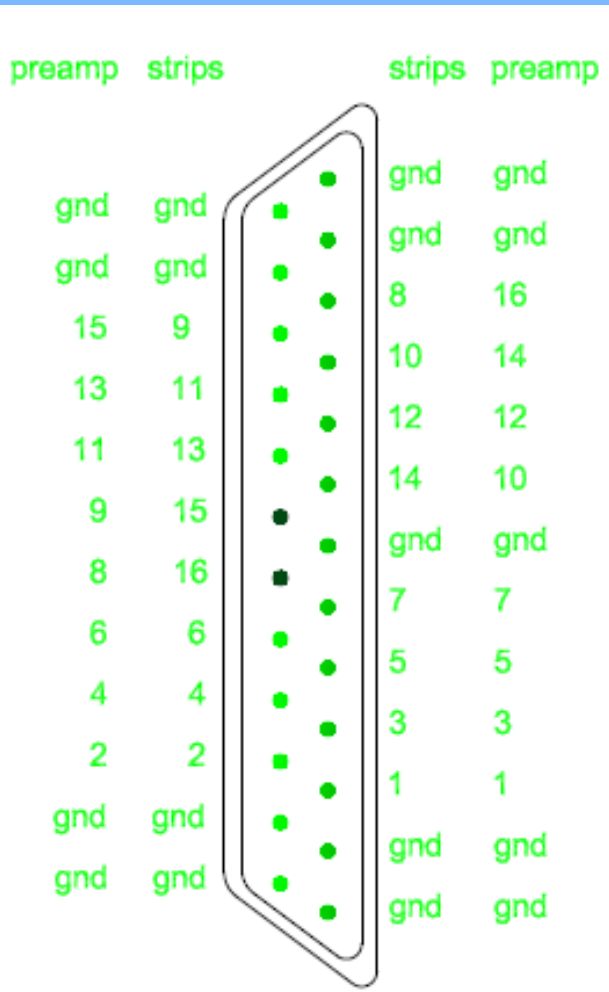
- We found **6 errors in the PCB that we fixed** (problems with weldings on the PCB), and other **2 errors in the lateral PCB (left side) that we will fix soon.**

FIXED ERRORS ON THE PCB



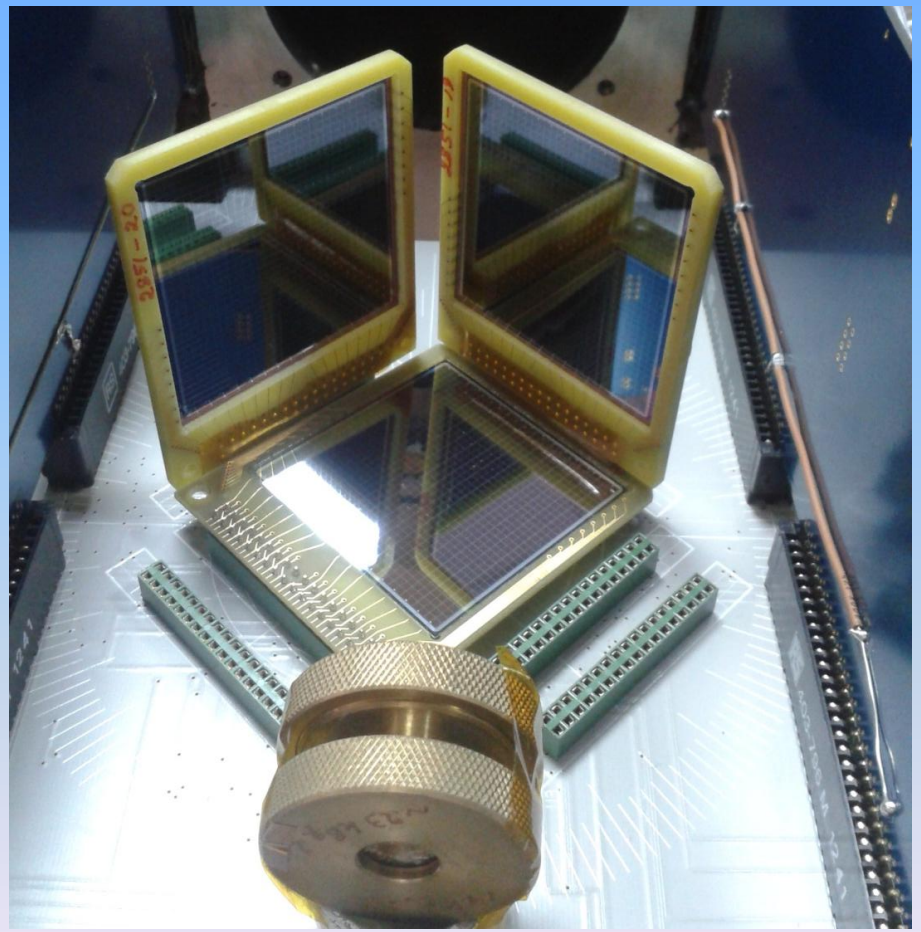
TWO ERRORS IN THE LATERAL PCB (WELDINGS)



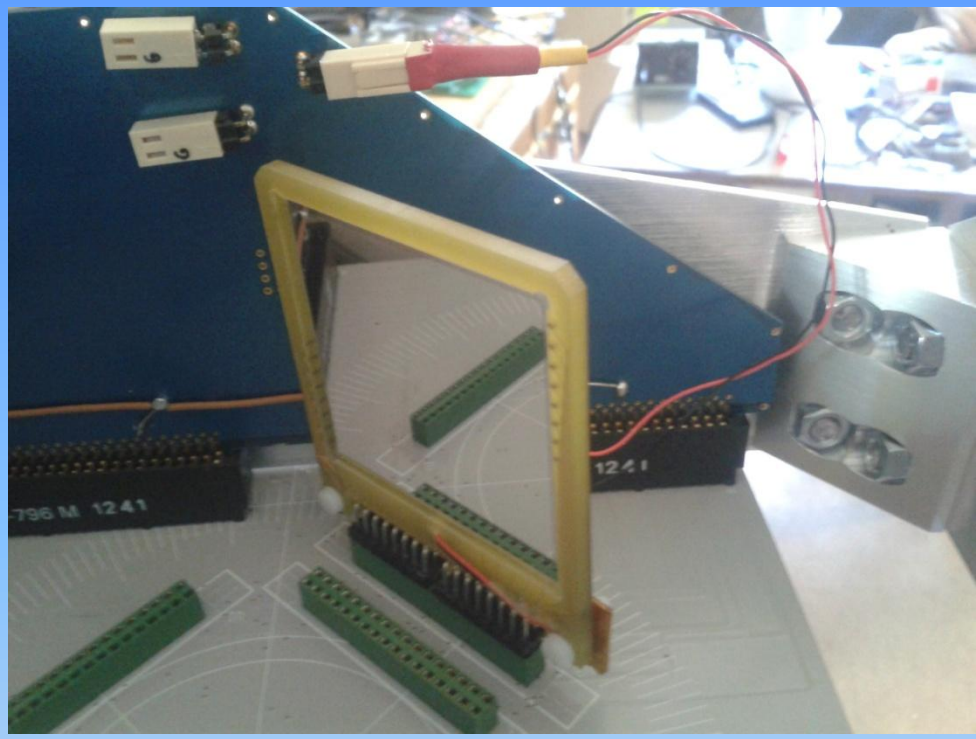


Detector positions

Check the detectors in all positions of the PCB with the data adquisition system



All the positions work well.



- Measurements with one, two or three DSSD's in all positions.
- Measurements with 1 PAD and 1 DSSD.
- Detectors: 295 µm, 297 µm, 61 µm (DSSD's) and 500 µm (PAD).
- Source: triple alfa
- Data adquisition software: MIDAS

Energy resolution of the detectors

	DSSD1		DSSD2		DSSD3		PAD
Thickness (µm)	295		297		60		500
Position	Vertical		Vertical		Horizontal		Vertical
V(V)	-75		-60		-25		-60
I(µA)	0.21		1.0		0.09		0.19
Dynamic range (MeV)	20	100	20	100	20	100	20
Resolution (KeV)	21.9	33.6	26.3	37.4	49.6	40.27	31.7

- The best results are obtained with DSSD1 (295µm).
- Horizontal position has worse resolution.

Dynamic range

Total Amplification: preamplifier amplification+ amplifier amplification

Dynamic range

20 MeV → More amplification but more noise

100 MeV → Less amplification but less noise

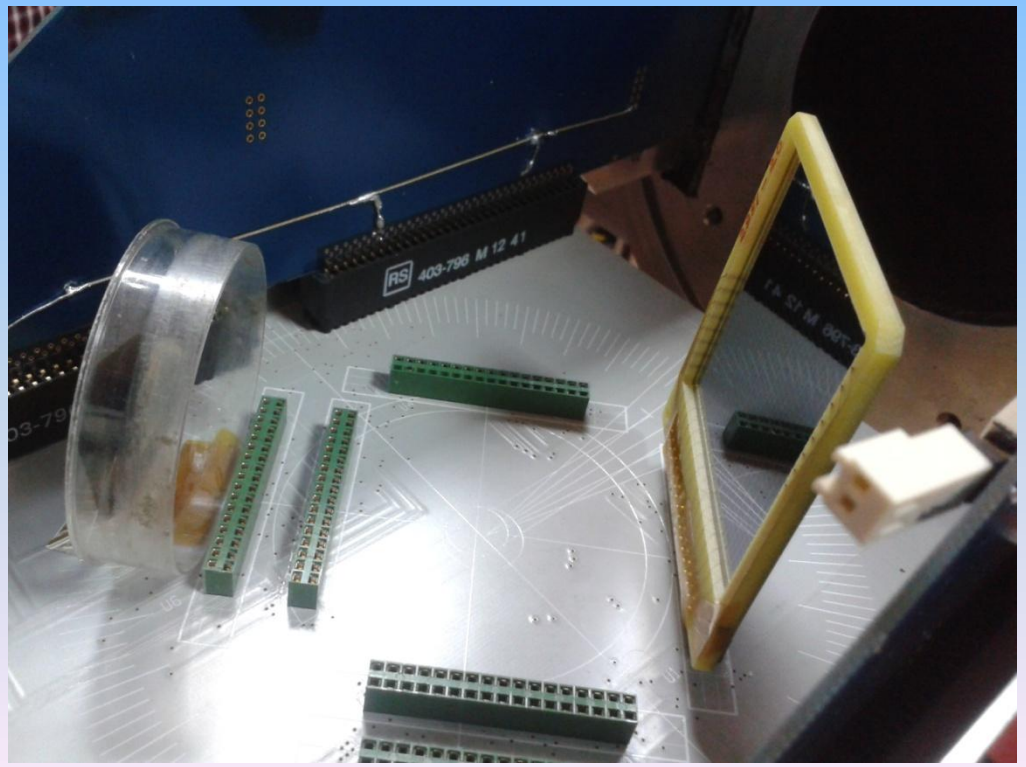
What it is better, 20 MeV or 100 MeV?

- Maximum amplifier amplification (16.4) + 100 MeV ⟶ limited energy range and worst resolution
- Small amplifier amplification (7.4) + 20 MeV ⟶ bigger energy range and better resolution

Dynamic range of 20 MeV is chosen for the measurements.

Cut off

- Detector:295 µm, -75V, 0.19 µA
- Source:^{148}Gd
- Pulser amplitude: 0.23245 V
- CAEN Attenuator (in dB)
- We choose only 1 channel to avoid noise



With the alfa peak and the pulser peak → **calibration line**

With the attenuator, the pulse amplitude is reduced in factors of dB;
the **lowest amplitude** is the **lowest energy in our enegy spectra.**

We reach low energies:
150 keV

CONCLUSIONS

- We have checked all the electric tracks between connections
- All positions in the PCB work well
- We obtain good resolutions (< 22 keV)
- 20 MeV of dynamic range is better for the resolution.
- We reach low cutoff energy (150 KeV).

CERN

I E M CSIC

F G E N

Grupo de Física Nuclear Experimental

THANK YOU FOR YOUR ATTENTION

CSIC

Consejo Superior de Investigaciones Científicas