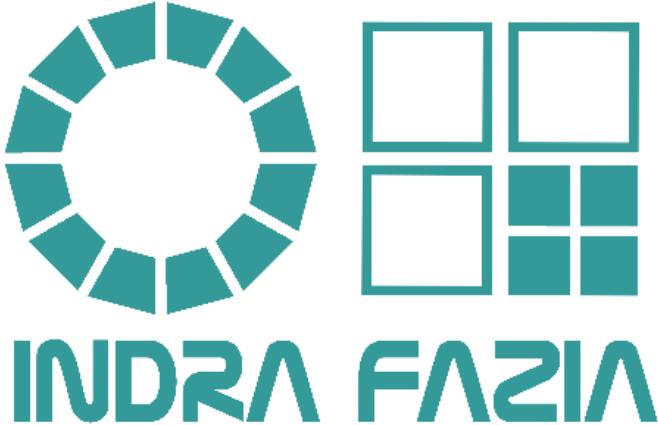


INDRA-FAZIA detectors and mechanics status



2022: Not only an update of the INDRA electronics

E818 focused on light clusters:
But we had a test beam too...

$^{84}\text{Kr} + ^{124}\text{Sn}$ @ 68 A MeV test beam May 2022

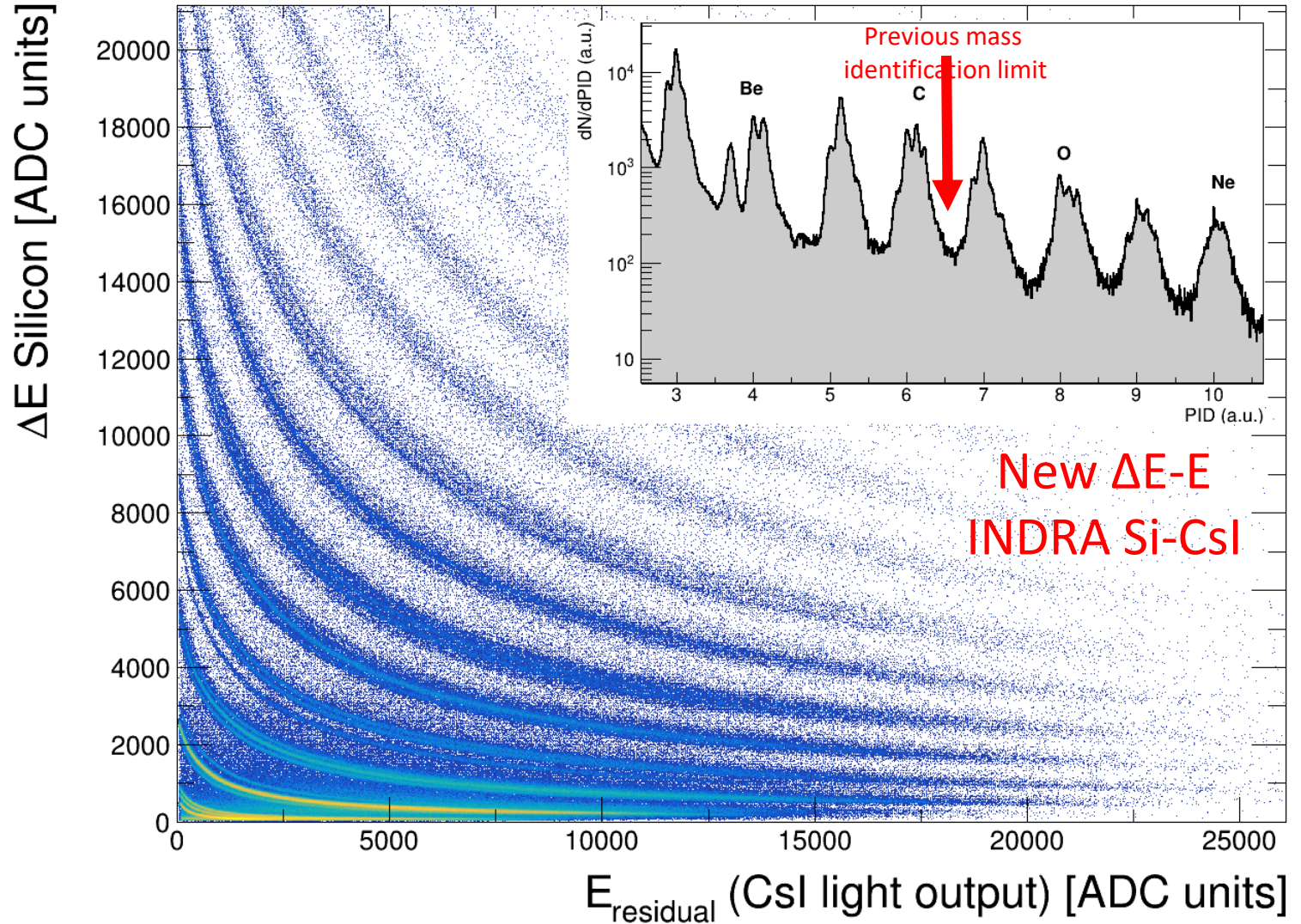
INDRA upgrade:

- New digital electronics & from 12 bytes to 16 bytes
- -> Pushing the PA gain
- New cabling
- New silicon detectors

=>upgrade of INDRA
Better isotopic resolution
From Z=6 to Z=10-12

A resolution:

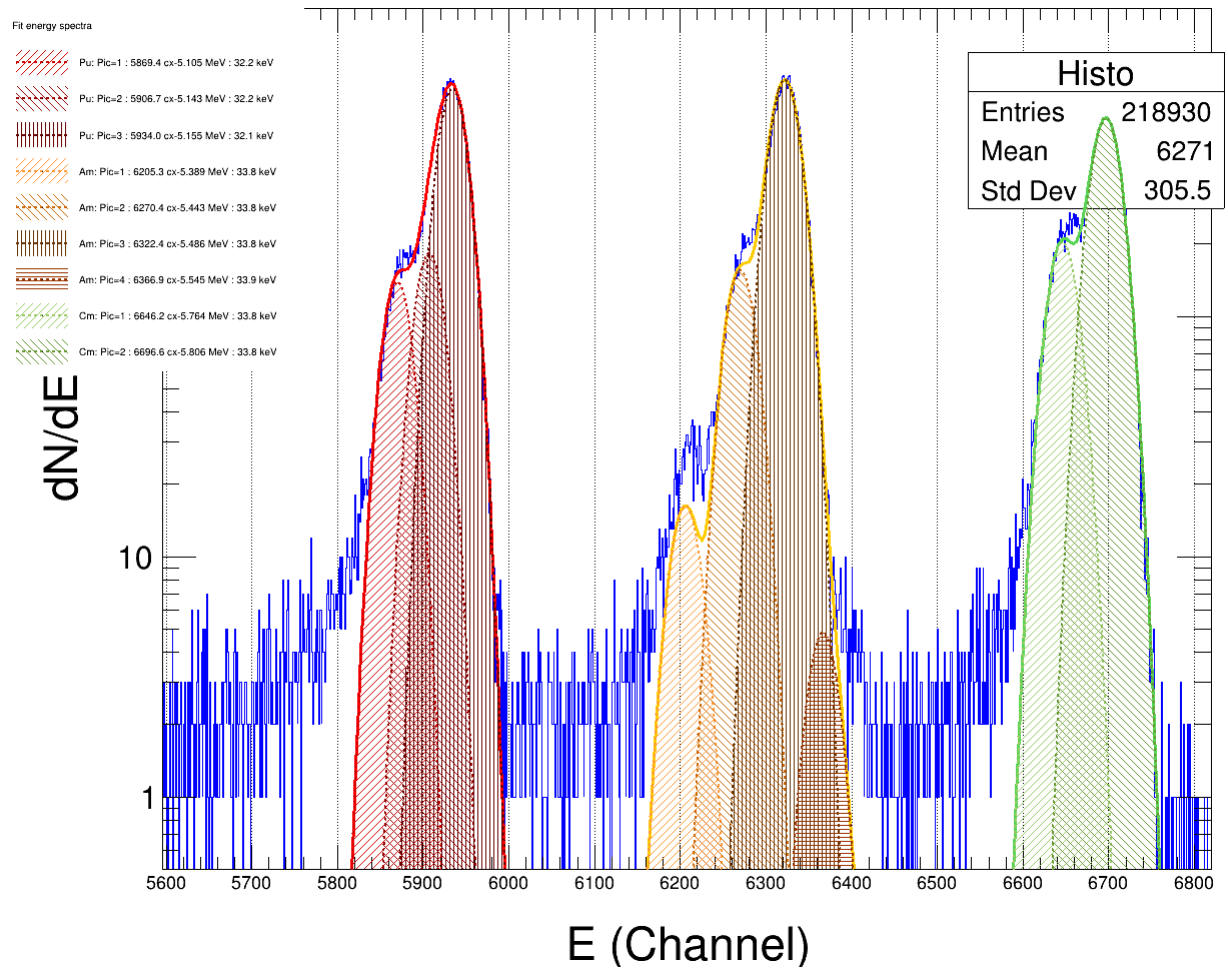
FAZIA: 1.8-13.5°
INDRA: now 14°-45°



New ΔE -E
INDRA Si-CsI

In 2022 the silicon improvements concerned the ring 6-7 (14°-27°) with brand new 300 μm detectors from Micron.

⇒ We ordered also new one by the fall of 2022 to change also ring 8-9 (27°-45°)
We received them in May 2023 and tested straightforward with Alpha source.



We received 17 pads and 12 are necessary.

They are quite good 35-45 keV resolution with the same electronic chain and ~55 MeV energy range

Numéro	épaisseur	déplétion	Voie 1	Voie 2	Voie 3	Voie 4	commentaires
3586-10-1	298 um	34 V	32,6 keV	38,7 keV	38,8 keV	32,7 keV	
3586-10-2	298 um	34 V	31,8 keV	34,4 keV	34,5 keV	32,1 keV	
3586-11-1	302 um	36 V	34,1 keV	34,7 keV	42,4 keV	Ok	Amplitude de la 4 ^{ème} voie environ moitié de la normale puis redevient ok après un dernier essai, connectique?
3586-11-2	302 um	34 V	34,0 keV	41,2 keV	34,9 keV	32,9 keV	
3586-11-3	302 um	36 V	33,8 keV	34,7 keV	48,7 keV	37,4 keV	
3586-13-1	303 um	36 V	35,1 keV	41,4 keV	40,7 keV	34,5 keV	
3586-13-2	303 um	40 V	31,8 keV	33,0 keV	31,7 keV	33,0 keV	
3586-13-3	303 um	36 V	33,0 keV	36,0 keV	51,0 keV	37,0 keV	Courant qui augmente avec le temps
3586-14-1	304 um	36 V	36,6 keV	38,5 keV	34,9 keV	34,8 keV	
3586-14-2	304 um	34 V	32,9 keV	38,7 keV	37,2 keV		Les pics bougent sur la voie 4
3586-14-3	304 um	34 V	31,0 keV	34,8 keV	34,6 keV	31,1 keV	
3586-15-1	303 um	30 V	++ bruit au seuil	généré seul	Ok	Ok	mechanical
3586-15-2	303 um	34 V	37,8 keV	38,2 keV	37,0 keV	36,5 keV	
3586-15-3	303 um	34 V	34,0 keV	36,2 keV	36,9 keV	35,4 keV	
3586-16-1	307 um	34 V	35,8 keV	45,1 keV	40,7 keV	non, fort I	Résolution dégradée sur la 4 ^{ème} voie, fort courant ~450 nA
3586-16-2	307 um	34 V	39,8 keV	39,7 keV	53,2 keV	43,3 keV	
3586-16-3	307 um	38 V	35,3 keV	35,8 keV	33,4 keV	35,5 keV	

They will be mounted in the experimental chamber by the beginning of July.
=> So we should expect a better cluster identification up to 45° next time.

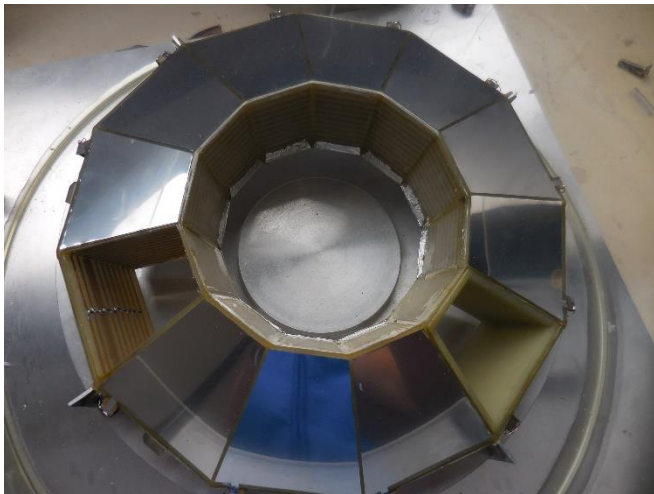
INDRA Ionization Chamber (Chlo)

In April-May 2023 we tested the existing Chlo at GANIL.

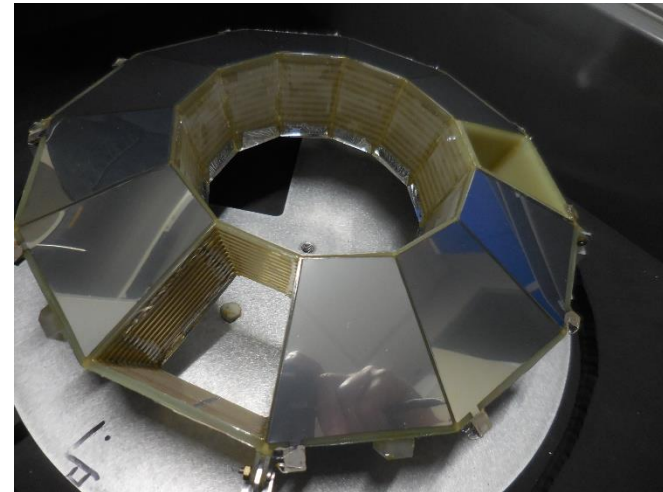
Two ring 6-7 seem in good shape, behaving at 30-50 mbar with a leakage rate of 1.5-2.0 mbar/hour.

But they are the so called “dissipation” version:

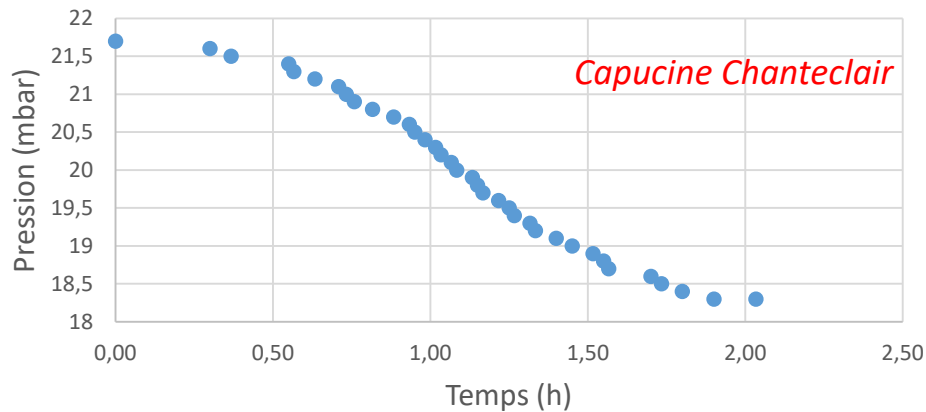
#1



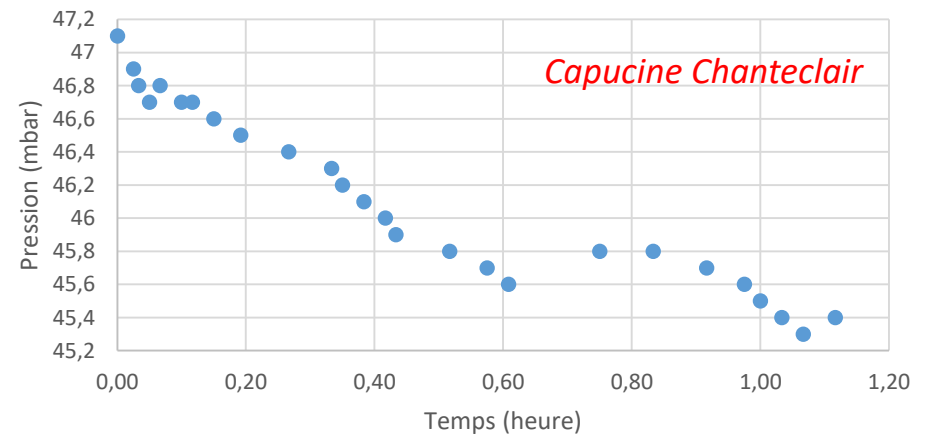
#2



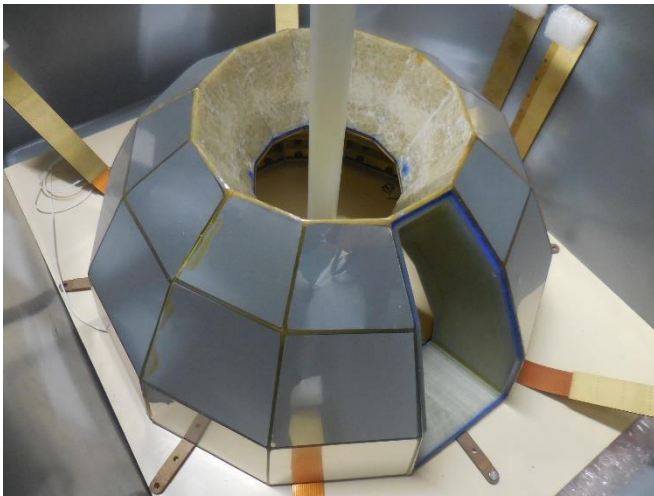
Pression en fonction du temps Chlo 6-7 n°1



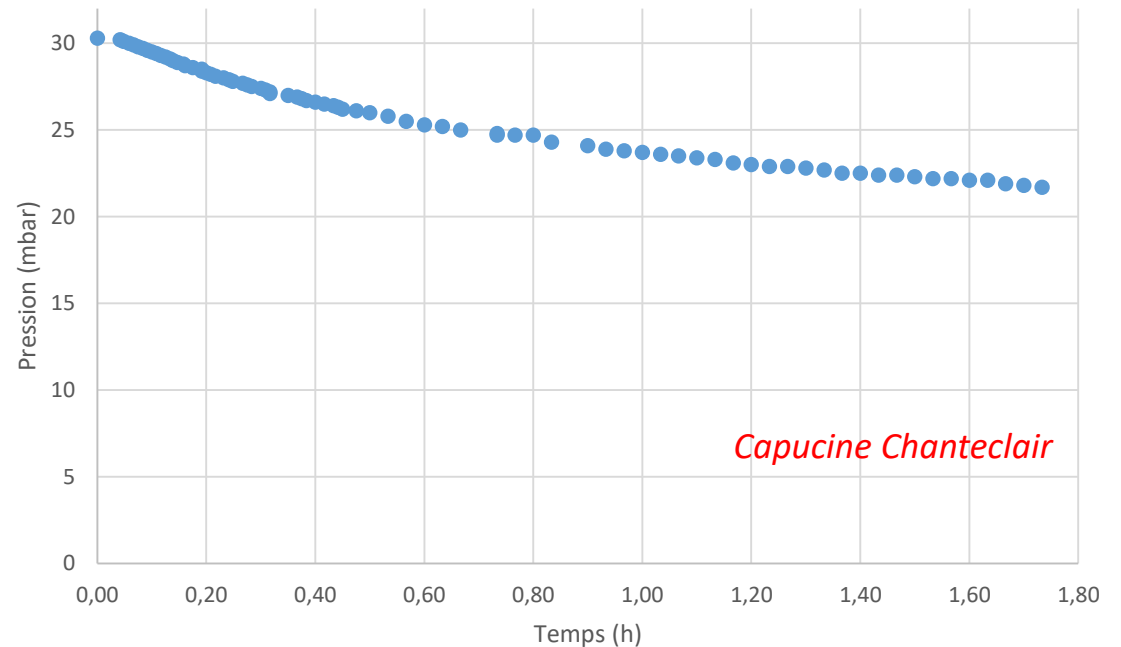
Pression en fonction du temps Chlo 6-7 n°2



We also have a Ring 8-12 (still a “dissipation” version) with a leakage rate of 3.2 mbar/hour.



Pression en fonction du temps Chlo 8-12 n°2

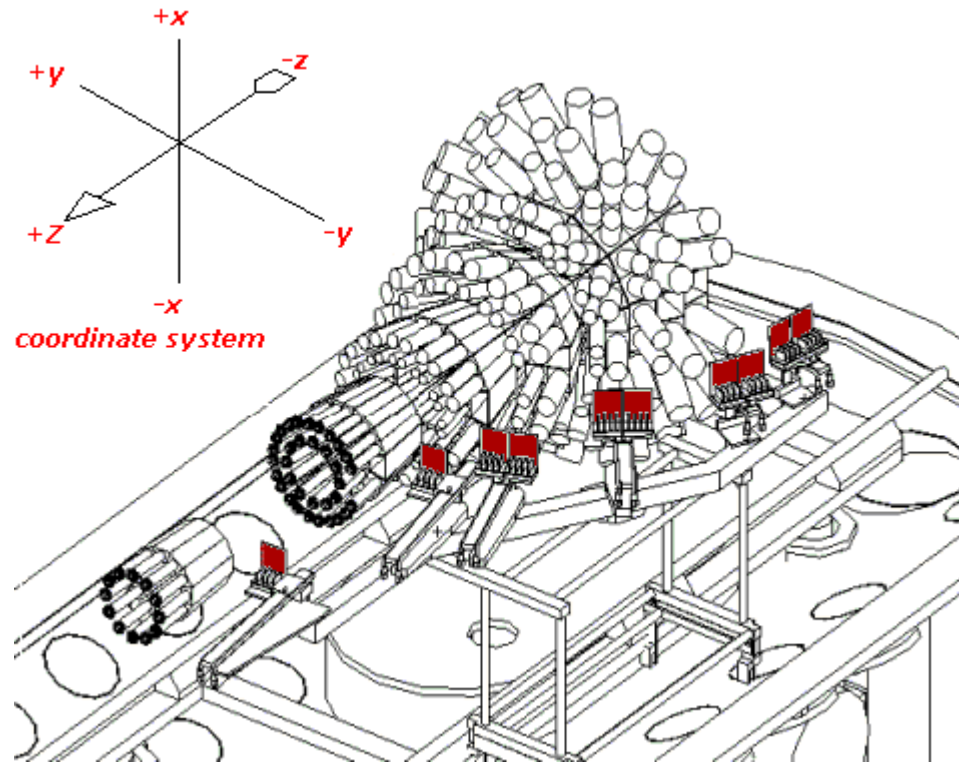


All of these tests have been carried out in air with He gas. No gas monitoring system was available by the time to check everything under vacuum in D5.

⇒ Next step.

All the electronics, power supply, cabling... are already available. But not verified so far.

INDRA 3rd campaign at GANIL 1997



The « dissipation » version using ToF silicons in a horizontal plane.
One cell for each ring has been removed to open the way to particles towards the ToF silicons (in red).



New Chlo developments

In parallel of these tests:

LPC Caen is now involved in a project of Chlo renovation (2023-2024)

Doing something new benefiting from progress in CAD, 3D printing, our knowledge and past experiences...

Independent mechanical cells, easier to repair, keep the geometry.

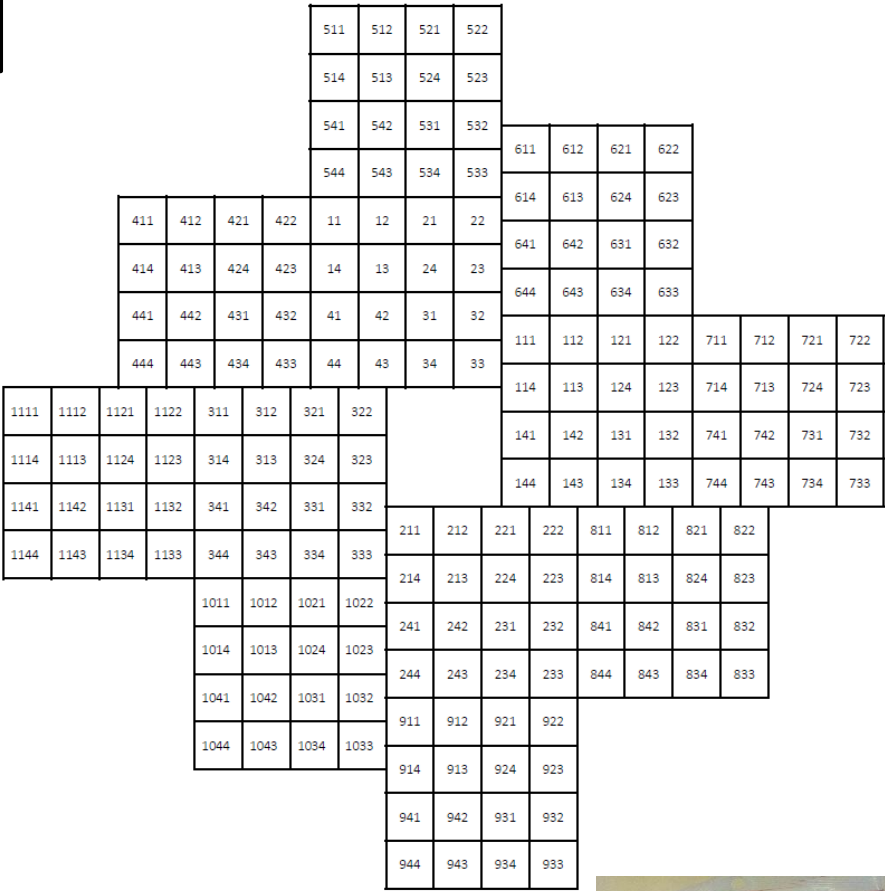
Service	2023	2024	2025	2023
Instrumentation	0,2	0,2 ?	?	?
Bureau d'études Mécanique	0,2	0,3 ?	?	?
Service électronique micro électronique				

Involved persons:

- Hugues de Préaumont
- Jérôme Perronel
- Yohann Brelet (Jean-Marc Fontbonne)

FAZIA

- Since the E818 experiment the blocks n°1,4,5,6,7,11 have been removed for maintenance.
- They are in their box.
- On block n°6 which was not responding during the Kr+Sn experiment we changed HB n°2->6 and PS n°6->17.
- PS n°6 is working -> spare at GANIL.
- Half Bridge n°2,11,34 sent to Florence for repair.
- Spare Block Card at GANIL: n°3,15
- Spare HB card at GANIL: n°32,35,41
- Spare PS card at GANIL: n°2,6
- Block n°0,1,2,3 are equipped with 750 μm thick Si2.



Mechanics:

- 12 new copper plates manufactured in 2021
 - 4 are mounted in D5 block n°0,4,5,6
 - 2 in Florence
 - 1 in South Korea
 - 5 spares at GANIL
- 10 back planes made in LPC Caen in 2022
- 5 connectors Jaeger for 48 V (new type)



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BON DE LIVRAISON

N°: BL000425

DATE : 22 janvier 2021

Expédié à:
LPC – UMR6534 – 0923
ENSICAEN
6 boul. Maréchal Juin
Tel. 02 31 45 25 00
14050 CAEN
FRANCE

A l'attention de M. Le Neindre

I found last Thursday 3 AMCRYS CsI(Tl)
detectors in my shelf!!
The last production was sent in two boxes
One of 69 and the other of 3 crystals.
I forgot the last one!

VOTRE N° DE COMMANDE	VOTRE CODE INTERNE	EXPEDIE LE	N° DE FOURNISSEUR	MOYEN D'EXPEDITION
0923L024621		22 janvier 2021		TNT
N° de connaissance :.....N.A		Poids total : N. A.	Nombre total d'articles : 2	
QUANTITE	N° DU COLIS	DESCRIPTION		
2	(1 cartons de 69 cristaux) (1 cartons de 3 cristaux)	72 cristaux « Scintillators based on CsI(Tl) single crystals, Dimensions length 20 mm, width 20, height 100 mm»		

We received also to new Korean FEE cards from Huelva with « only » the « analog part »

