



Project Manager Report 2026

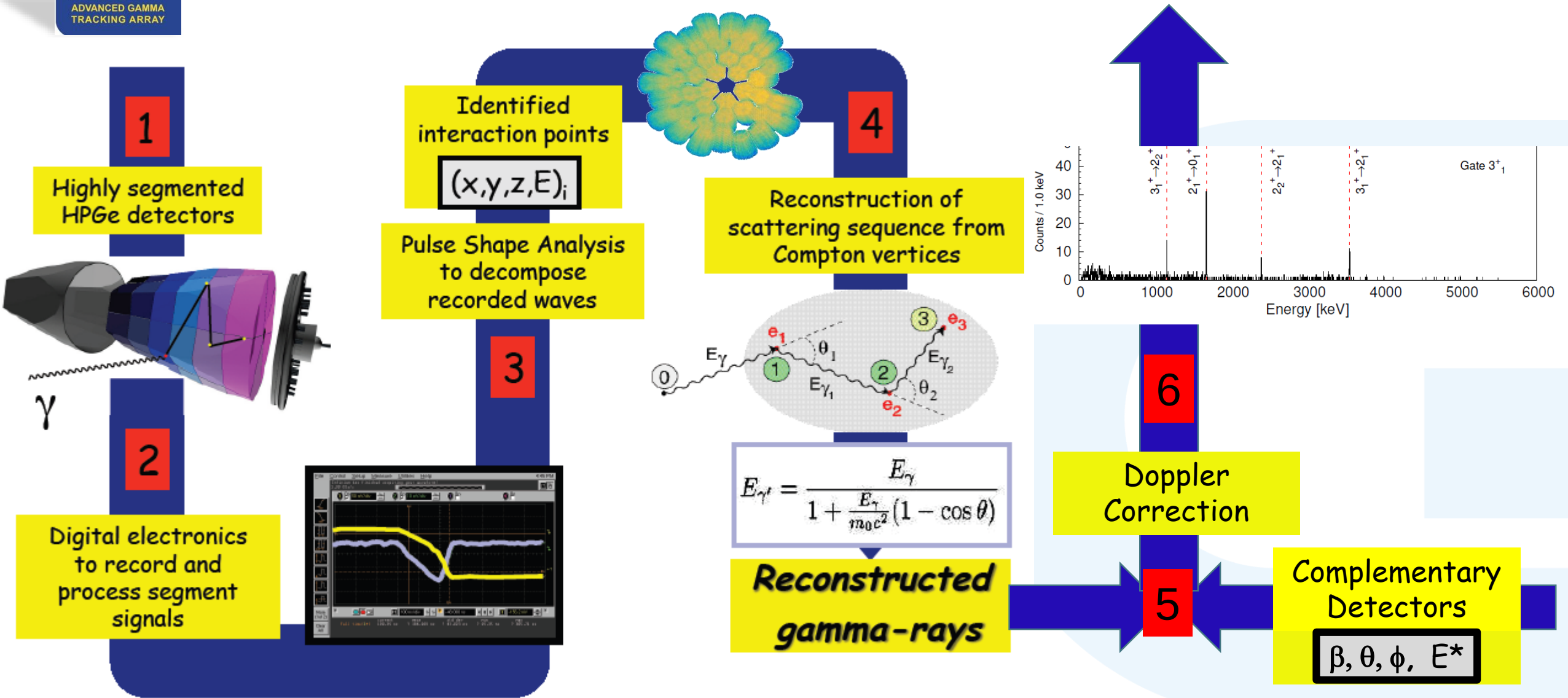
Emmanuel Clément (GANIL) on behalf of the AMB

AGATA week Sept 2026
26th AGATA WEEK

OUTLINE

The AMB is the construction and development body, in charge of executing the Project Definition included and funded by the Phase 2 MoU and supporting the host lab team

- ☐ Project structure
- ☐ Updates on the organigram and responsibilities
- ☐ Focus on the detectors and futures business model
- ☐ Focus on the Phase 2 firmware situation
- ☐ Focus on the Data management
- ☐ Budget
- ☐ Beyond Phase 2



AGATA: International Structure (Sept 2026)

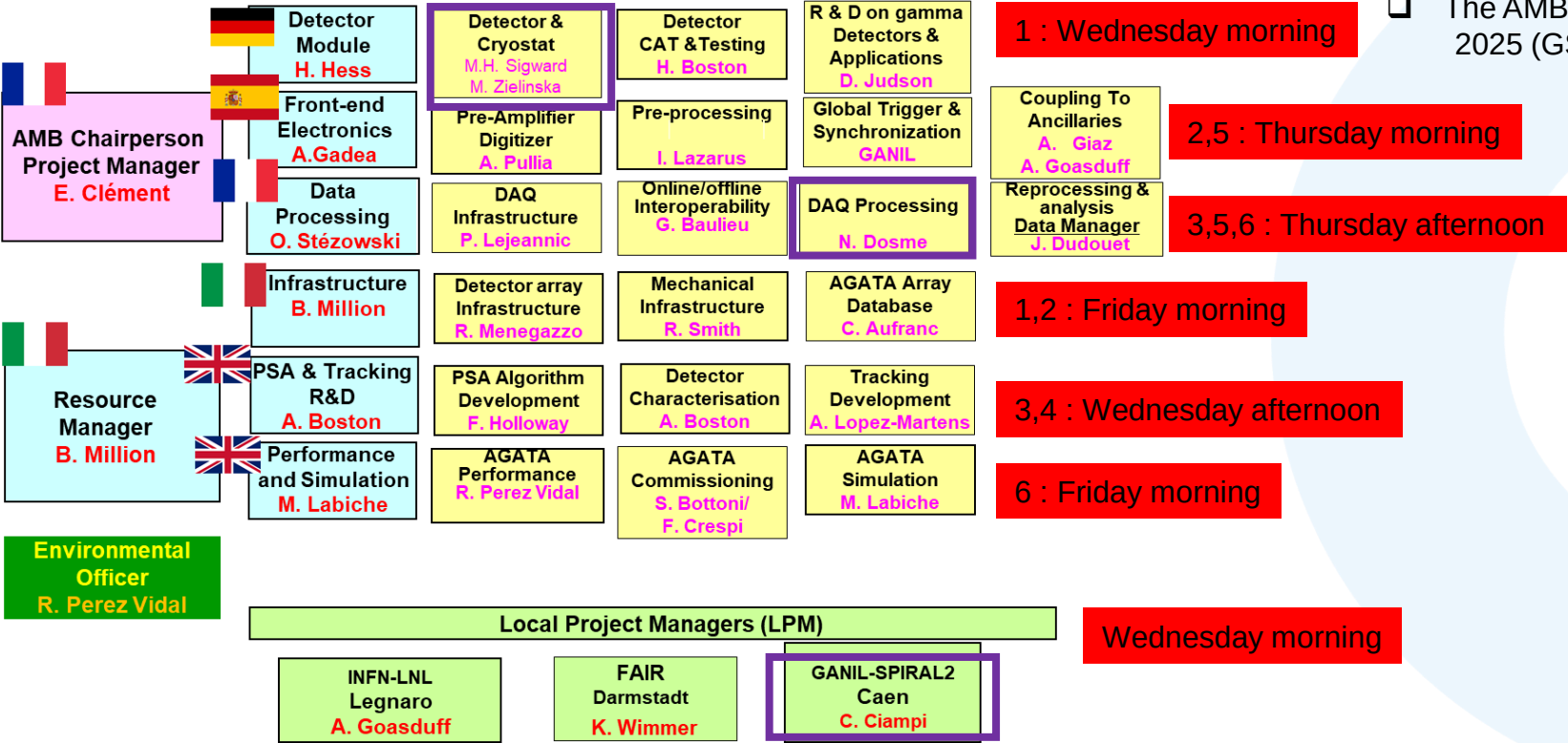


AGATA Management Board and Teams Phase 2

Project Manager / AMB Chairperson
Working Group Chairpersons, ASC Chairperson (M. Gorska) ACC Chairperson (JJ Valiente Dobon).
LPM-LNL, LPM-GSI, LPM-GANIL I. Kuti (Dissemination),
M. Zielinska (CEA), vice chair ASC

AGATA Working Groups

AGATA Teams



- ☐ The AMB meets every month by zoom
- ☐ Excellent stability and smooth evolutions of the board
- ☐ One AMB meeting per year in presence
- ☐ 3 AMB meetings per year include all team leaders.
- ☐ The AMB organises the annual AGATA week 2025 (GSI) ; 2026 (HIL) ; 2027 (To be located)

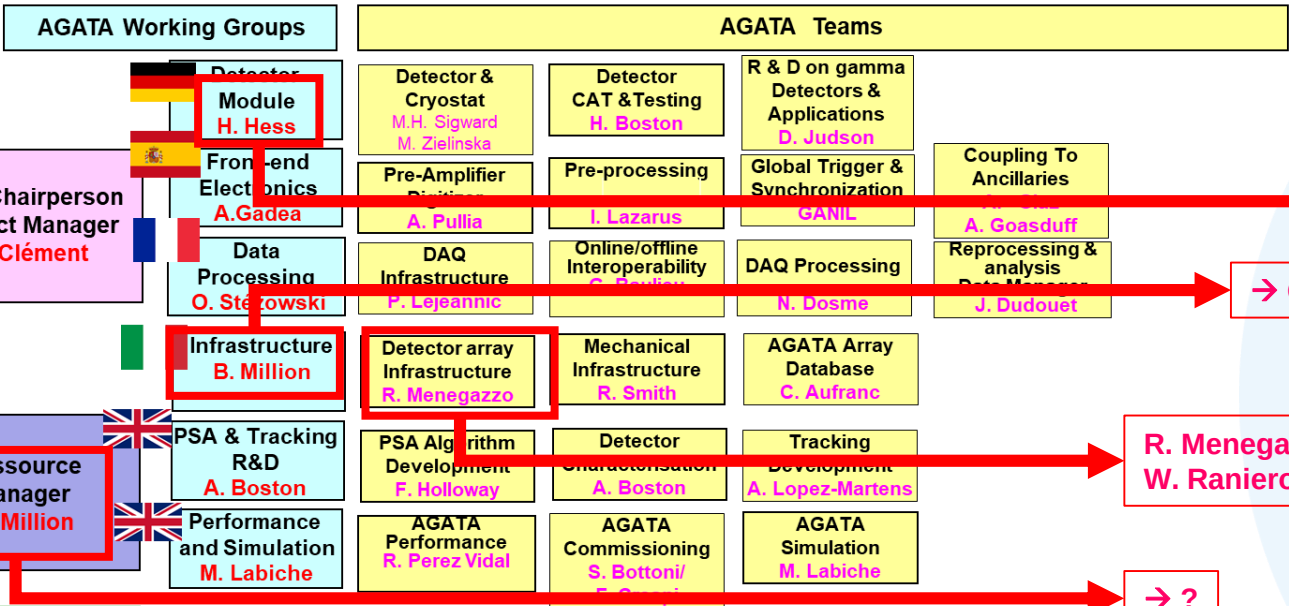
(un)fortunately,
the ASC
confirms my
position for 5
more years at
its last meeting

AGATA: International Structure (Sept 2026)



AGATA Management Board and Teams Phase 2

Project Manager / AMB Chairperson
Working Group Chairpersons, ASC Chairperson (M. Gorska) ACC Chairperson (JJ Valiente Dobon).
LPM-LNL, LPM-GSI, LPM-GANIL I. Kuti (Dissemination),
M. Zielinska (CEA), vice chair ASC



**AMB Chairperson
Project Manager**
E. Clément

Ressource Manager
B. Million

Environmental Officer
R. Perez Vidal



- ☐ The AMB meets every month by zoom
- ☐ Excellent stability and smooth evolutions of the board
- ☐ One AMB meeting per year in presence
- ☐ 3 AMB meetings per year include all team leaders.
- ☐ The AMB organises the annual AGATA week
2025 (GSI) ; 2026 (HIL) ; 2027 (To be located, **Spain ?**)

→ Permanent position by GSI in IKP

→ G. Benzoni

R. Menegazzo
W. Raniero

→ ?

(un)fortunately,
the ASC
confirms my
position for 5
more years at
its last meeting

Project Status



- The highest priority of the AMB remains the delivery of the V2 system from DIGIOPT12 → PACE/STARE→DCOD with Analysis pipe
- The firmware and the mass production itself are on the critical path
- The integration is a milestone of 2026 -2027
- The second priority is to support the LNL/PD local team in the switch from the « PRISMA » to the 0° campaign

Detector status (Sep. 2026)

Detector procurement

The “overall” status today is

- 77 asym-capsules delivered
- 1 ORTEC prototype, not functional
- In prod : 2x GANIL, 1x IFIC, 2x INFN, 1x IPHC
- 3 from 1 full DEGAS cluster
- 3 D-AGATA (capsules repaired by OC and delivered)

Total A-Sym = 89 in the pipe (2026 CEA order considered as cancelled for the moment)

Preliminary idea for 2027 is 1xINFN, 3xDEGAS(Romania) 3xSlovakia (?)

----- 96 asymmetric capsules identified

Cluster Assembly

ATC24 (GSI) delivered

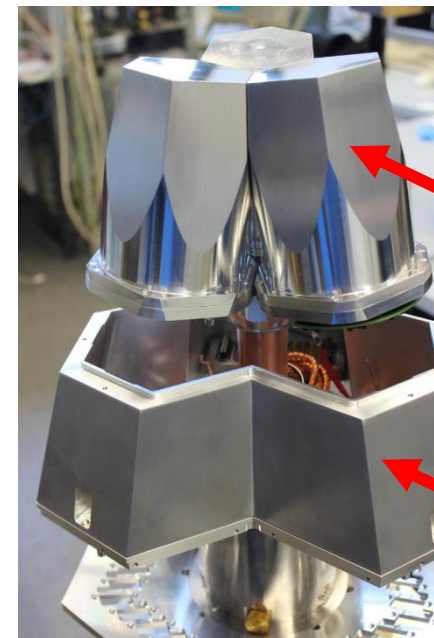
ATC25 (GANIL) delivered

ATC16 (conversion of the last ADC03 - GANIL): delivered (July 2026)

Test cryostats refurbishment done

2x ATC from INFN + 1x ATC from Salamanca + 1x ATC from CEA in the pipe

D-Cryostat upgrade contract signed with CTT (OC GANIL)



GANIL

3 x encapsulated HPGe
crystal from MIRION®

1 x cryostat from CTT®

AGATA Triple Cluster (ATC)

MIRION annual meeting January 21st 2026



Major progress on the CTT to MIRION transfer

The 2025 – 2026 orders are still CTT but the next will be to MIRION

The D-AGATA cryostat upgrade will be a CTT-MIRION joined work

We finally secured the cryostat procurement for the long term !

During the meeting a first price was announced for a MIRION cryostat

→ **240k€ (was ~150k€ by CTT).**

First cryostats by MIRION will be ordered in 2027

At first MIRION will maintain its cryostat as it is expected that CTT maintains its cryostat together with the AGATA collaboration

A subject to be treated in the AMB is how the WG will evolve knowing this change of paradigm

- MIRION warned us that the Ge metal price has **tripled since 2021** and **doubled in the last 6 months** ; the 2.5% limit in price increase will be hard to maintain from 2027
- The unit cost of a full ATC will increase

Germanium

- 80% of refined Ge production worldwide is from China
- China is applying export restriction on HPGe
- +400% increase in metal Ge pricing from 2023 to sept 25 and increasing trend
- Legacy MIRION Ge supplies are NOT from chinese sourcing but Ge overall market is affected
- No effect of AGATA price for 2026, more to come in 2027

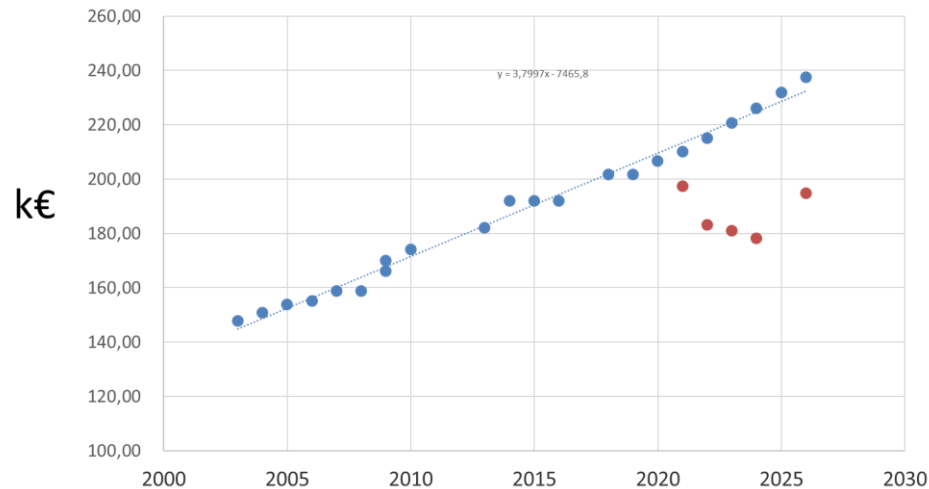
Estimated COST for 1 FULL ATC as for September 2026

Estimated increase
(vs 2026 cost)

As for september 2026:

- Cryostat: CTT→MIRION 240k€
- Capsules: 194k€ (7 caps/year) + 3%
1.5%(Hyp.)→2.5% (2026)

Unit Cost Survey

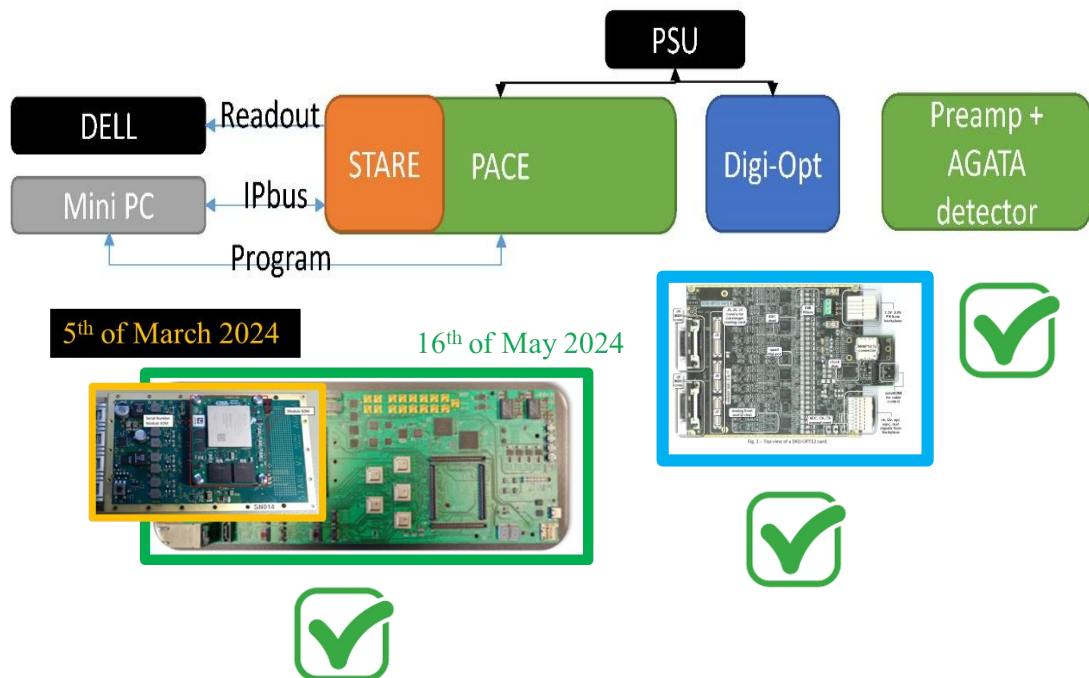


120 units ordered by 2030 is getting less and less probable
→ 2032+ ? (beyond present MoU)
Remember that the Detector task is budget driven

	No discount	With discount			
		scenario 2.	scenario 1.	as for today	
	average cost over 10y no discount (7/8caps/y)	average cost over 10y MoU (7/8caps/y)	average cost over 2027-2030 with 12 caps/y ->135 capsules (Cryostat Mirion) (estimate updated in 2026)	average cost over 2027-2030 with 7 caps/y ->124 capsules in 2034 (Cryostat Mirion) (estimate updated in 2026)	average cost over 2027-2030 with 7 caps/y ->117 capsules in 2030 (Cryostat Mirion) (offer updated in 2026)
Item	Cost in k€	Cost in k€	Cost in k€	Cost in k€	Cost in k€
Detector (×3)	678,5	547,3	530,4	638,9	652,4
Cryostat (×1)	127,5	118,9	197,5	197,7	234,2
Electronics (×3) + GTS/SMART + Upgrade Pahse 0 & Phase 1	89,9	89,1	70,3	87,0	87,0
PSA & DAQ + Storage + Analysis	45,8	45,8	36,0	44,5	44,5
Infrastructure	28	28,0	20,5	25,4	25,4
Mechanics	13,1	13,1	23,9	29,6	29,6
Total	982,8	842,1	878,6	1023,1	1073,1
→ Unit ATC cost reduced in scenario 2 due to higher discount →			array of 135caps in 2030	array of 124caps in 2034	array of 117caps in 2030

→ Unit ATC cost reduced in scenario 2 due to higher discount →

Phase 2 FEBEE ; evaluation status



- The most challenging R&D of phase 2
- The critical path is the integration at the firmware level in the existing system (GTS, and Data Path) due to human resource availability

The ASC approved to charge the OC for the maintenance of the firmware with the ZeptoNova company contract since 2025

2 test benches in LNL and 2 test benches in Orsay

Message : all V2 2π (90 channels) items are funded but we have also tension in the production line with industrial latencies.

We are missing a batch of PACE PCB (12k€ - not a budget issue)

All FPGA for 3π have been ordered and delivered in 2026

Funds are secured at IJClab for the IT infrastructure

The V2 electronic is not a budget issue.
It is HR driven

Phase 2 FEBEE ; evaluation status

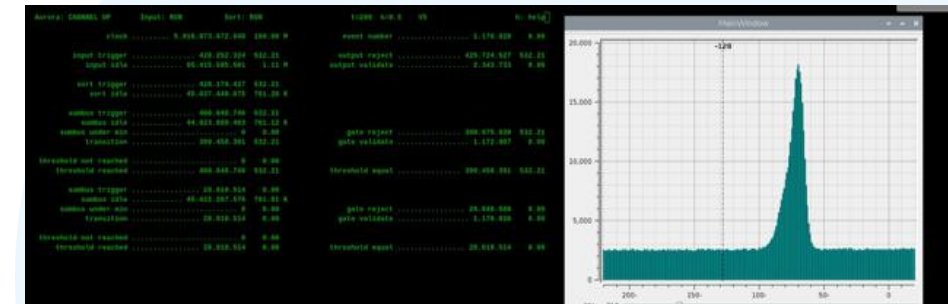
GANIL



Our bottlenecks are

- The firmware delivery with high delay
 - The data integrity has been validated, PSA and data contents validation to be completed (INFN, ZeptoNova, IFIC, Ip2i, IJClab)
 - GTS integration 90% completed (INFN, ZeptoNova, IFIC, GANIL) ; SMART to be deployed in std at GANIL from 2027
 - SLC with DIGOPT12
 - Cold start reliability and power management
- Unexpected production issues for the PACE boards and long delivery time for some connectors, cables ...

Since March, clock and trigger cycle running



Short term : our strategy is to put maximum effort (Alain, Andres) to follow closely the ZeptoNova work and to follow in details the procurement planning (B  n  dicte, Andr  s, Nabil)

Zeptonova 2025/2026 contract completed and deliverable report sent to GANIL.

Documentation available now at: <https://pacedocumentation-6e73de.pages.in2p3.fr/>.

and the different version of the firmware developed are stored at: <https://gitlab.in2p3.fr/agata/daq/pace-bitstreams>

Aurora: CHANNEL UP				t=100 k=0.5 V5				h: help	
clock				event number				4.51 K	
input trigger				output reject				1 0.00	
input idle				output validate				2.186.365 4.52 K	
sort trigger									
sort idle									
sumbus trigger									
sumbus idle									
sumbus under min									
transition									
threshold not reached									
threshold reached									
sumbus trigger									
sumbus idle									
sumbus under min									
transition									
threshold not reached									
threshold reached									

The firmware : our project plan



- The development was highly perturbed by the 2020-2021 COVID lockdown, followed by the constraints of the LHC Run 3 start in some laboratories.
- As a reminder, full hardware and firmware integration falls at IFIC in 2023, which was already beyond the MoU commitments.
- The main developer left Spain in 2024.
- The collaboration has lost most of its FEBEE teams compared to Phase 0.

Currently, we are subcritical and unable to absorb the defaults.

- However, we could maintain involvement at 15% FTE from January 2025 for 18 months, with three contracts ($\Sigma 58,5\text{k€}$ paid by OC) between ZeptoNova in Leuven and GANIL
- Progress thanks to the outstanding commitment of Andrés and Alain.
- However, the present situation is not reliable.
- The project cannot continue like this because the collaboration is not making the necessary effort.



The firmware : our project plan



- We need urgently and desperately an engineering team to take responsibility for PACE and its firmware in a long-term perspective.
- Maintain as well the support from Zeptonova, as a provider company under the supervision of the engineering team taking the responsibility.
- AGATA as collaboration must keep a certain degree of know how to be able to proceed with new developments in the future



The firmware : our project plan



- We will open a new 56-day EFT contract with ZeptoNova (53k€ funded by OC hosted at GANIL) with clearer deliveries and stricter validation points from the AGATA teams (GANIL-IFIC-LNL)
- The contract is to be completed by Christmas 2026 – T1 2027 and payment will be made on results only.
- I am defining a showstopper.
 - ❖ If, by the 2027 AGATA week, we are unable to
 - deliver a stable and functional pipeline;
 - identify a group committed to taking responsibility for the long-term support and R&D of the PACE board (FW + hardware)
 - The GANIL campaign is at risk with a lower Ω than the first campaign
 - As a consequence, I will consider holding the development and going to cover AGATA 2π at GANIL with an alternative solution using CAEN modules and initiate the needed work
 - RIB does not request high-level triggers.
 - It will be costly (€2M → €3M for FEBEE).
 - There will be a cut in momentum, but at that time we will have more than 90 detectors in the pocket with 'only' ~30 FEBEE channels available from phase 1

Data flow and Acquisition status



- Maintaining the present system with upgrades
- The phase 2 data-pipe line is ready (UDP check in Orsay, pushing the PSA workload on modern systems)
- Software Slow Control installed in LNL
- After V2 implementation, due to the rapid increase of the number of detectors, a massive investment will be needed in 2027 -2030 (0.9M€) with possible savings thanks to the CNRS *accord cadre*
- **Total reorganisation of the TIER's repository by IP2i**

Jérémie has completed an incredible work on the AGATA data
It's worth reiterating that this is truly a Herculean task

He's currently rivalling ATLAS in terms of resources at Bologna. It's really massive and paves the way for a more structured way of working in the future, with a catalogue, metadata, etc. ...

The next Herculean work is to regularize the analysis software's developed recently in the collaboration and their licensing.

The controlled versioning, availability and support of AGAPRO is priceless for the AGATA scientific quality. We must bring into this controlled area (versioning, availability and support) the other codes.

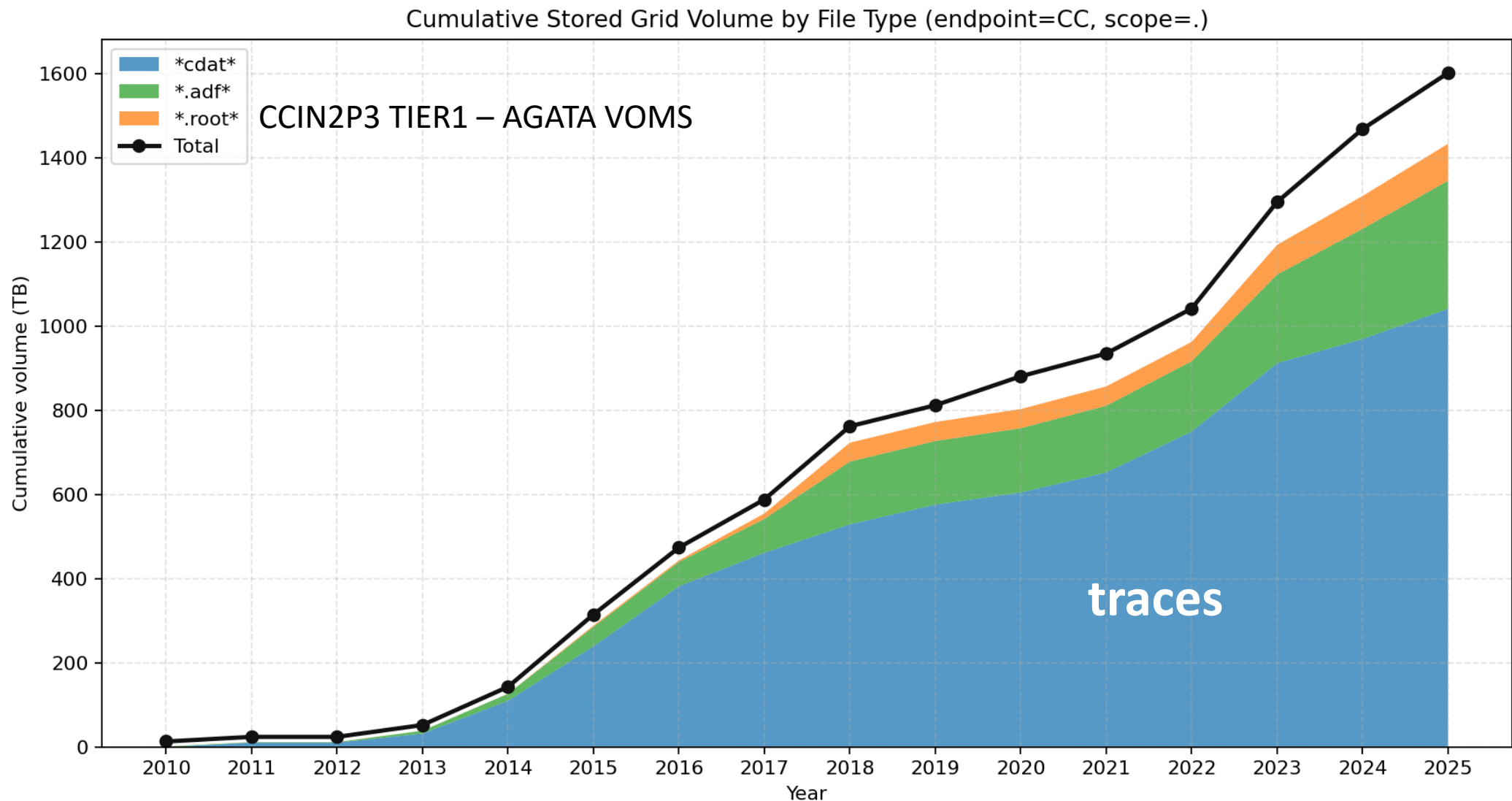
(see ACC session)

The screenshot shows a web application titled "AGATA historical migration - status". It features a summary section with four boxes: "137 COMPLETED", "0 NONE", "0 FAILED", and a progress bar showing "0/35", "0/10", "0/39", and "0/53". Below this is a table with columns: Campaign, Equipment, Facility, Status, Progress, Source, Push, Sync date, Skip sync, and Bundling file. The table lists various campaigns and equipment, such as "GSI_2012", "GANIL_2013", "GANIL_2015", "LNL_2010", and "LNL_2011", with their respective equipment and facilities.

Campaign	Equipment	Facility	Status	Progress	Source	Push	Sync date	Skip sync	Bundling file
GSI_2012	AGATA_P1_C0M_001	040214_Installation	pending		scatd3_legacy	scatd3	scat	yes	
GANIL_2013	AGATA_P1_C0M_002	15Mar_commissioning	pending		scatd3_legacy	scatd3	scat	yes	
GANIL_2015	AGATA_P1_C0M_003	15Mar_commissioning_2015	pending		scatd3_legacy	scatd3	scat	yes	
GANIL_2015	AGATA_P1_C0M_004	com_vortex_2016	pending		scatd3_legacy	scatd3	scat	no	
GANIL_2015	AGATA_P1_C0M_005	com_magat_2016	pending		scatd3_legacy	scatd3	scat	yes	
LNL_2010	AGATA_P1_EXP_001	2010_wmb11	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_002	2010_wmb22	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_003	2010_wmb27	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_004	2010_wmb43	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_005	2010_wmb45	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_006	2010_wmb49	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_007	2010_wmb50	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_008	2010_wmb07	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_009	2010_wmb07_geno	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_010	2010_wmb09	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_011	2010_wmb19	pending		scatd3_legacy	scatd3	scat	yes	
LNL_2010	AGATA_P1_EXP_012	2010_wmb21	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_013	2010_wmb24	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_014	2010_wmb25	pending		scat_legacy	scat	scatd3	no	
LNL_2010	AGATA_P1_EXP_015	2010_wmb28	pending		scatd3_legacy	scatd3	scat	no	



AGATA DATA- Refining our data management



« metadata »

Analyzed

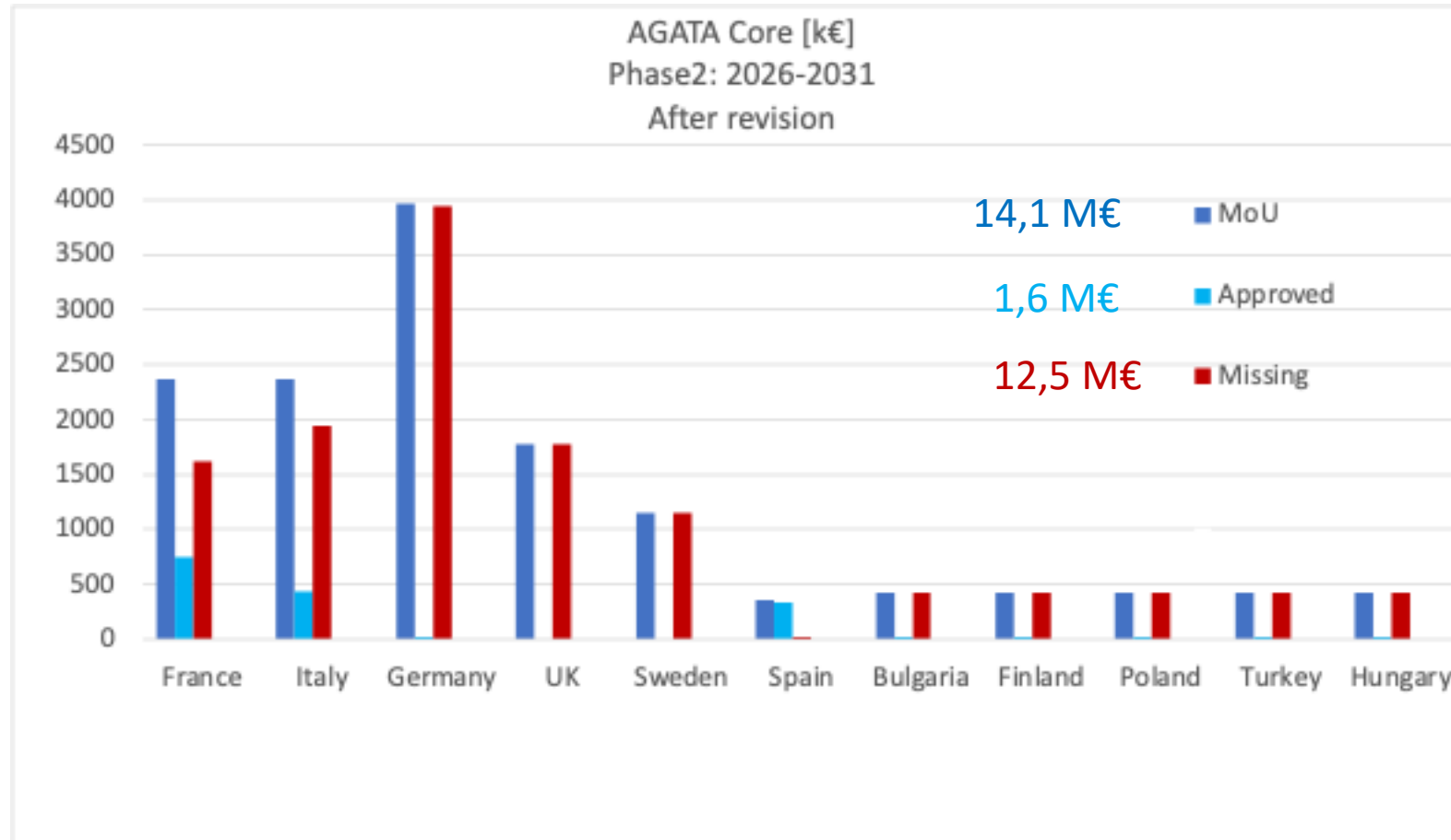
Processed

MySQL data base extracted from GRID – completed (2026)
→ AGATA Data catalogue

Courtesy J. Dudouet (IP2i)



Capital Resources MoU Phase 2: 2026-2031



Status for Core purchase in **2026** towards **135 capsules (3π)** setup within 2030

	<u>On-going</u>	/	<u>Needed</u>
• Caspules	1.170 k€ for 6 capsules in 2026		
• Cryostats			
• FEE	15,7 k€ opt. fibers/mechanics /digiopt12		12 k€ Pace
• DAQ			
• Infrastructure	61,7 k€ Autofill/LVPS racks (GANIL.2) /patch boxes/opt. fibers		24 k€ Mechanics (HC) 190 k€ Mechanics (support and shaft) (manpower on UK grant?)
TOTAL:	1.247,4 k€ already ongoing		226 k€ needed in 2026-27

Operational costs 2026

(as for September 2026)

Country	OC funds MoU share (k€)	Funds allocated (k€)
Bulgaria	25	15
Finland	29	
France	138	69
		46
		23,46
Germany	138	
		26,0
Hungary	38	38
Italy	138	132
Poland	25	
Spain	39	39
Sweden	77	
Turkey	38	
UK	107	121
Common Accounts		
TOTAL	792	509,5

- Bulgaria: First contribution
- Finland: as expected
- France: as expected
- Germany: 26 k€ from GSI
- Hungary: as expected
- Italy: as expected
(6 anticipated in 2025)
- Poland: no funds available
- Spain: as expected
- Sweden: KTH and Lund contributions
- UK: OC for 2024-2026 (100 k€ + 105 k€ + 121 k€) approved
- Turkey: no funds possible

Total contributions 2026 (65%) 509,5 k€

Operational costs 2026

Spent expenses

(as for September 2026)

Fixed expenses:

- LN2 (array + Detector lab LNL): 100 k€
- Detector labs: 32,8 k€
- GRID: CNAF 0 k€

Priority:

- Cryostat maintenance: 101,8 k€
ADC->ATC; D-AGATA
- Capsule repairs: 248,8 k€
12 annealings + 1 repair A003
3 upgrade D-AGATA

Maintenance/Replacement:

- Electronics replacement 42,2 k€
PACE firmware (ZeptoNova)
+ components + mechanics
- INFRA replacement 14,7 k€
LN2 cards + patch boxes
- MECHANICS replacement 1,9 k€
linear bearings

Others:

- Website 4,1 k€

Item	current expenses	Common account expenses
Detector & Infrastructure		
LN2	100,0	
Capsule maintenance/repair	0,0	248,8
Cryostat maintenance/repair		101,8
HV/LV system, infrastructure	0,0	14,7
Detector laboratory (consumables etc.)	32,8	
Electronics & DAQ		
Electronics maintenance/repair		42,2
DAQ maintenance/repair		
Other costs		
Grid/Data Analysis/Dissemination/ Website	0,0	4,1
Shipping costs	0,0	
Mechanics etc.	1,9	
Total operation & maintenance costs (excl. personnel)	134,8	411,6
		546,3

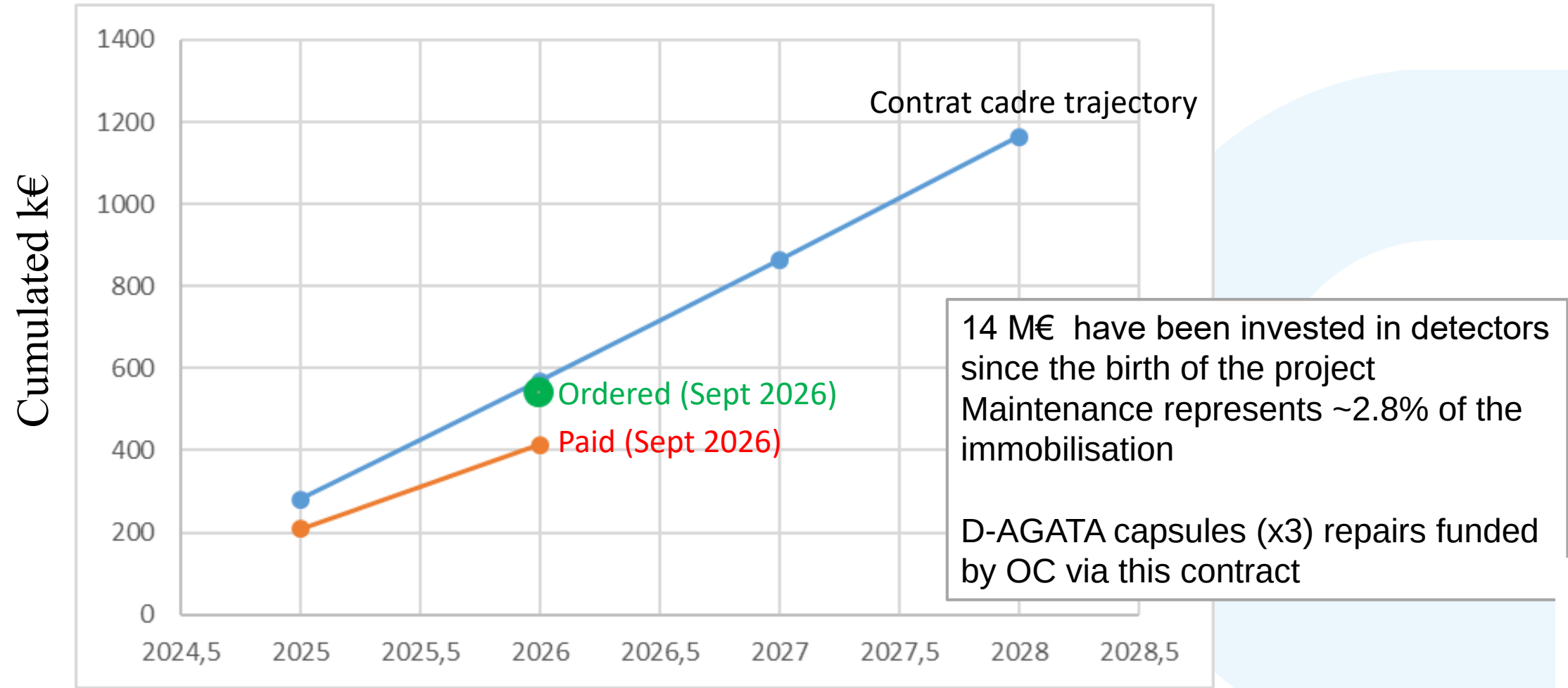
Total expenses so far 546,3 k€

Maintenance

A 4 years contract (1.6 M€, inc 2 new GANIL capsules) between GANIL and MIRION for new orders/ annealing / repairs has been signed using the CORE and OC (common account) located in the GANIL. → Faster orders



Maintenance = {Repairs + Annealing }





From my early morning walk in Warsaw today
(Rokosowska street)

Pave the way to Phase 3

On our way to Phase 3 !



→ The AMB should start preparing for phase 3 (>2031) from a technical perspective, which will form the basis of the next MoU.

Many open questions :

- Construction of a 4π spectrometer? → Science prospective will tell us ... Resource board will constrain us
- Would it be a MoU for the operation and upgrade of obsolete material only (FEBE, DAQ and INFRA)?
- **Detectors**: re-evaluation of budget and human implications following the CTT – MIRION transfer of technology. The maintenance of the CTT-like cryostat is also an open question.
- **Back-end electronics**: CAEN® and MESYTEC® have digitizers in their catalogues with readout firmware that are almost compatible with the AGATA needs. The current CAEN® products are being integrated at LNL. Both companies are developing White Rabbit (Time Stamping) integration.
- **Data Flow**: Is DCOD the best option for distributed data flow with the available open-source Docker® / Agent technologies ?
- **Data storage** : >1.6 Po of data at CCIN2P3 since 2010. (70% are traces and ~30-40% ^{60}Co) → sense ? Manageable ?
- **Pulse Shape Analysis** : Should the PSA R&D team be transformed into a fully AI-oriented team? is the original 3-teams structure still well suited ?
- The IPHC **scanning table** will shutdown after the Marie Hélène's retirement at the end of the phase 2 MoU : which strategy for scanning activities ?
- **Simulation** : Should we maintain sovereignty or join other initiatives?
- We will need to review our AMB organigram accordingly and anticipate also our age pyramid

Time line

- T0 could be this AGATA week for the AMB
- 2027-2028 should be the year of the Project Definition preparation by the AMB
- 2029 internal review and initiate funding agency discussion (?)
→Drafting a MoU with financial perspectives
- 2030 – getting a MoU signed for the 2031 funding



**Thanks to all AGATA
contributors and to the
local LNL/PD team**

