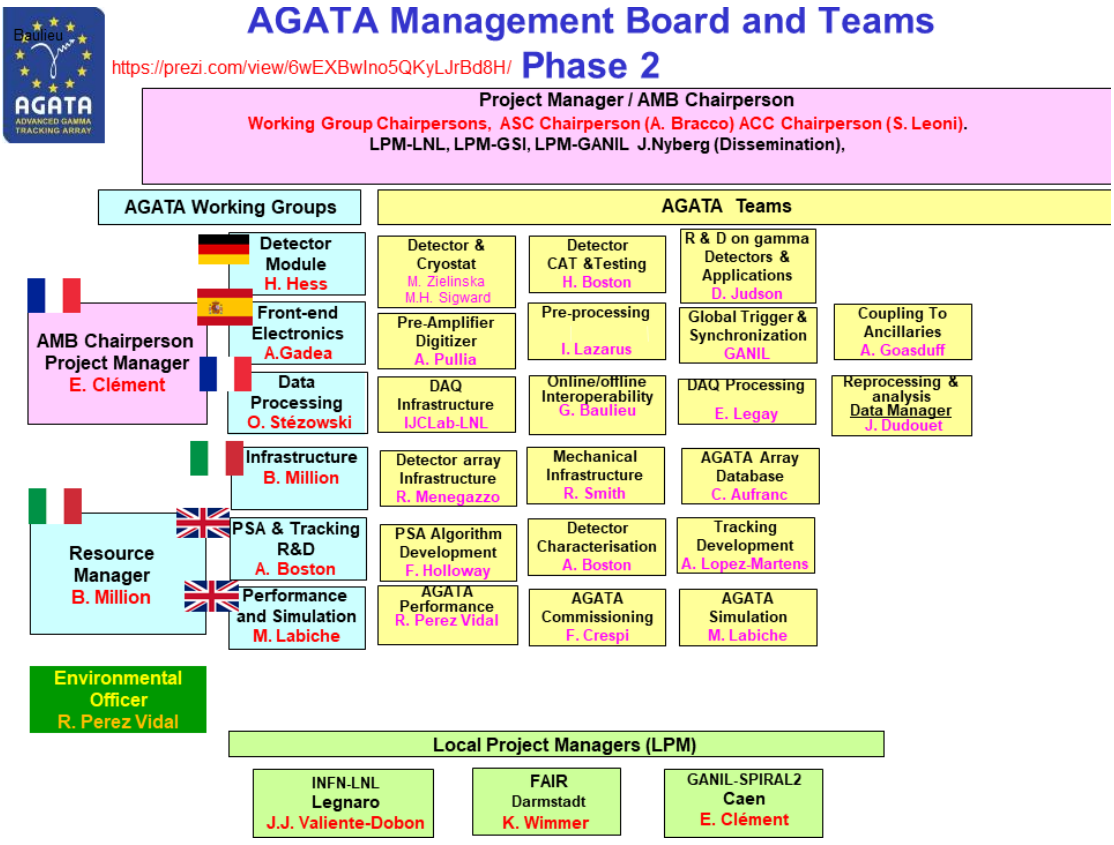
AGATA AMB report for the 11th of March 2024 ASC meeting

E. Clément on behalf of the AMB

Executive Summary

The AMB met on the 17th of November, 21st of December, 29th of January and in presence on the 22nd- 23rd of February.

The present AGATA Management Board structure is presented below. L. J. Harkness has expressed her wish to leave the PSA team leader position. AMB has proposed the responsibilities to new personalities. F. Holloway (Liverpool) has taken the responsibility since beginning of 2024.



The main milestones of the past months are :

- The LNL campaign is running full swing with an impressive amount of experiments performed over the last months. The AMB recognizes the outstanding effort and commitment of both the AGATA teams and the local LNL team in making AGATA operational and running for its users. The array

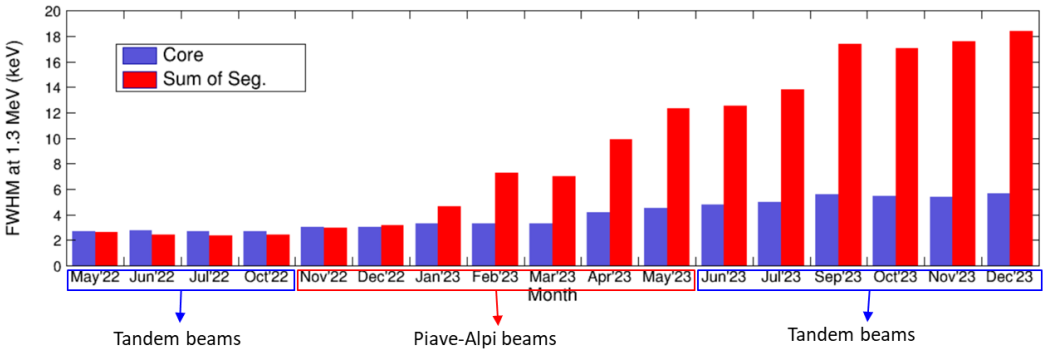
was shut down over the Christmas period for maintenance in several aspects of the system. A serious issue with water leak in the cooling block of the DIGOPT12 was observed during the autumn beam time leading to the destruction of few boards. New cooling block have been manufactured in emergency with re-enforced coating to deal with the "hard" water provided by the LNL accelerator. Replacement of the board have been ordered on Operation Account. An independent chiller installation with soft water is under study similarly to the GANIL setup or GRETINA. Funds have been allocated and the procurement will be launched as soon as the specifications and detail studied by the company delivered. One proposition is to invest in this system which will follow the array in the next host-labs.

- The AGATA phase 2 electronic is making steady progress debugging and correcting all aspects step by step. The Digitizer, PSU, mechanics and STARE elements have completed their developments and started the procurement of the first batch. The PACE board development is making progress on a daily basis and the team is approaching the moment of final validation. Tests with the full chain from detector to DAQ have been performed at LNL under the supervision of the Valencia team. A major milestone was achieved in a measurement with a high quality detector connected to the full phase 2 electronic chain. We confirm that the resolutions are within specifications. The GTS implementation is nearly completed. Petalinux was embedded in the board as well as the EPIC service in collaboration with GANIL. The register server has been delivered by LNL and embedded by Valencia. The PACE board is now connected to the AGATA electronic network. The GTS/PLL alignment remains the only hardware verification to be done. Full data readout was performed and analyzed by IP2I Lyon. Minor corrections are needed. STARE is ready to be produced. A last verification of the cooling part with the full mechanics needs to be validated. A task force of the FEBEE WG is meeting every 2 weeks by zoom to scrutinize the progresses. The final dead line is end of March before the main developer leaves the collaboration.

- The AGATA phase 2 software team is making regular progress on the data flow and performs burning test by pushing the emulator to beyond the specification. Great progresses made. The main package was already integrated into the AGATA environment. The team has demonstrated that the PSA rate can be improved by several factor using innovative architecture of the data flow on modern computer. Basic bricks for the integration of V2 are ready. It is worth mentioning that the DAQ team requires several weeks of work to integrate, upgrade and test the DAQ box during the integration of V2. The AMB supports this view and will request in the second half of 2024 3 to 6 weeks of availability of the system to be coordinated with the beam time. This effort is mandatory to integrate the upgrade. Otherwise, one should wait for the 6 months break needed to shift to the 0° campaign.

The main points of vigilance for the next months are :

- Commissioning of the complete hardware electronic chain of Phase 2 and final internal review for full validation prior to mass production. Mass production will be validated if :
    - Resolution of core according to specification (done)
    - Resolution of segment according to specification (done)
    - Full adf event analyzed by PSA (90%)
    - GTS alignment validated (90%)
- J. Collado (IFIC) who is leading the PACE board development will leave the collaboration in March 2024.
- Neutron damage : the report given by the Performance team during the AGATA week warned the AMB on the present resolution of the array even after the neutron damage correction is applied. The plot below shows the evolution and a major step is observed after the use of the heavy beam for long period delivered by the Piave-Alpi complex. The AMB follows carefully the situation. A longer source run was performed on March to investigate more the limits of the present neutron damage correction algorithms. 6 capsules are already being annealed by MIRION in 2024 and more to come. There is no feedback presently for an AGATA or GRETINA like capsule after several annealing in term of loss of performances. The AMB is in particular investigating a possible strict criterion to help in the decision.



FWHM resolution at 1.3 MeV for the encapsulated detector 00C since the beginning of the AGATA phase II campaign at LNL. The core energy resolution worsened from 2.7 keV to 5.7 kev, while the sum of segments deteriorated from 2.7 keV to 17.9 keV. Note: the measurements were performed by using 6 μs of trapezoidal-filter risetime (May-Oct 2022 and Feb 2023 and Nov 2023) and 2.5 μs of trapezoidal-filter risetime (Nov 2022-Dec 2023).

The resource Manager report is attached to the present document. The detailed Product Breakdown Structure of the phase 2 electronic production was done and available funds identified in the collaboration. See the report.

LNL Status (J.J. Valiente-Dobon)

The box below shows the status of the experiments approved at LNL.

PAC@LNL 21-23 February 2022

28 proposals submitted
- **10** (+3 commissioning) priority A
- **5** priority B

PAC@LNL 05-06 December 2022

24 proposals submitted
- **6** priority A
- **10** priority B

PAC@LNL 10-11-12 July 2023

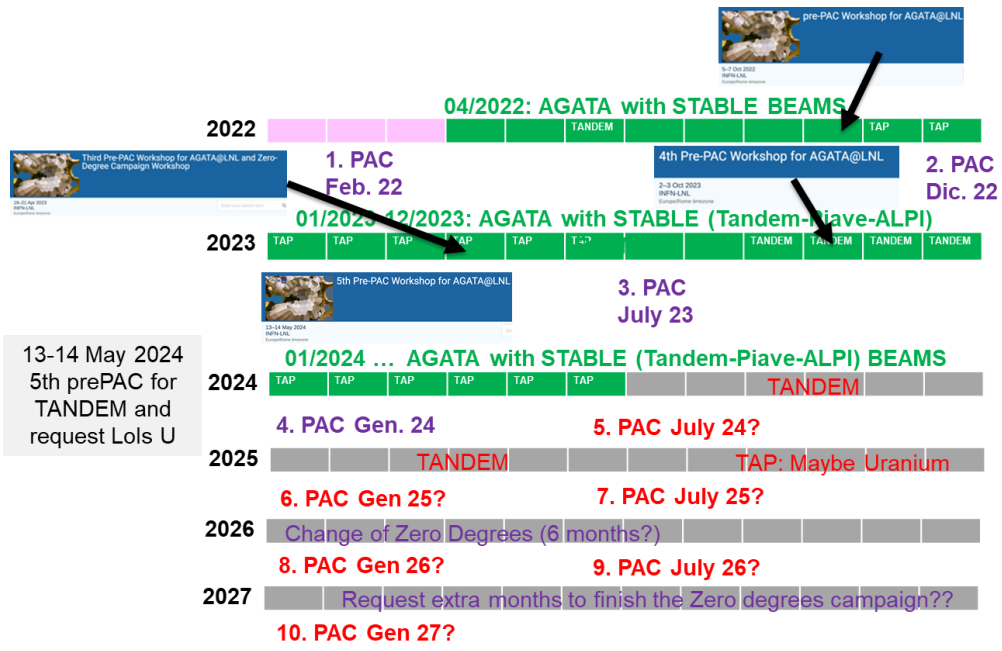
15 proposals submitted
Tandem only beams:
- **8** approved priority A
- **3** approved priority B

PAC@LNL January 2024

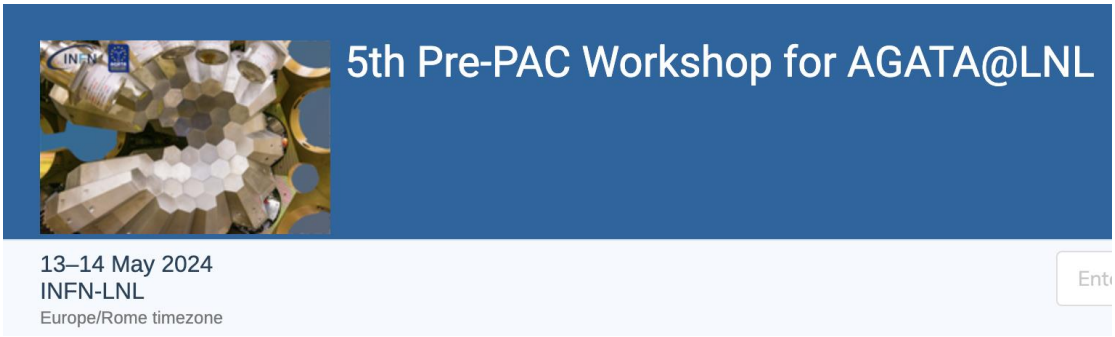
TAP beams:
18 proposals submitted
- **7** priority A
- **5** priority B

26 + 3 experiments performed

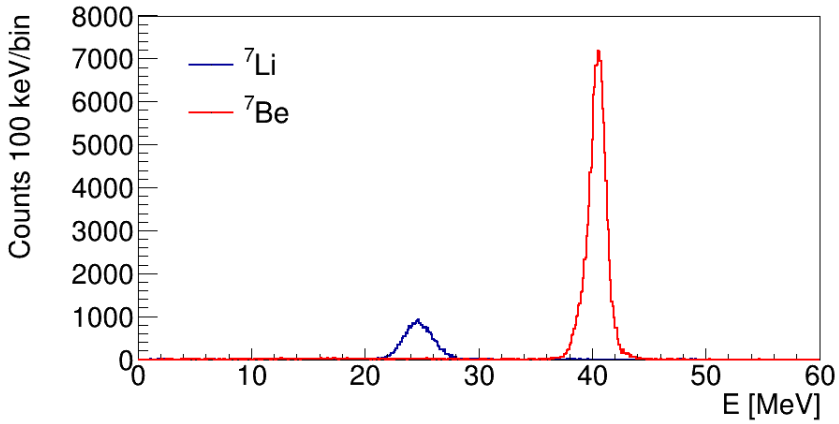
April 2022-June 2023: 22 experiments – 9 months of beam time for AGATA - 80% beam time (without beam preparation); October-December 2023: 7 experiments scheduled - 90% TAP beam time (without beam preparation) → 7 performed + 2 beam tests EXOTIC. The present view with uncertainties on the LNL campaign is summarized below.



The 5th PrePAC workshop has been announced. https://agenda.infn.it/event/39886/



First experimental run with EXOTIC after nearly 4 years.



- Beam: $^{7}Li^{3+}$, 48 MeV, 1-35 pnA
- Target: $^{1}H_2$, 1 bar, -184° C
- RIB: $^{7}Be^{4+}$, ~42 MeV

1. October 28-29, 2023: in-beam test of the remote control systems of the magnets and of the slits, production of a ^{7}Be radioactive ion beam after nearly four years of inactivity;
2. December 1-2, 2023: in-beam test of the performance of the first MCP (efficiency and position resolution);

Two additional two-day commissioning runs will be needed in 2024

3. Summer 2024: in-beam test of the two MCPs and of the event-by-event tracking algorithm for the beam particles.
4. Autumn 2024: first test up to the AGATA reaction chamber in real experimental conditions.

In case of successful commissioning, we should be able to accept proposals for experiments with secondary beams delivered by EXOTIC in the PAC meeting of December(?) 2024.

Infrastructure at LNL

No major problem or accidental detector warmup
Identified issues and adopted solutions
Low opening thresholds of cryostat venting/overpressure valves
Venting valves closed by plastic ties. New calibrated valves available. Installation TBD

Fragile sealing of level capacitor feedthroughs
Leaking LN2: unresolved problem

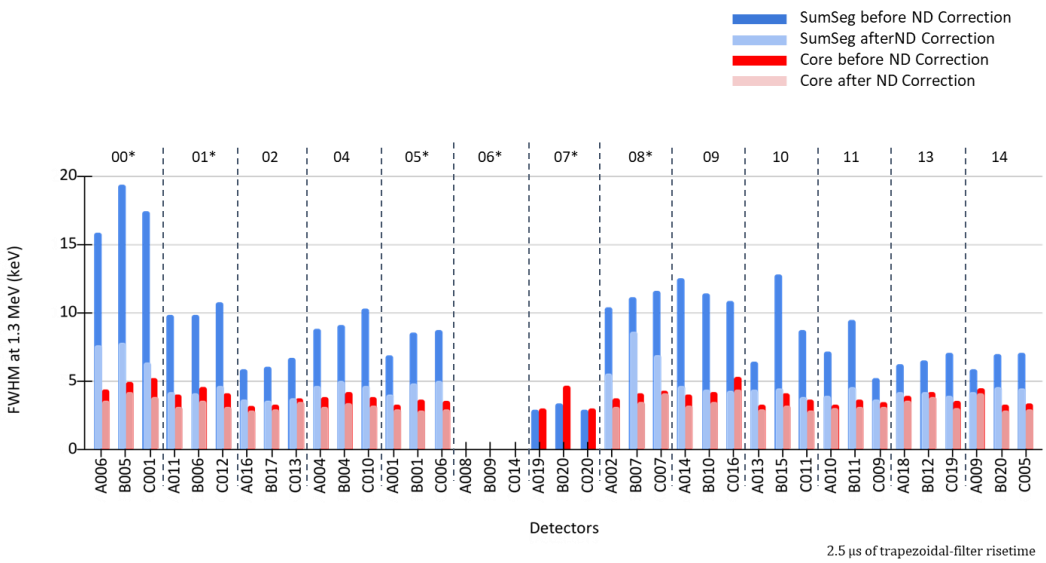
Very thin bayonet O-ring
New peek adapter with additional O-ring installed on most detectors

Rigid metallic hoses
Fixture holding bayonet and metallic hose in place

Humidity
Additional isolation around the bayonets and improved air circulation

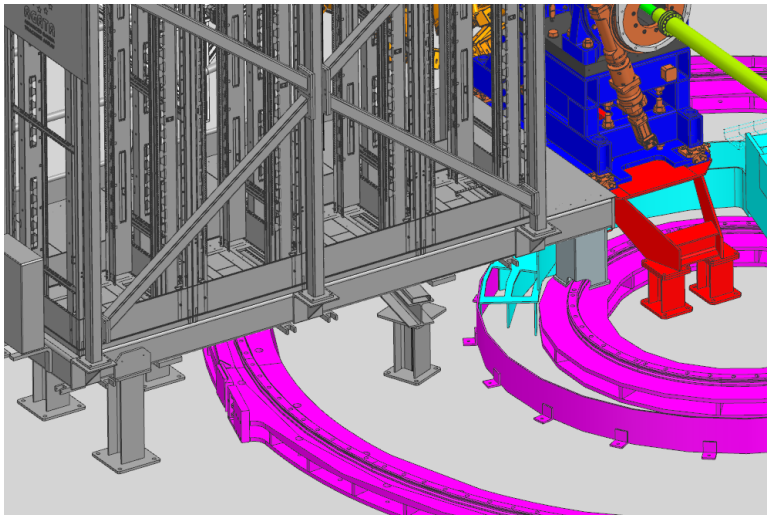
Detector survey. (February 2024) at LNL

Change of 2 clusters for better resolution. 2 ready in hall2 to replace the next 2 bad (to be confirmed withing AMB after careful re-analysis of the neutron damage calibration). See detector reports and summary below.



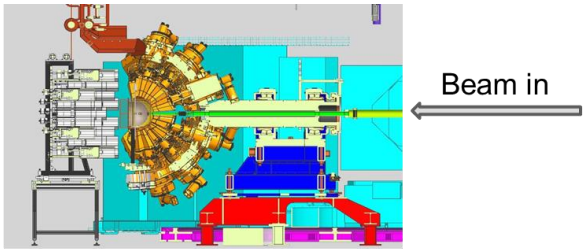
LN2 distribution system at the zero-degrees position under study.

New support structure for the platform holding the electronics with low profile cable trays underneath the platform. No changes to the platform with the service racks (LN2 control, HV and electronics for ancillary detectors. Unchanged detectors - racks relative position same MDR and LVPS cable length/routing. No problems with optical fibers (manhole just behind the racks).



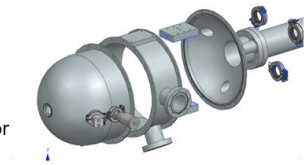
Several mechanical upgrade on the holding structure, etc...

- AGATA fixed postion
- Beam line goes through the shafts and is connected to the shell of the chamber
- Beamline diameter 55 mm, narrowing down to 33.4 mm at chamber entrance
- Telescopic movement of the beamline to change detectors-target distance working in high-efficiency configuration
- continuous range from 0 to - 55 mm

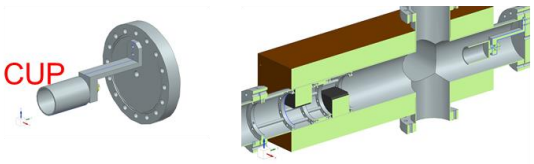


- MULTI-PURPOSE CHAMBER
- 2 mm Al; 170 mm radius; Flattening towards the 90 deg ring (outside AGATA view)
- Inserts with blind holes for ancillary detectors holding structures
- NB: ancillaries will need to be moved towards target positior

==> specific chambers for SUGAR (gas-jet target) and GRIT



- DOWNSTREAM AND BEAMDUMP
- Limited space available ~ 3m
- Need to accommodate beamdump
- Beamline easily detached from scattering chamber
- Additional pumping units
- Shielding with 40mm Pb + W alloys



New position and new support for shaft+honeycomb designed and produced
Solutions for beamline – scattering chamber – beamdump are in advanced stage of design
==> mechanical/technical drawing in production
==> tendering and production first half of 2024

- Capability to host various ancillary detectors and new targets

==> Opportunities for new physics campaigns

- Discussion for integration PARIS and NEDA collaboration started
- Time required to complete the new configuration: 6 months
- Significant effort from the local group for the installation of a set of detectors, dedicated to specific physics cases, both for mechanical adaptation and

electronics coupling with the AGATA system, including ad hoc developments. Strong synergy with mech/elec WGs
- Given this experience, presumably simplified installation of detectors at zero-degree. If electronic v2 available for AGATA, version v1 back for (some) ancillaries?
- Introduction of new arrays, NEDA and PARIS, previously successfully used at GANIL via gts, TP (only NEDA).

Reprocessing at LNL

- Remarkable Work of the LNL Local Group — not only the nearline group — who successfully provided advanced analysis during the previous experiments
- Support Before the Experiment:
  - Vademecum (when the calendar is out):
    - Access to LNL, Responsibility Declaration, Shifts Explanation (experiment monitoring and data analysis), Google Doc (run list and online checks), Manual and Training offered to the external groups, Requests for People during the preparation, Data Transfer instructions, !!New!!Requests for Visits of students
  - !!New!!Email to the Spokesperson(s) (about 7-10 days before their experiment):
    - Reminder about the Vademecum, Stress the Request for People for the data analysis, Request for the Involvement of Who is Going to Analyse the Data (if any) and their willingness to take Responsibility for the data analysis
- Support During the Experiment:
  - Setting of the Experiment Folders and Configuration Files for the data analysis
  - Setting of the Data Analysis Scripts (simplified to 2 commands) and the Local Machines
  - AGATA ready and calibrated by the AGATA group (formally, not the nearline group, practically, many people involved in both groups)
  - PRISMA and Ancillary Analysis set and Performed in case of absence of external help
- Strong connection with the Software Development
- The software for the nearline analysis is the same as the one used for the offline analysis
- The Selector used at LNL for AGATA has been Developed By F. Angelini, M. Balogh, D. Brugnara, A. Goasduff, E. Pilotto, M. Sedlak, L. Zago, with D. Brugnara as the main developer
- Updates on the Simulations used for the analysis:
- Added OSCAR, SAURON, CTADIR
- Femul is Maintained by the local group:
- Added OSCAR, SAURON
- Bugs on the Tree Builder of PRISMA fixed
- Selector:
- Fast and Updated for all the detectors,
- Reproducibility — the nearline analysis can be reproduced offline
- Issues for the Nearline Analysis:

- Most of the work is done by the local group and it continues to be difficult to involve the external experimental groups and the other members of the AGATA collaboration in the data analysis
- It is very expensive for the local group to handle experiments in which the configuration is changed very often, this should be taken into account by the spokespersons, who should try to ask for detailed analysis when the setting parameters seem okay

Electronic at LNL

- Issue with high-fold experiments (e.g. Costel's experiment) TP condition has to be very well thought and it should be clear to the community that (1p channel and g-g) is not a selective trigger in such experiments.
- New V2 electronics
    - Temporary installation of the C6400 servers in sala VAX (up to 4 2U-servers -> 16 snodes, keeping the actual number of GGPs)
    - Need of switches for the data network of the V2 (4 links 100Gbps already installed between VAX and exp. Hall)
- GALILEO V1 electronics back to ancillary when V2 ready:
    - Participation to the trigger decision based on the individual channel
    - More convenient for high rates experiments (F-E) with EUCLIDES

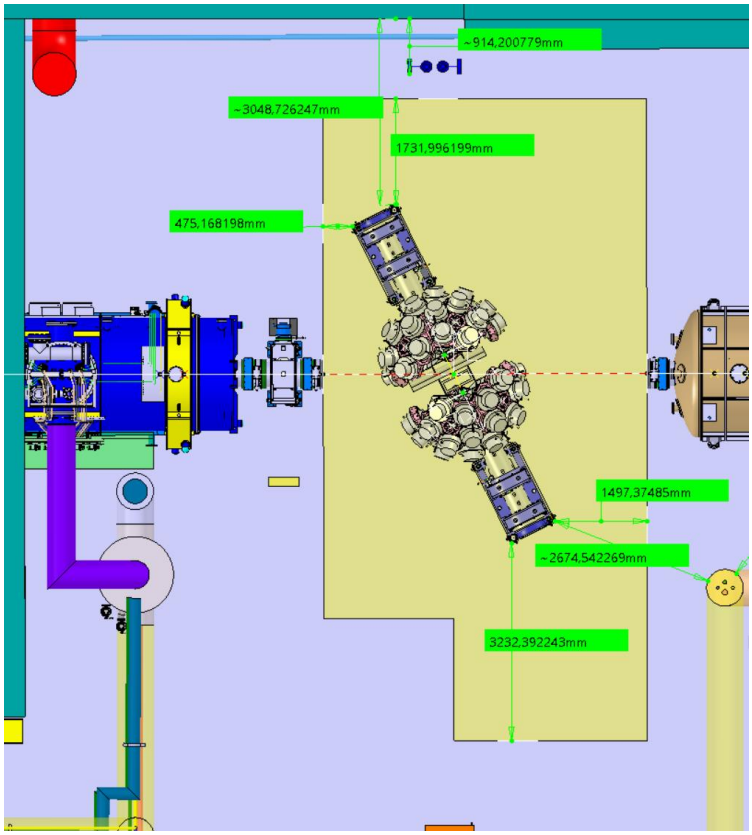
Perspective for the 0° campaign :

- NEDA: NUMEXO2
    - Integration of the NUMEXO2 in XDAQ: avoiding three DAQ systems
    - NEDA servers in VAX connected with the AGATA MPO fibers
    - Online conversion of the MFM to ADF.
- PARIS: CAEN Digitizers
    - Similar to the solution used so far, no participation to the TP

- 54 NEDA
- 55 E-DE telescopes of EUCLIDES (using the DE to generate the trigger request)
- 27 ATC
- 190 individual trigger requests to be distributed in three partitions, still feasible with the EXOGAM2 TP. We will need to check how the GGPs with the EUCLIDES firmware deals with the channel IDs.

GSI Status (K. Wimmer)

The present activity is to maintain a contact inside the LEB cave and in particular the integration work.



AGATA at Low-Energy-Branch

The yellow area is the installation space with integrated AGATA setup. This is space is reserved for experiment equipment only. The area was defined along time ago, some flexibility is possible. Note that AGATA is half open here (~350 mm) and the rotation of the two sides is not aligned.

To foster the visibility of AGATA at GSI, it was proposed to organize one of the next AGATA weeks.

REPORTS FROM THE WORKING GROUPS

Detector Capsules: Status Deliveries and Acceptance (H. Hess)

Status of the detectors:

12 ATCs are presently installed (01-02-03-09-10-11-14-15-17-18-19-20) in the array
5 ATCs in the laboratory (ATC: 07-13-21-6-12) - February 2024:

- ATC 21 is the new one now will be used for test the new digitizer
- ATC 7 repaired and available
- ATC 13 repaired and availabe
- ATC 6 and ATC 12 removed for neutron damage capsule (annealing)

The rework on the DEGAS cluster has re-started. CTT is currently working on ATC21 at IKP and on the conversion of the last Doubler Cluster in triple.

Activities on Detector Capsules

A021: FAT for the new capsule (owner UK) by IPHC Strasbourg
Delivered to Cologne on 29th January
All resolution for the core and the 36 segments at low and high energy within specification. Average resolution of the segments at high energy 2.14 keV due to new assembled test-cryostat. In a previous measurement, with detector mounted in another test-cryostat an average resolution of 2.04 was achieved. Efficiency 83.4 %.

B008: FAT after repair due to leakage current by IPHC Strasbourg.
Delivered to Cologne on 29th January
All resolution for the core and the 36 segments at low and high energy within specification. Average resolution of the segments at high energy 1.98 keV. Efficiency 79.8 %.

Allocation of the detectors: 65 detectors available within the AGATA community
INFN Legnaro: At the moment 45 detectors are mounted in 15 ATCs on site.
Saclay: None
Liverpool: None
IPHC Strasbourg: 2 detectors

- A005 mounted in the Salamanca TC, scanning ongoing
- C004 waiting for transport to Cologne

Salamanca:
1 detector

- B003 mounted in the IPHC TC, will be delivered to Salamanca in week 44 for scanning

IKP Cologne: 17 (+3) detectors

- A012, A015
- B002, B008, B013,
- C002, C008, C022
- S001, S002, S003
- A021, B022, C017 mounted in ATC22
- A006, A008, B005, B009, C001, C014 will be transported to Mirion for annealing in week 11

MIRION : none
Open Orders: 12 detectors

- 1 x Owner (Spain) delivery expected July 24
- 4 x Owner (Italy)
- 1 x Owner (UK) delivery expected April/May
- 3 x Owner (France) delivery expected April 24
- 3 x Owner (GSI) must be delivered within 24

Cluster Assembly and Maintenance
Cologne & CTT:
DEGAS TC: assembled with A501, B501 & C501
Except one slightly degraded core resolution caused by an electronic problem (bad FET or other electronic problem in the cold part) the resolution of all three detectors are within specification. In particularly, no degradation on any segment resolution due to crystal problems are detectable. Resolution of the cores: A501 = 1.28/2.36 keV; B501 = 1.98/3.50 keV and C501 = 1.31/2.43 keV. All segments at low energy are between 0.90 keV and 1.15 keV with an average value of 1.02 keV (A501), 1.02 keV (B501) and 1.06 keV (C501). The cold preamplifier of detector B was replaced by a new one, tests are ongoing

ATC22 (serial number 10092, owner INFN): hardware and electronics delivered to Cologne on 30 th of May assembled with A021, B022 & C017 tests ongoing

ATC23 (serial number 10092, owner INFN): hardware and electronics delivered to Cologne on the 30th May,assembled and tested with electronic test device annealing started detectors will be mounted soon

ATC16 (conversion of ADC03): hardware and electronics delivered to Cologne in February 24 assembled and tested with electronic test device

Legnaro:
Status Array & repairs:12 ATCs mounted in the frame
5 ATCs in the lab:ATC07: short connection between low voltage and ground on the warm preamplifier board due to corrosion, preamplifier board was replaced in December (INFN, GSI & IKP) repaired and available

ATC13: oscillations induced by PT100 grounding was reworked in December (INFN, GSI & IKP) cryostat repaired and available
ATC21: one segment missing, used for test of the new digitizers
ATC06: removed from the frame in December capsules dismounted due to neutron damage capsules transported to Cologne, will be transported to Mirrion in week 11 for annealing cryostat annealed
ATC12: removed from the frame in February capsules dismounted due to neutron damage capsules transported to Cologne, will be transported to Mirrion in week 11 for annealing

Infrastructure and Mechanics (B . Million)

-DSS :
Most of the activity is related to maintenance activities and preparation to the extension of the array.

LVPS

- Delivered 2 new LVPS system: December 2023. Some issues with the Profibus connector
- Replaced EPICS IOC, updated PLC code and GUI for tank valve and LVPS management by colleagues from Saclay (Arnaud ROGER and Stéphane TZVETKOV @ LNL)
- A third group has been ordered to cover the 2π needs

Cables

- Few damaged LV cables. Spares available

Detectors

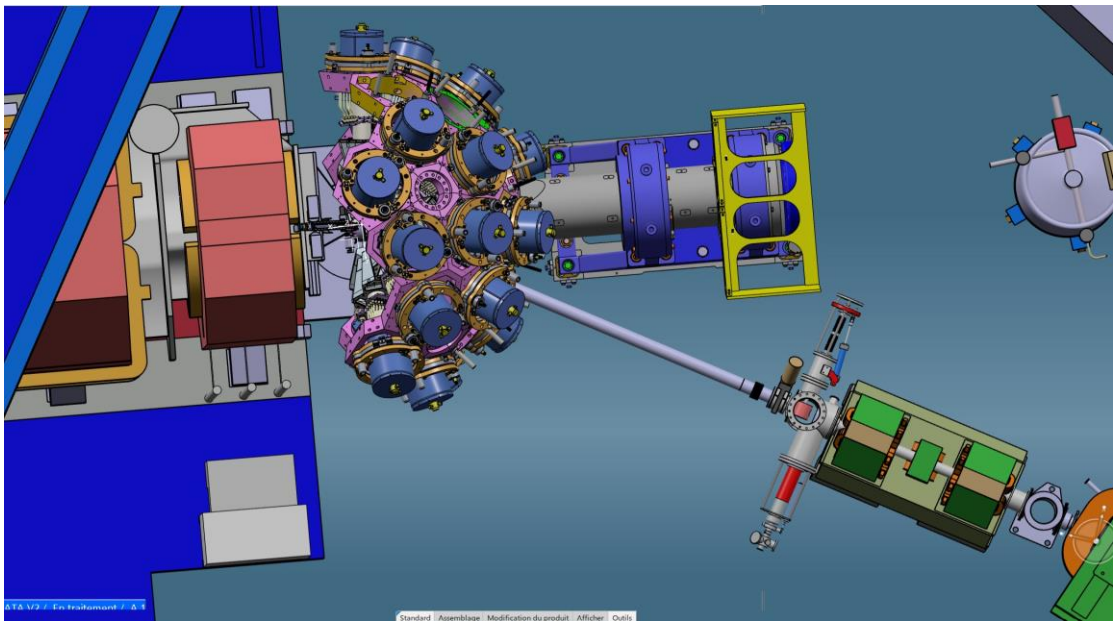
- Installed several fans to improve air circulation: reduced condensation of humid air on cold detector surfaces and lower electronics working temperature

EM tests

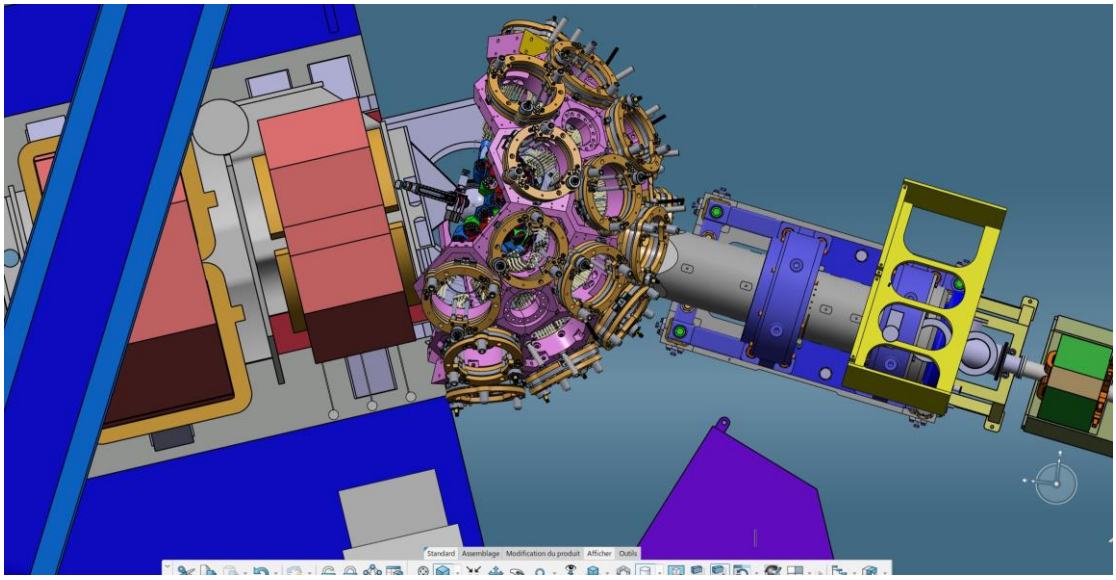
- Unfortunately, no real issue for the switch off the detectors was found by the on-site measurement.
- Slow noise base line segments
- Report by R.P. and N.K.

It is anticipated to update the Host Lab requirement to cover the infrastructure using the V2 system.

- **Mechanics:** Presently few exchanges with the GANIL team to anticipate the integration work in case AGATA returns to GANIL by the end of the decade. The 28° configuration for fission runs and a 0° configuration for a GRIT-SPIRAL1 run have been studied. No problem so far was reported.



28° configuration at GANIL



AGATA 0° configuration at GANIL for GRIT/MUGAST

- DataBase activity:
Nothing to report.

Front End Electronics (A. Gadea)

Report of the Electronics W.G. for the January 29th, 2024 AMB meeting

Coordination: last Electronics W.G. VC February 6th 2024, next Electronics W.G. VC meeting on Tuesday March 5th 2024 at 10:00 CET, 9:00 U.K.
Intermediate AGATA Electronics Production decision meeting February 19th 2024

Status at LNL (A.Goasduff, E. Clement, A.Gadea et al.):

Digitizer Heat Exchanger Issue

Found leaks or condensation in two other digitizers, damaging boards. Required new segments cards to replace the ones damaged, 3 new water damaged and one for which half of the channels are not stable. Finally, 8 DIGIOPT12 Segment boards V3.6, SN/ AGT22S63, AGT23S06 to AGT23S12, sent to LNL to replace damaged DIGIOPT12 phase 1 boards. For the replacement of the used boards GSI has proceed to make an order on O.C. funds for 9 Digiopt12 boards: 1 core + 3 segment boards v3.6 (adapted to v3.6.1) and 5 segment boards v3.7.0.

Late November it was discussed the issue of the heat exchangers, suffering of corrosion due to the circulating water, and it was decided to replace them. After discussions it was decided that the body of the heat exchangers can be produced at INFN-Padova and the pipes, mounting and Alodine treatment were responsibility of IFIC and ETSE Valencia. Heat exchangers were produced before Christmas, mounted after Christmas. Processed with Alodyne 1200S anti-corrosion treatment in January, completed and commissioned the first week of February and sent to LNL on 7th of February. All Digitisers have now mounted and tested the new heat exchanger mounted by our Padova and LNL colleagues.

From the 37 installed Digitizers, 35 are available for measurements. 2 Power backplanes seems to have issues and we are checking if we have some spares at ETSE-Valencia, if so they will be sent to LNL as early as possible.

Chiller procurement: In order to avoid issues with uncontrolled composition of the cooling water, It was proposed to use a secondary circuit for the electronics, making use of a chiller with a circulating pump. Redundancy was required and we now have the quotation with a costs of about 29 k€ if a full redundancy (2 chillers) is required. We are presently discussing with the company to optimize the redundancy.

New EXOGAM NIM GTS carriers production: The decision to produce GTS NIM carriers (hosting more GTS mezzanines that the VME ones), was taken on view of the extension of the electronics including Phase 2 systems. E.Clement reported that the first GTS carrier NIM module received at GANIL, early February, to be tested and if working the mass production will be launched. The connectors are hard to buy so GANIL team have bought all those available in France. This will therefore be the last batch.

Trigger Processor status : The experimental campaign will resume on the 22nd of February. Most of the experiments will be with PRISMA-AGATA. As long as possible, we will keep using the old TP. During the second experiment A.Gosduff will again perform a test with the EXOGAM2 TP to check that the modifications made in

the setup phase have improved the situation compared to the last campaigns. The old TP is also at its limits, and we are not able to add more ATCs so having a fully functional EXOGAM2 TP will become critical very soon. Regarding the EXOGAM2 TP E.Clement reported that he, A.Gadea, A.Goasduff and A.Boujrad and S.Coudert (GANIL engineers) performed extensive tests in LNL. The designer of the firmware left GANIL and went to industry so the code needs to be investigated by the present GANIL Engineers. Some of the problems found by A.Goasduff, can be reproduced-loss of efficiency has been reproduced and improved. TP seems to validate additional TRs, but not losing any that should have been validated. So it only collects extra data. There is an analysis window which seems to cause a deadtime (outside specifications) more investigation is needed. E.Clement has prepared a full report of the LNL TP visit including actions.

GGP maintenance : The maintenance on the GGPs was done, over the 36 operational we have found 7 with damaged MOLEX connectors on the DC/DC-GGP connection. Generally on the 5V connection. Connectors were replaced with Au-platted ones.

DIGIOPT12 (A.Pullia, S.Capra):
Discussion of the new Digiopt12 V3.7 ENOB results emailed by A. Goasduff. Calculated the average of the new Digiopt12 is on average ENOB 0.1 bits lower than the old ones (old boards between 11.4 and 11.5 ENOB). By excluding the one faulty channel (ch 2), the average of old and new card ENOB is the same. The card can be swapped out and repaired in Milan.

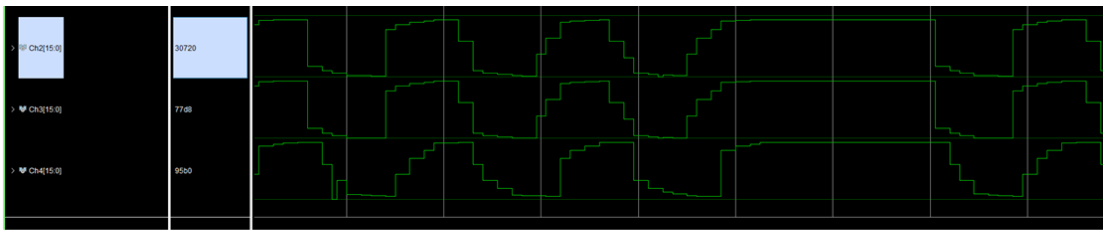
A.Pullia mentioned that the new ADC has no external reference like the phase 1 DIGIOP12 cards; a new op-amp could be swapped in a small upgrade if needed to improve by about 0.1 ENOB. Suggesting also investigating the offset values.

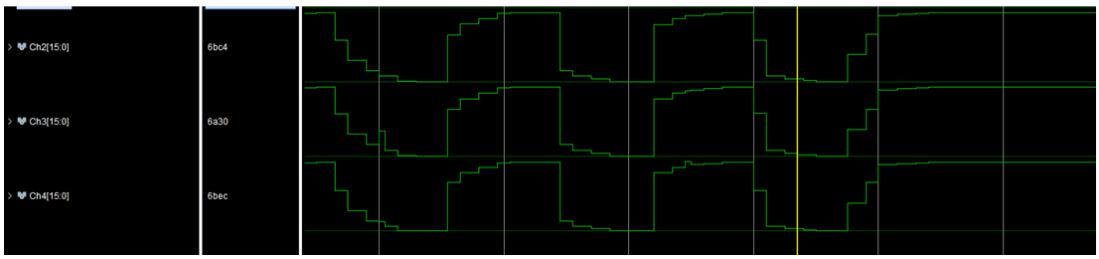
Once understood the problem and that is easily solvable, we have given EOS the ok to complete the production.

PACE Status (J.Collado)
Test Requested before production:
1) Resolution: the test is completed. The resolution with a pulser is of the order or 4 per 10.000 at the amplitude equivalent to 1 MeV signal from the preamplifier. Also with detectors in the setup, resolution compatible with Phase 1 measurements.

Peak	Bin	FWHM	Voltage	Rel Error	ENOB
1	19315	7,79	321.9 ± 0.12 mV	0,04%	11,8

2) ADC Alignment and data processing test: Alignment working as shown in the following figures of three channels from different boards before and after alignment. The signal displayed is the alignment pattern



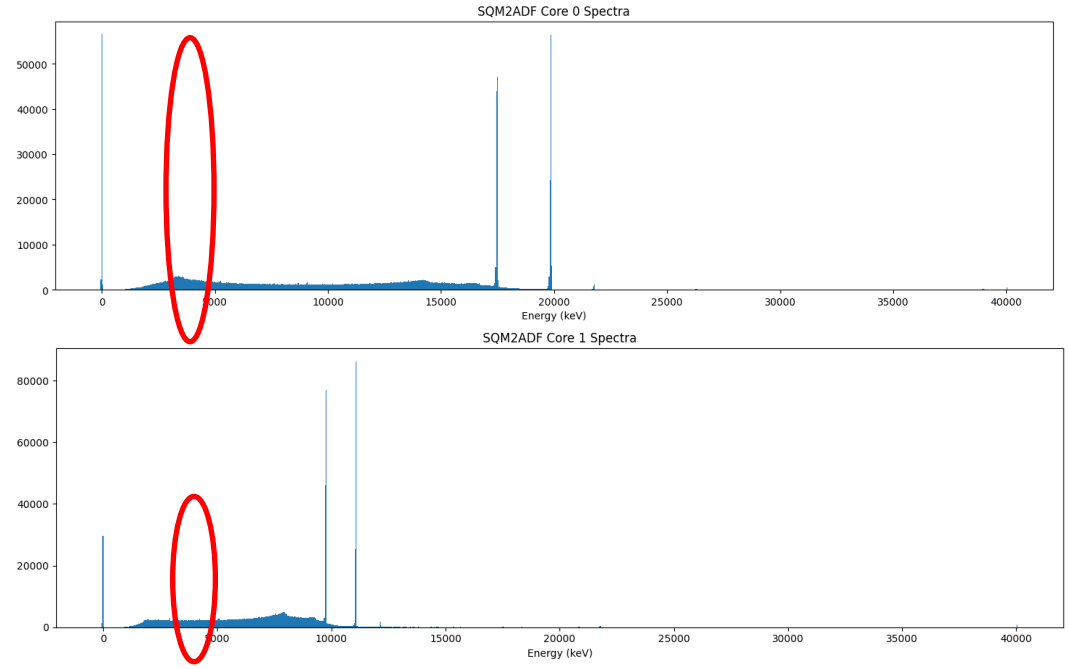


Regarding the data analysis, observed issues with data:

-Problem due to a failure of transferring data to STARE due to unforeseen cyclic unavailability of the Aurora link from time to time. Nevertheless, even if all ADF frames are now valid and signals are starting to appear for cores. Guillaume Baulieu from IP2I Lyon is following the data integrity analysis

Remaining issues:

- the energies from odd segments
- the traces from segments
- the first bins from cores signals histogram (counts in the 0 channel)
- the differences between high gain and low gain energy histograms
- the missing counts at low energy in the core histograms



J.Collado has analysed the issues and some of them come from misalignment the transfer of the data from the different buffers to the ADF buffer. The data copy is done in 64 bits blocks. New run to be created and analysed .

3) Full GTS testing,

GTS- Ethernet now seen by Petalinux.

Regarding the GTS operation from PACE- Tests not complete. Progress so far:

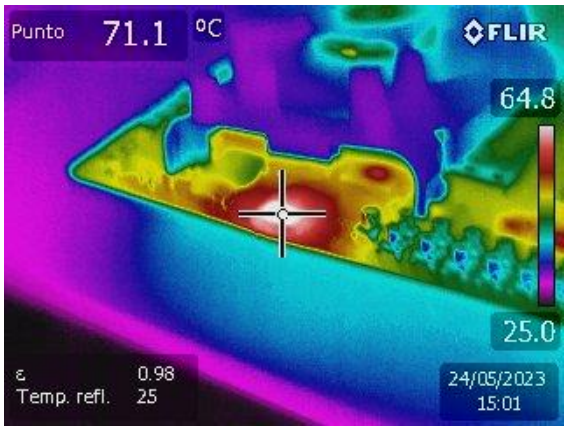
a. PLL and delays can be operated from software and all operations necessary for GTS clock alignment can be performed as standalone actions.
b. PACE can connect to GTS tree and see messages in the FPGA, the GTS clock system is aware that the PACE is not aligned.
c. Register server implemented with correct register names (access over IP bus)
d. EPICS server not connected or tested because the PACE ethernet link will not establish an SSH link (ping works OK so the link is alive). SSH is needed for debug and remote access.

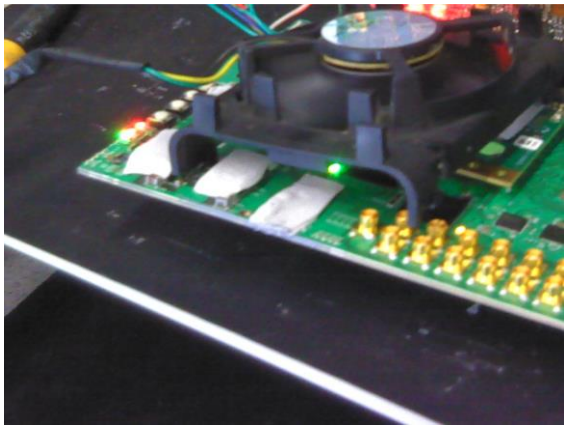
GTS alignment not yet tested. GTS validate/reject with TP not yet tested. Next steps are to bypass the SSH and test the GTS using EPICS without debug or remote access. This needs both J.Collado and A.Goasduff to work together. Also need to fix the missing SSH connection with Petalinux. J.Collado believes that the hardware is OK and the problem comes from the software/firmware.

STARE Status (N.Karkour, X.Lafay)
Waiting for the integration tests. Focussing on a new development for full test system for topology manager and to simulate multiple crystals with multiple STARE cards. Planning ways to improve the monitoring when going beyond 39 crystals.

EMC report is under preparation.

PSU and Mechanics: (V.Gonzalez, J.Collado)
Mechanical item production ongoing. PACE cooling plate might require modification depending on the thermal tests being done





PSU ready for production but waiting to complete the integration tests, just in case there was any modification to be done.
Power backplane 50 units ready.
The signal backplane has been modified again and a new preproduction run will be done before the full production. This week order for the pre-production run will be done.

Software, STARE Firmware and Slow Control (N.Dosme)

No progress on Slow Control since last report.

Work is paused. RUDP was considered good for small packets, but now with 8k packets sending a full AGATA event no losses have been found using UDP at 5 or 6Gbps rates. Lost packets can be identified. N.Dosme mention the development a lost packet monitor software. Concerns regarding packet loss rate going up in the full AGATA with consequent reduction in effective efficiency of AGATA.
N.Dosme has problems at higher rates but IGBps is limit of PSA- at this rate no packets are lost.
Further discussion needed on RUDP.

Ip2I has developed the counter for missing packets.

Orsay testbench will have 12 links, switches and routers between buildings to compute farm to make tests of lost packets. Waiting on delivery of fibre link for this.

Pointed out that the STARE has 10G links in order to permit a software trigger which needs 50kHz rate for all data. Transfer bandwidth is currently limited by PSA to much lower rates to few kHz.

N.Dosme worries that RUDP in case of higher error rates will exacerbate it by increasing network traffic.
Pretty sure there is no gain from using RUDP.
Evidence and further discussion needed

Production of phase 2 electronics:
In February 19th we reviewed the progress in the 3 areas remaining to be tested to see if production can now be safely started. The three areas are:

1) verification together with IP2I Lyon of ADF data, including PSA
2)GTS configuration, alignment and operation (including validation/reject by TP) using GTS code in PACE hardware
3)Hardware integration tests of power and cooling using final version of STARE (preseries) (includes operation of cards to transmit data to server to generate realistic thermal load).

Regarding the verification together with IP2I Lyon of ADF data from PACE, Guillaume Baulieu is performing the check of the data. We had no news since late January, but J.Collado noticed that the last data run was corrupted and no data can be found inside. A new version of the firmware has been created and J.Collado with A.Goasduff are producing a new data set.

GTS alignment not yet tested. GTS validate/reject with TP not yet tested. J.Collado believes that the hardware is OK and the problem comes from the software/firmware. News are expected for the next Electronics VC

Regarding the full integration of the pre-production STARE in the Mechanics, V.Gonzalez is waiting for new fibres to connect from the hardware to the 4 servers. Delivery scheduled early next week. Also waiting for thicker foam pads to take heat out of PACE. These will replace the stack of thinner pads in use now which are thought to be increasing thermal resistance at the joins/interfaces between the pads. If the new pads don't work then a fan will be needed for each PACE.
Test of the new STARE have shown that the new firmware connects but doesn't initialise the system. Action on X.Lafay to resolve the problem this week.

Production decisions:

We will investigate the cost and delays associated with starting the PACE PCB production in parallel with the final PACE tests to potentially save time in the production process but with the risk that tests might still result in PCB changes. Risk is currently believed to be low

STARE Production- all parts ready, but N.Karkour is still keen for full integration test to be completed before starting manufacturing.

DIGIOPT12 Segment digitiser tests ok (just one faulty channel to be repaired from a known issue) – segment production will start.

Next production discussion in the scheduled W.G. meeting on March 5th .

Personnel
J.Collado will stay till mid march.
We have scaled down the requirements for the new engineer to be contracted and including a more appealing work programme. We are distributing the call this week.

Status of the SMART development at GANIL (Gilles Wittwer)
Procurement of material has started. The goal is to get as soon as possible a SMART Tree running at GANIL.

Data Processing (O. Stézowski)

Page dedicated to current actions here

Phase 1 and commands:

- Test of the acquisition at 'high' rates (so called 5kHz topology)
  - Issue identified, first node to crash was the one with the lowest RAM memory
    - RAM to be ordered to reduce the problem and be able to run at 5kHz (see table later). Funded by GANIL OC.
    - Alignment to 64Gb for all nodes foreseen (see table, end of this report)
      - On HP machine, RAM to be transferred for old HP … on going
      - For Dell machine RAM to be bought by GANIL … on going
  - stop issues to be understood …reproduced @ Orsay, on site tests reported this week
  - New DCOD (+agapro in PEM) version installed at LNL (since 22/01/2024)

Anode	model	Crystal	Total RAM [GB]	Modele (with dmidecode)	TB bought
anode64	dell r730	00A	32	HMA81GR7MFR8N-UH	32 Gb
anode66	dell r730	00B	32	36JSZF51272PZ1G4G	32 Gb
anode57	hp dl180 g6	00C	20	36JSZF51272PZ1G4G	From Old
anode27	hp dl180 g6	01A	24	36JSZF51272PZ1G4G	From Old
anode29	hp dl180 g6	01B	24	36JSZF51272PZ1G4G	From Old
anode86	dell r720	01C	32	M393B1G70QH0-YK0	32 Gb
anode80	dell r740	02A	32	HMA81GR7AFR8N-VK	32 Gb
anode79	dell r740	02B	32	HMA81GR7AFR8N-VK	32 Gb
anode78	dell r740	02C	32	HMA81GR7AFR8N-VK	32 Gb
anode81	dell r720	04A	32	M393B1G70BH0-YK0	32 Gb
anode82	dell r720	04B	32	M393B1G70BH0-YK0	32 Gb
anode83	dell r730xd	04C	64	HMA82GR7MFR8N-UH	RIEN
anode71	dell r740	05A	32	HMA81GR7AFR8N-VK	32 Gb
anode90	supermicro	05B	64	HMA82GR7DJR8N-XN	RIEN
anode84		05C	64	HMA84GR7MFR4N-UH	RIEN
anode58	dell r730	07A	32	HMA81GR7MFR8N-UH	32 Gb
anode64	dell r730	07B	32	HMA81GR7MFR8N-UH	32 Gb
anode60	dell r730	07C	32	HMA81GR7MFR8N-UH	32 Gb
anode55	dell r730	08A	32	HMA41GR7MFR8N-TF	32 Gb
anode56	dell r730	08B	32	HMA41GR7MFR8N-TF	32 Gb
anode59	dell r730	08C	32	HMA81GR7MFR8N-UH	32 Gb
anode68	dell r730	09A	32	HMA81GR7MFR8N-UH	32 Gb
anode70	dell r740	09B	32	HMA81GR7AFR8N-VK	32 Gb
anode91	supermicro	09C	64	HMA82GR7DJR8N-XN	RIEN
anode62	dell r730	10A	32	HMA81GR7MFR8N-UH	32 Gb
anode63	dell r730	10B	32	HMA81GR7MFR8N-UH	32 Gb
anode93	supermicro	10C	64	HMA82GR7DJR8N-XN	RIEN
anode74	dell r740	11A	32	HMA81GR7AFR8N-VK	32 Gb
anode73	dell r740	11B	32	HMA81GR7AFR8N-VK	32 Gb

anode72	dell r740	11C	32	HMA81GR7AFR8N-VK	32 Gb
anode88	dell r720	13A	32	M393B1G70QH0-YK0	32 Gb
anode28	hp dl180 g6	13B	24	36JSZF51272PZ1G4G	From Old
anode89	dell r730xd	13C	64	HMA82GR7MFR8N-UH	RIEN
anode77	dell r740	14A	32	HMA81GR7AFR8N-VK	32 Gb
anode76	dell r740	14B	32	HMA81GR7AFR8N-VK	32 Gb
anode75	dell r740	14C	32	HMA81GR7AFR8N-VK	64 Gb

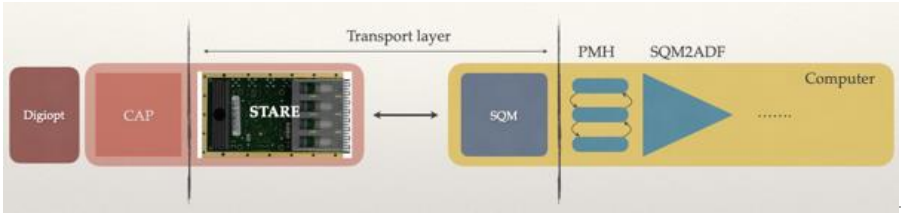
- OC = replacement of phase 0 &1
  - All commands done (see table) … all received
  - To be installed & benchmarked at Orsay first
- Core money, total to be invested in 2024-25 284keuros
  - 80keuros given by IN2P3 this autumn, in advanced with respect to the MOU
    - Split in 35k switches (1 switch about 24 STARE) / 45k nodes
  - 80-90keuros in 2024
  - 80-90keuros in 2025
  - In principle 50keuros transferred from GSI to Orsay…CEPH upgrade in 2024?

Current situation

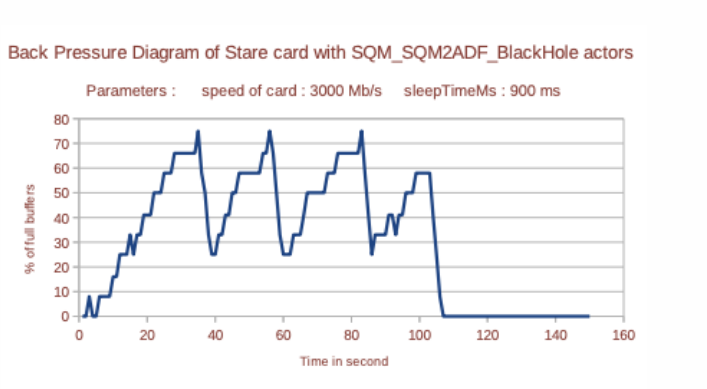
	What	Source	Ordering by /Reception by	Date Commande	Date Reception	Cost HT - euros	Cost TTC - euros
	Computing nodes new electronics	**CORE_MOU_P2**	IJCLab/IJCLab	11/23		**45 408.86**	54 610.63
	10 Switches V2 Electronic	**CORE_MOU_P2**	IJCLab/IJCLab	11/23		**34554**	
ok	**Replacement knodes by Appolo2000** Service machines	**OC_MOU_P2**	IPHC/IJCLab	12/23	28/11/2023 Orsay	**17761.16**	*21313.39*
ok	**Replacement 5 anodes phase 0**	**OC_MOU_P2**	IPHC/IJCLab	11/23	28/11/2023 Orsay	**13666.75**	*16400.10*
ok	**Replacement switches**	**OC_MOU_P2**	IPHC/IJCLab	11/11/2023	28/11/2023 Orsay	**18692.55**	*22431.06*

Phase 2 developments :

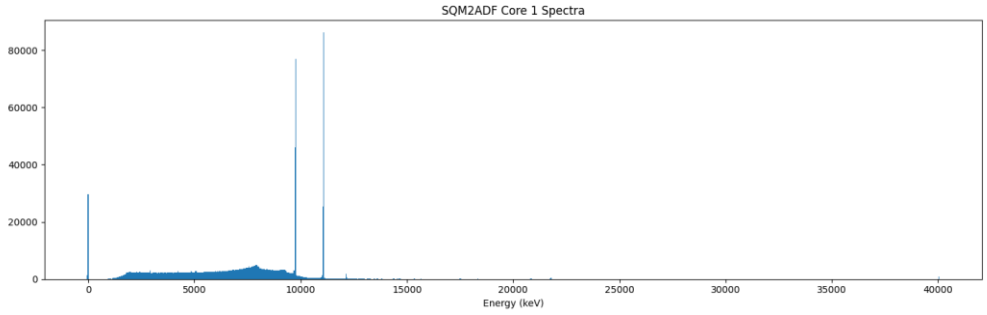
- V2 electronic data pipeline

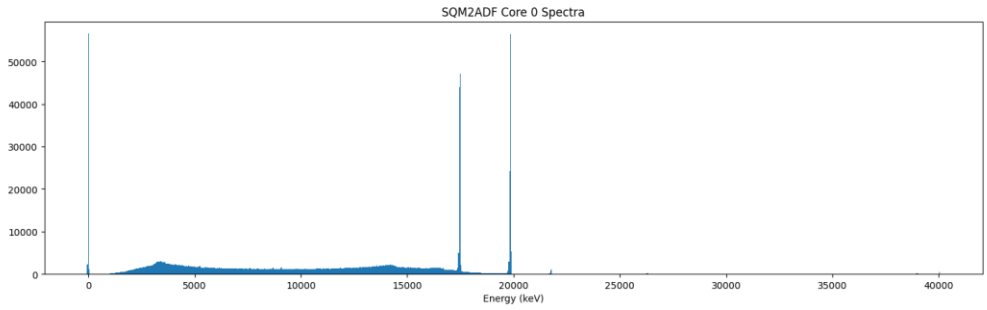


  - On going tests at Orsay with the ADF emulator internal to STARE
    - Few improvements in SQM
    - 5Gb/s run without issues
    - Backpressure software management, development still ongoing



- Data produced by Javier with real detector
  - In December Standard adf data stream partially validated
  - Some issues reported (identical Timestamp, back in time, overlapping adf frames …) to Javier beginning of December
    - Debugged 17th January (tricky bug)
  - New data set checked with about 2 000 000 standard adf events

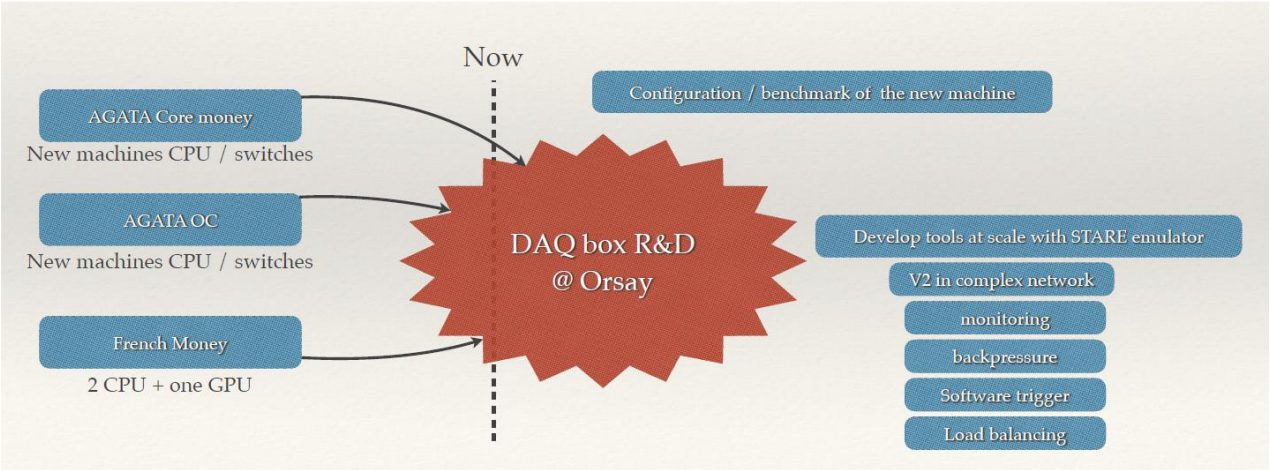




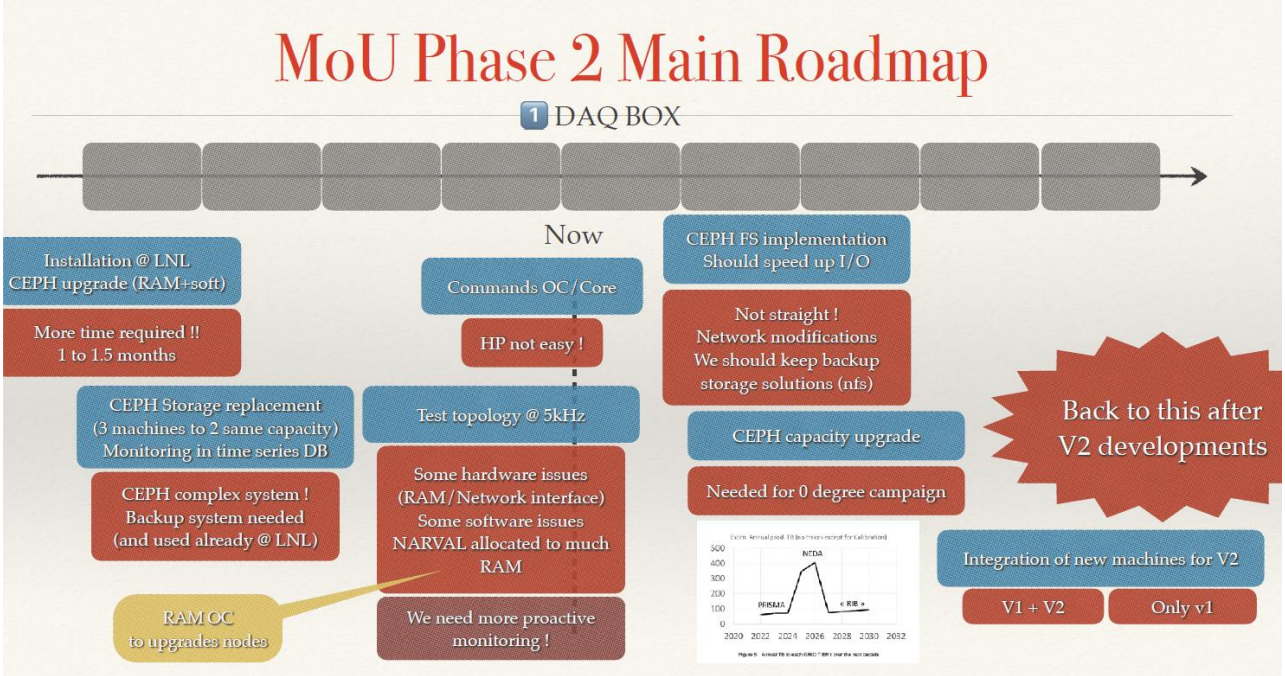
  - Brief report on what seems still not validated
    - Energy spectra for uneven segments …
    - Segments signals … related to alignment procedure not done?
    - Quantitative measurements to be done
    - …
- Slow control software to be installed at LNL in the coming weeks

- Other Phase2 related developments:

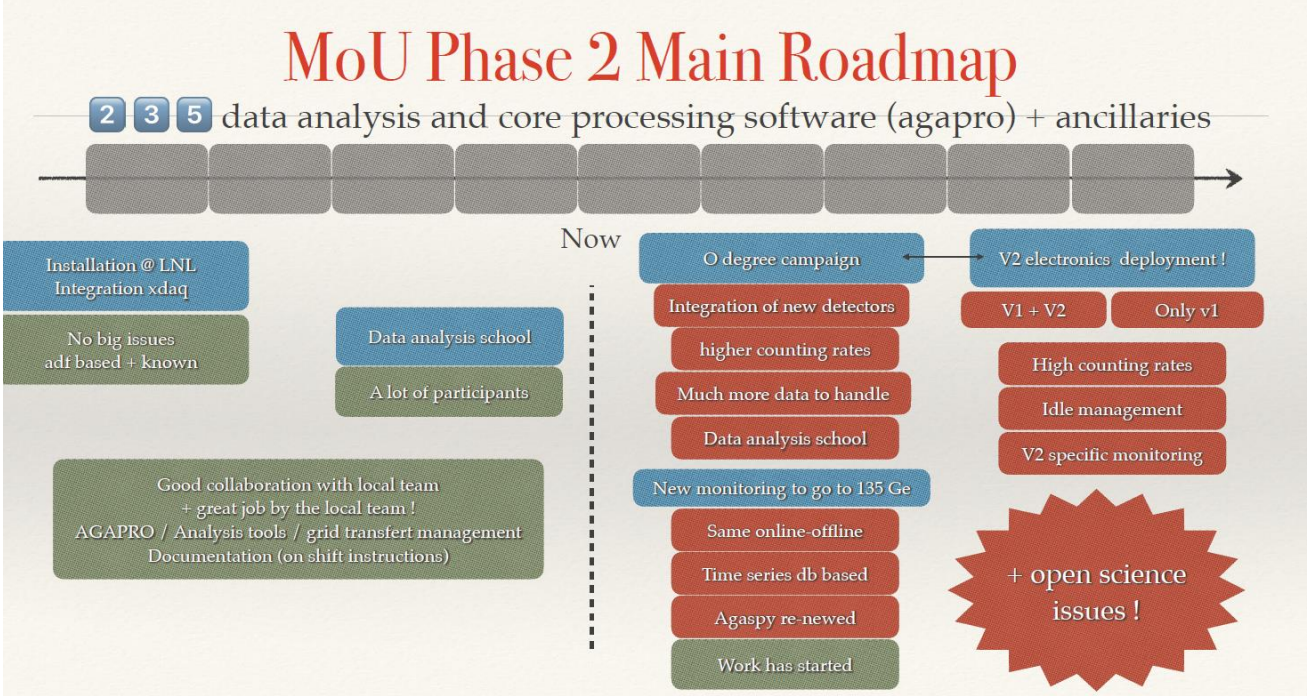
Mini R&D DAQ Box @ Orsay : Cluster is growing with switches and recently bought machines.



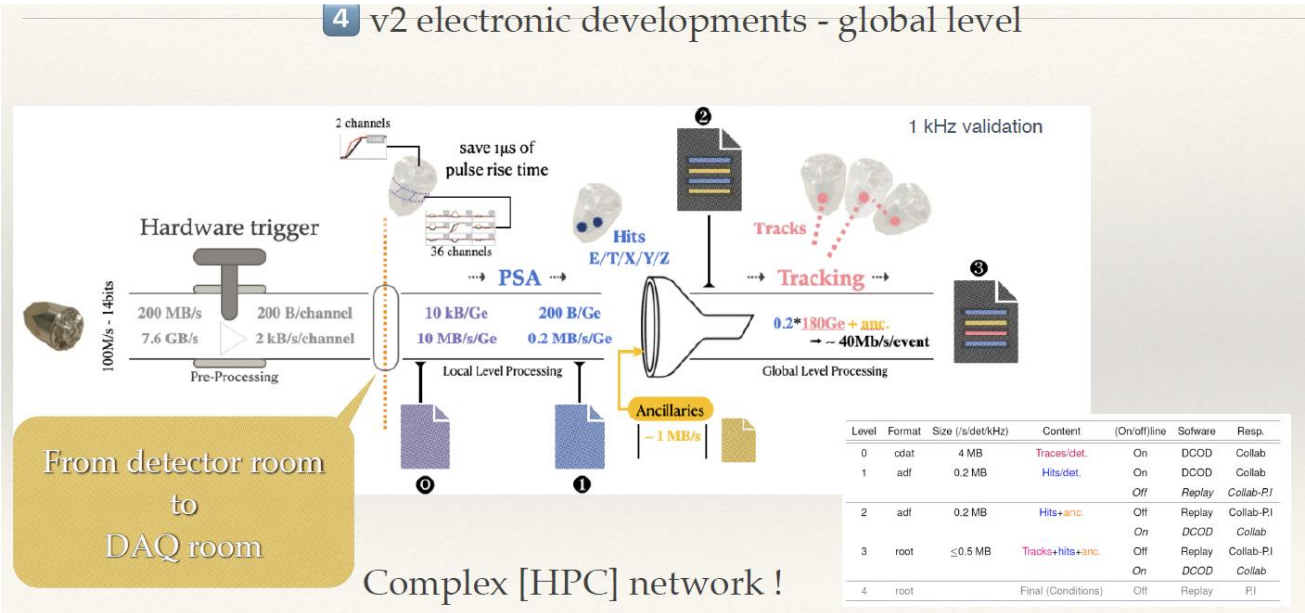
The present timeline for the DAQ is show below :

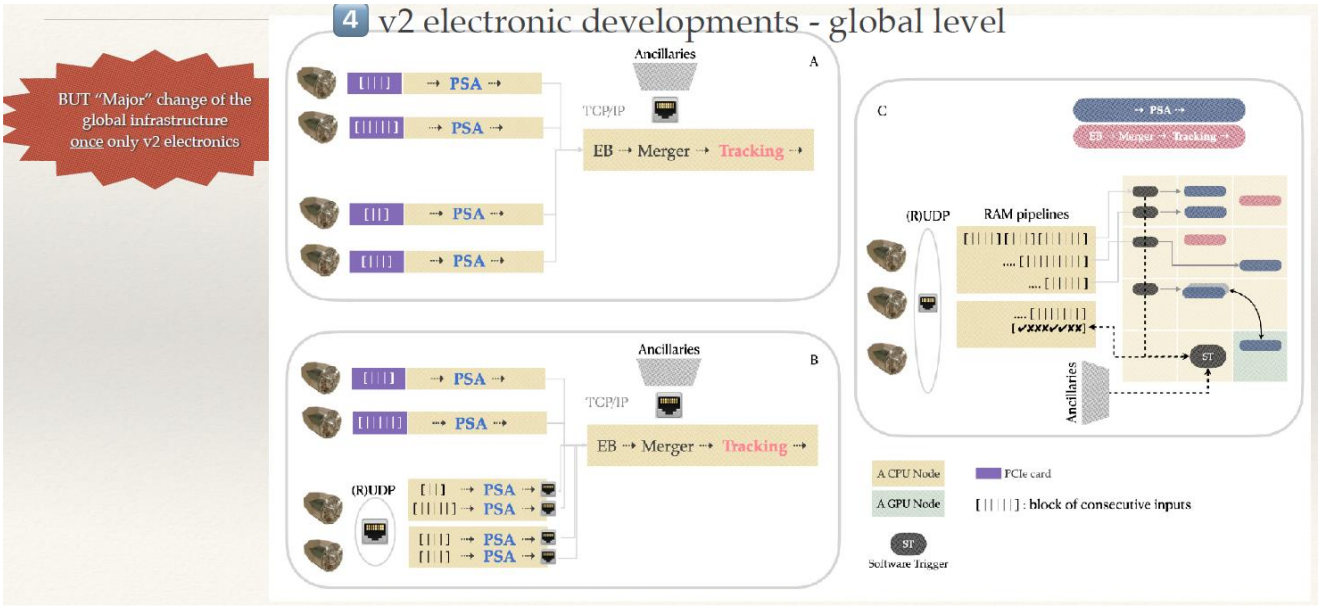


The roadmap regarding the software and data processing is shown below :

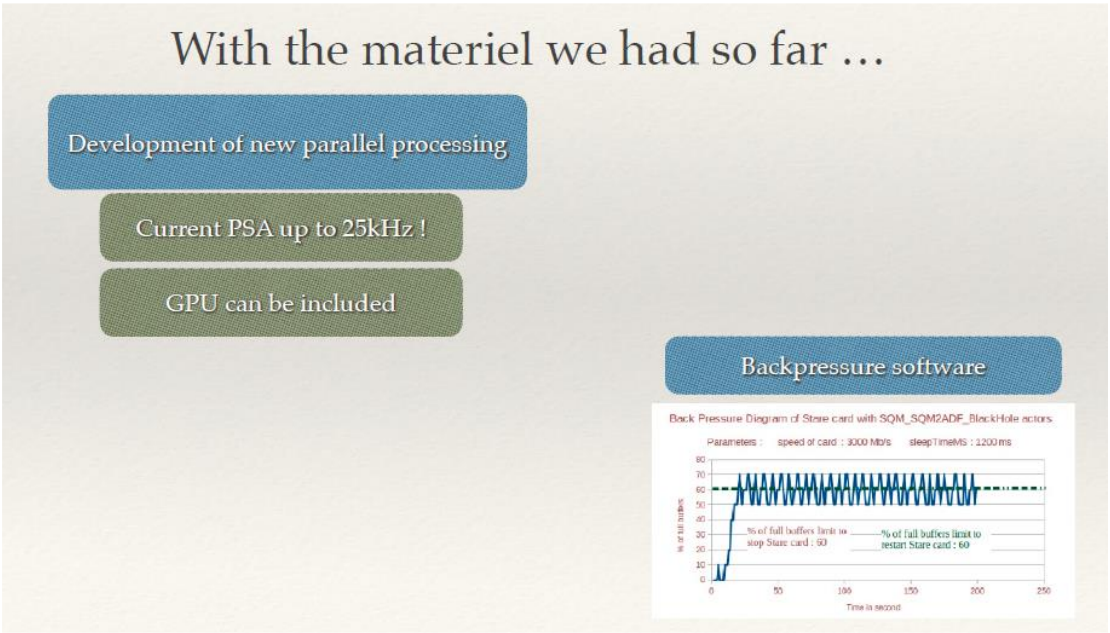


Regarding the V2 electronic implementation, the global level description is kept up-to-date and implemented in the topology. See below





Innovative data flow structure are also investigate to speed up with the present PSA algorithms the on-line capabilities of AGATA.



As requested by the ARRB, the computing model document for phase 2 was delivered : **https://atrium.in2p3.fr/13435097-6696-4efa-8d2d-9ac410c5941d**

PSA and Tracking R&D (A. Boston)

Characterisation

Report from Dan. Last Team meeting 9th February 2024

Liverpool update:

The move into new scanning lab has taken place. The old scanning table and associated apparatus has been fully setup and commissioned. The new scanning table is in position and ready. An AGATA test cryostat has been test mounted in the frame. A new 4 GBq ^{137}Cs source has been ordered and is planned for delivery in mid-March. A side scan of A601 will be performed on the old scanning table in the next few weeks. A full characterisation will follow on both the old and new tables. A visit to the University of Birmingham Neutron facility took place on Friday 9th Feb. A plan for neutron damaged measurements is now being finalised. Neutron irradiation tests are planned to commence in May 2024.

Salamanca Update:

Scanning of B003 has been delayed by a problem with the data acquisition losing events, possibly due to the network connection. Scanning is currently stopped until this is solved. Simulations are being performed to plan the time required for the scanning once the data acquisition problem is solved. Current estimates show that scanning the detector at several different angles will take 2 months – until end of April. They would like to keep B003 until at least the end of June so that additional data could be collected in case problems are identified during the analysis.

IPHC Update:

Scans of A005 are progressing slowly. There have been difficulties getting an accurate alignment of the cryostat. The Salamanca test cryostat is slightly different to the IPHC cryostat and so the optical module used for the laser alignment is not in the same place on both cryostats. This caused a slight tilt of the Salamanca cryostat of up to 0.476 degrees resulting in a difference of ~ 750 um between the front and the back of the detector. Horizonal scans have been performed at 90 degree rotations of the crystal to measure the position of the central bore hole and to characterise the misalignment.
This has now been corrected for, to within 0.055 degrees, and positioning accurate to < 100 um has been achieved.
A storm last year damaged a NIM crate controller. A new one had to be sourced and installed, leading to additional delays. Additional delays of around 1 week were caused by not having access to enough disk space to store new data. Future plans are to increase available storage from 30 Tb to 60 Tb and to modify the TNT2 card software to write out compressed data to reduce required space.

^{241}Am scans are now in progress. Full 2x2mm scans have been performed. Next will be scans for comparison with the Liverpool data and to characterise the dead layers.
Installation of a new air-cooling system is scheduled for early March, meaning scanning will be delayed for further 1-2 weeks. It is estimated that it will take around 2 months to complete the IPHC measurements.

Once the scanning of A005 has been completed. Work will be undertaken on the cryostat holding structure to correct for the alignment problem and to implement a new

way to hold the weight of the collimator so that it is not supported by the xy axis, as this introduces problems with alignment. Around 1 month will be required for the mechanical work. A further 2 months will be needed to full test the new design. IPHC will require a capsule to perform these tests.
Previous scans have informed the process potential improvements have been identified. These changes should make future scanning much more reliable and automated.

GSI update:
Beam time at GSI starts in April and runs until the end of June so they will not be able to start measurements with A005 until July. They can take delivery if IPHC finish earlier but cannot do anything with it. The second half of 2024 is the only time GSI can scan an AGATA detector as the next beam time starts early 2025.
The scanning table detectors are currently being used to scan particle detectors. This is not using the FEBEX cards that will be used for the AGATA detector scans.
Jürgen anticipates many problems getting the scan of A005 set up as the FEBEX cards have been problematic in the past and have not been used with 37 channels. The scanning table has not been used for a while. It is expected that the scan of A005 will require 6 months for the setup and data collection.

Discussion:

Summary of discussion: Given the fact that GSI will not begin the work on A005 until after the June beamtime, it was agreed that the detector will remain at IPHC for additional scans to extend the tomographic work initially performed by Michael Ginsz. This will involve 12 horizonal scans of the detector on a 1 mm grid, rotating the detector by 30 degrees each time and then reconstructing a 3d map of the detector. This is expected to take 42 days in total. A005 will then be transported to GSI to be scanned before the 2025 beamtime starts. This combined with the time needed for the GSI scans means that A005 will not go to Salamanca until the end of 2024 / early 2025. This means there is less pressure for them to finish the scans of B003 quickly, assuming that there is no demand for B003 to be used elsewhere.

R&D on PSA

Report from Fraser, new team leader. Next Team meeting March 2024:

Implementation of the multi-interaction PSA grid search using the GRETINA approach

This has been fully implemented in AGAPRO and works.
Comments: An issue in the assumptions of the optimisation was identified that could be detrimental to its operation in the AGAPRO pipeline. Within the GRETINA algorithm the optimum combination of signals is performed by determining the minimum of a partial differential of the observed chi square. Whilst this approach generates a fit to the experimental data with the minimum chi-square, the parameters of the fit are non-physical and do not respect energy conservation. Some predictions from the PSA deviate in energy as much as 50%, additionally the individual energy contributions can be negative. To remedy this a secondary refinement using an iterative nonlinear least squares fitter is used to produce a more physical result, however the input signals to the fitter are fixed and so the bias on the PSA cannot be removed.

Modifications to the GRETINA algorithm to remove this bias are not possible. The GRETINA algorithm inherently depends on finding the minimum of a partial differential of the observed chi square. This property is not always near-zero in a real scenario, and bounding the solutions to physical scenarios prevents the algorithm from forming the best combination. The consequence for tracking performance are being discussed with the GRETA collaboration.

Implementation of the multi-interaction PSA grid search using SIMPLEX

A secondary algorithm was developed in response to this bias that determines the best optimum linear interpolation of signals rather than their combination. The algorithm, provisionally named SIMPLEX, utilises a similar grid search procedure as used in the GRETINA algorithm but works in an L2 feature space. SIMPLEX uses Barycentric De-mixing to determine the optimum energy fractions of the simulated signals, this produces a physically constrained optimum that does not need a secondary fitter. As such the SIMPLEX algorithm can determine the optimum combination of signals more reliably.

When presented with the same combination of basis signals, the SIMPLEX algorithm and the GRETINA fitter produce consistent energy predictions. Deviations in the PSA predictions occur from within the grid searches of both methods. These deviations are particularly interesting as they could infer the presence of additional interactions, perturbations in the signal, and the influence of the charge clouds.

Algorithm throughput with multiple interaction processing

Currently both the GRETINA and SIMPLEX algorithms are capable of running on exhaustive, coarse and adaptive grid structures, however the execution rate of the exhaustive search prevents its use in real time PSA. Adaptive grid approaches saturate at ~7kHz but do not scale linearly with thread count and have not been tested on AGATA-exact hardware. Both methods would benefit from optimised grid structures.

Significant performance improvements are possible from having the pipeline run multi-instanced rather than only multithreaded. GPU acceleration is possible and Fraser has developed the kernels to do it (they haven't been tested them in AGAPRO yet). The other avenue for accelerating the throughput is using the graph-accelerated methods which would directly replace the AGS hierarchy we use at the moment.

Performance with in-beam data

Experimental characterisation of the PSA algorithms has been performed using the ^{98}Zr PSA testbench dataset. An underlying issue was identified in how the PSA communicates its solutions to the GRT, currently the GRT within AGAPRO is designed to operate with the expectation that PSA will make the decision as to the validity of the 1 or 2 interaction prediction and pass the best guess to the GRT rather than being provided both predictions. Originally the new PSA was configured to return both predictions, leading to the GRT using the 2-interaction prediction for all events.

In order to allow for the PSA to make a decision whether the event is comprised of 1 or 2 interactions a set of veto parameters were introduced. These parameters allow for

the PSA to selectively veto 2-interaction predictions that are physically too close or have unfavourable energy fractions. A secondary penalty system was implemented to allow for the distance between interactions and energy fractions to apply as a weighted penalty factor during the grid search. With this approach a suboptimal fit can be chosen if it has preferable physical properties. As PSA is presented with only a narrow perspective of the gamma-ray path, the tuning of these parameters is difficult and will likely need bespoke corrections for each energy range. Currently the PSA is configured to use the 2-interaction prediction if the figure of merit improves by at least 45%, the light component is at least 5% of the total energy fraction and 50 keV in absolute energy and the interactions are at least 7 mm apart within the segment.

After applying these constraints, the tracking performance improved. Observations on the prediction frequency of positions within the array appear more homogenous, removing the aggregation effect seen with using single-interaction PSA, instead the 2-interaction PSA appears to form predictions at the extrema of the segments. This is not unexpected as the optima of mixing two disparate signals will cover far more of the response space than two similar ones, but it is likely that additional constraints are necessary to penalise this behaviour. This is being optimised.

An additional challenge was identified in the incorporation of the PSA into the wider AGAPRO pipeline, this issue regards the recursive subtraction processing. In its current implementation the subtraction is applied using energy-ordered subtractions for single-interaction PSA and then again for the 2-interaction prediction. This is problematic as the residuals from the subtraction are performed fully for the single-interaction PSA and then the resultant residual is then added to the single-interaction PSA prediction to produce the 2-interaction query. This approach ignores the effect of multiple subtractions which may bias the PSA. The processing was re-written to run both 1 and 2 interaction PSA sequentially, this produces a better chi-square for the full event.

Other future proposed work

T0 sensitivity of the PSA and how it affects the predictions. PSA could be modified to include the time shift in its search more appropriately, ideally the PSA would search over the full (x,y,z,t) space but that has ramifications on both the execution rate and memory footprint of the PSA:

Two approaches to the PSA are available if we wanted to do this, treating the time and spatial dependence as separate behaviours (which is what we do now) or treating them as coupled ones. As you can imagine treating them as independent is far easier to do, it'd just take replacing the iterative loop with an exhaustive sweep. The number of maximum iterations in the iterative method is 10 with a nominal number of iterations of 4, doing a full sweep of 10 time shifts could increase execution times by a factor of 3.

The second, more involved option would be to time shift the basis points instead and build a PSA algorithm to search that space. This approach will likely incur significant memory costs but there are intelligent ways of handling the search so that the execution rate is not hit as badly. I'd be possible to evaluate the basis using a coarse grid approximation that includes coarse time shifts, and then perform the fine grid search including finer time shifts. If we don't want to store the shifted pulses in memory then

we could modify the mapped metric to allow for an integer time shift (e.g. 1 or 2 time samples) or use a scaled addition/subtraction of the signal differentials to do partial time shifts (e.g. 3ns) of the unshifted basis.

Upcoming workshops

OASIS AGATA AI workshop 2024, proposed date in March/April to be confirmed – waiting for responses from those contacted in on 5th Feb.

Tracking report

Report from Waely, team leader.

With Konstantin Stoychev and Desislava Kalaydjeva, an investigation into how tracking behaves when the proper position & energy dependent uncertainties are used to estimate the error on the Compton scattered energies (obtained from positions and that are compared to the ones obtained from the energy depositions in each interaction given by PSA).

- A Monte Carlo sampling of the positions of the hits around their "nominal" one had to be implemented for each Compton vertex in order to obtain the distribution of cosines of the scattering angle and from that distribution, one can obtain the error on the cosine (and hence the scattered energy).
- The uncertainty tables from Marco Siciliano obtained from the bootstrapping technique as well as from Sidong Chen obtained from the self-calibration method have been implemented to smear geant4 data and to track.

We are currently running OFT on geant4 simulated events as well as with real ^{60}Co data taken at GANIL and also the PSA test bench data (^{98}Zr).

Performance and Simulation (M. Labiche)

The team is working on the compatibility with GEANT4 11.1.2 –near completion. Basic simulation tests completed successfully. Advanced simulation test (requiring AGAPRO-FEMUL) on going. Wish to complete this work before preparing the next simulation workshop.

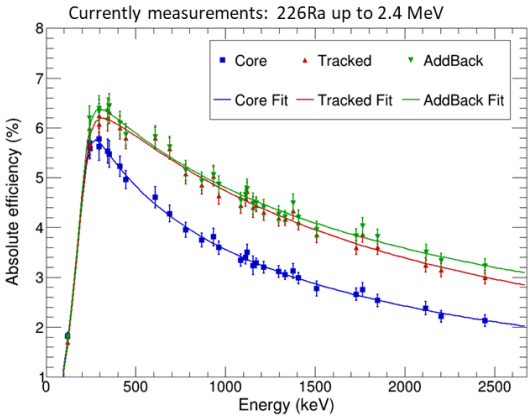
First implementation of PRISMA as ancillary detector completed. (Milan workshop). Position resolution maps created to mimic PSA (= substitute to the smearing in OFT).

AGATA for FAIRROOT: still some way to go (First implementation foreseen for this summer. MOCADI coupling : Completed but not yet distributed, examples being prepared ROOT files as input/output. Completed but not yet distributed. OFT being modified to accept root file as input.

Performance and Simulation WG are eager to redo a meticulous efficiency measurement at LNL to validate simulated efficiencies, with as many good/working detectors as possible. and over a wider energy range, beyond 2.5 MeV.

M. Balogh, Md. S. R. Laskar, S. Bottoni, R.M. Pérez-Vidal, S. Pigliapoco and the AGATA performance team collaboration

How do the AGATA performances evolve at high energies?



- Preparation of experimental proposals
- Analyses of γ-ray spectroscopic data
- Validation of GEANT4 simulations
- Optimization of the tracking algorithms

Analysis mode	Efficiency	P/T
Core	3.05(9) %	16.8(6) %
Tracked	4.16(12) %	32.9(9) %
Addback	4.21(13) %	28.6(8) %

@ 1.3 MeV

R. Pérez-Vidal et al., INFN-LNL Annual reports, vol. 56, 2022. (34 detectors)

No efficiency measurement exits above 2.5 MeV. A proposal was submitted to the last PAC to measure high energy grays emitted by a 56Co source and during the reaction 66Zn(p,n).

M. Balogh, Md. S. R. Laskar, S. Bottoni, R.M. Pérez-Vidal, S. Pigliapoco and the AGATA performance team collaboration

1st PHASE:

^{56}Co γ-ray source measurement:

- Efficiencies up to 3.4 MeV
- Quotation to be requested to Campoverde

2nd PHASE:

^{66}Zn(p,n) reaction:

- Efficiencies above 4 MeV
- σ≈ **680 mb**
- I_{beam}≈ **5 pnA**
- AGATA @ **back-most**
  - **144x10^3** counts/ crystal x day @ 4.3 MeV
  - **~70x10^3** counts/ crystal x day @ 4.8 MeV

PAC	Acronym	Title	Spokesperson	Institute	Request	Assignment
23.053	AGATA-PERF	Performances of AGATA at high energies	M. Balogh	INFN-LNL	2	-

Comment:

It is proposed to assess the performance of the AGATA array for γ-ray energies up to 4.8 MeV. The proponents aim at focusing on efficiency, resolution, and performance of the tracking algorithm, which are all crucial technical aspects. So far, no evaluation has been done up to such high energy, although a clear interest exists in the community in measuring high-energy discrete g rays. Standard sources of relatively long-lived isotopes will be first used to characterize the array up to 3.5 MeV (including a 56Co source to be purchased by the collaboration). In a second step, it is proposed to use a 66Zn(p,n) reaction, at 13 MeV, to produce γ rays with energy up to 4.8 MeV. For this purpose, 2 days of measurements are requested. Although the PAC recognizes the importance of performing a detailed characterization of the AGATA array up to such high energy, the measurement is considered not urgent. Therefore, in view of the very high beam-time pressure, the Committee was unable to recommend the requested allocation in this PAC cycle.

To be performed summer 2024 (at least the 1st phase)

Measurement	TIME Requested
^{60}Co (LLP+GLP calibration)	2 days
^{56}Co+others sources (Eff)	3 days
^{66}Zn(p,n) (Eff)	2 day in-beam - 3 days off-beam
^{60}Co (LLP+GLP calibration)	2 days
^{56}Co+others sources (Eff)	5 days

AGATA placed in nominal and close-up positions, using both standard rise-time values of 2 and 6 μs

PAC results: the AGATA performance study was considered non urgent and it was not recommend for a beam time assignment.

Dissemination (J. Nyberg) – agata.org

The AGATA web site is maintained up-to-date by Johan.

- Organigram. https://www.agata.org/organisation

- Minutes of the 2023 ACC meeting
  https://www.agata.org/acc/collaboration_meetings/

- Update of the list of the ACC members if any
  https://www.agata.org/acc/members

- Update of the list of the ASC members

- Minutes of the ASC meetings after March 2021 (ASC chair).
  https://www.agata.org/asc_files/

- Update of the list of PAC approved experiments https://www.agata.org/agata_pac_approved_experiments/