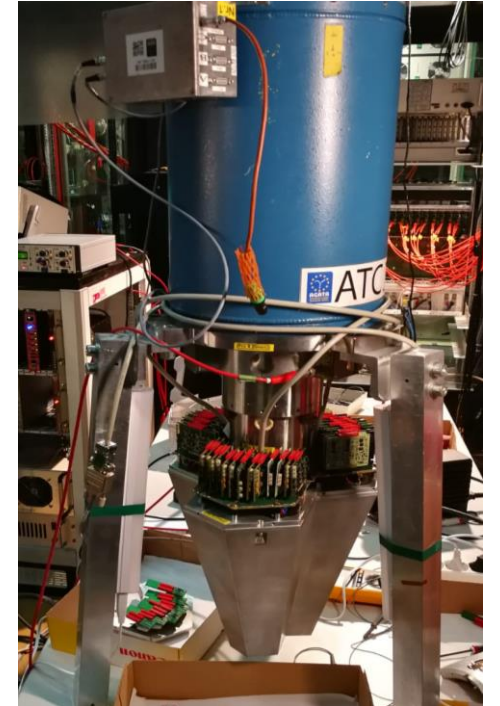


Activities on AGATA triple cryostats @ LNL



Marie-Hélène Sigward for the **Detector & Cryostat team**

Evolution of the configurations

ATC 07

➤ February - March 2022



ATC 17

ATC 18

Evolution of the configurations

ATC 07
ATC 17 ATC 18

➤ February - March 2022



■ Arrival @ LNL ■ Test & repair ■ Cold & OK ■ On the array ■ Faulty ■ under annealing process

Evolution of the configurations

ATC 01
ATC 03
ATC 06
ATC 07
ATC 08
ATC 09
ATC 10
ATC 11
ATC 12
ATC 14
ATC 15
ATC 17
ATC 18

➤ June 2022 (22nd AGATA WEEK)

13 ATCs at LNL

- ❖ 11 ATCs on the structure
- ❖ 1 ATC under test in the detector lab
- ❖ 1 ATC out of order : cryostat requires a complete overhaul (will return to IKP)

 Arrival @ LNL  Test & repair  Cold & OK  On the array  Faulty  under annealing process

Evolution of the configurations

ATC 01
ATC 03
ATC 06 ATC 07
ATC 09 ATC 10 ATC 11 ATC 12
ATC 14 ATC 15
ATC 17 ATC 18 ATC 19

➤ September 2022

13 ATCs at LNL

❖ 13 ATCs on the structure

 Arrival @ LNL  Test & repair  Cold & OK  On the array  Faulty  under annealing process

Evolution of the configurations

ATC 01
ATC 03
ATC 06
ATC 07
ATC 09
ATC 10
ATC 11
ATC 12
ATC 13
ATC 14
ATC 15
ATC 17
ATC 18
ATC 19
ATC 20

➤ November 2022 - January 2023

15 ATCs at LNL

- ❖ 12 ATCs on the structure
- ❖ 1 ATC in assembly and test
- ❖ 2 ATCs in the lab to repair

 Arrival @ LNL  Test & repair  Cold & OK  On the array  Faulty  under annealing process

Evolution of the configurations

ATC 01
ATC 02
ATC 03
ATC 06
ATC 07
ATC 09
ATC 10
ATC 11
ATC 12
ATC 13
ATC 14
ATC 15
ATC 17
ATC 18
ATC 19
ATC 20
ATC 21

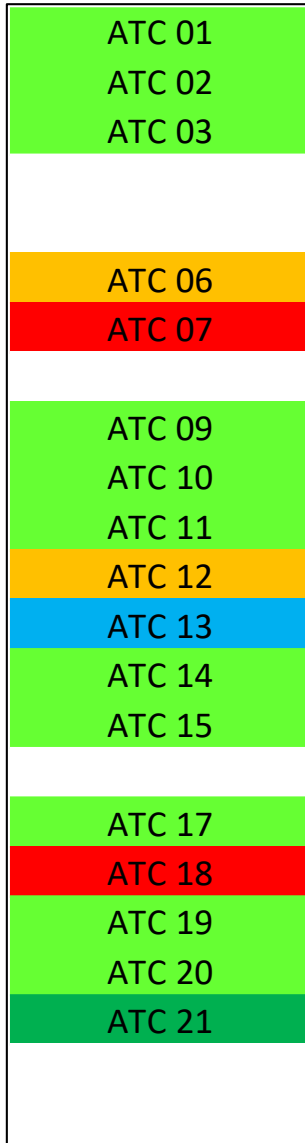
➤ July 2023

17 ATCs at LNL

- ❖ 13 ATCs on the structure
- ❖ 1 ATC under investigation & test in the detector lab
- ❖ 1 ATC in the lab to repair
- ❖ 2 new arrivals

 Arrival @ LNL  Test & repair  Cold & OK  On the array  Faulty  under annealing process

Evolution of the configurations



➤ December 2023 - January 24

17 ATCs at LNL

- ❖ 11 ATCs on the structure
- ❖ 1 ATC functional in the detector lab
- ❖ 1 ATC under test in the detector lab
- ❖ 1 ATC in the lab to repair
- ❖ 2 ATCs disassembled for capsules and cryostat annealing

■ Arrival @ LNL ■ Test & repair ■ Cold & OK ■ On the array ■ Faulty ■ under annealing process

Latest configuration

ATC 01
ATC 02
ATC 03
ATC 06
ATC 07
ATC 09
ATC 10
ATC 11
ATC 12
ATC 13
ATC 14
ATC 15
ATC 17
ATC 18
ATC 19
ATC 20
ATC 21
ATC 22
ATC 23

➤ June - September 2024

19 ATCs at LNL

- ❖ 11 ATCs on the structure
- ❖ 3 ATCs Functional in the detector lab (2 + 1)
- ❖ 1 ATC under test in the detector lab
- ❖ 1 ATC in the lab to repair
- ❖ 3 empty ATCs waiting for annealed capsules

 Arrival @ LNL  Test & repair  Cold & OK  On the array  Faulty  under annealing process

What about ATCs out of the structure

➤ In preparation or in test:

ATC 23 → new ATC fully operational

ATC 21 → used for Digitizer test since December 2022

ATC 12 → On test
after complete annealing of capsules and cryostat



What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair

❖ Cryostat issues: Oscillation - Vacuum

ATC 13

Saturated getter on ATC 18 (oct 23)



What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair

- ❖ Cryostat issues

- ❖ Electronical issues: broken warm preamp - broken FET - broken motherboard

~ 3 Core warm preamps

~ 20 Segment warm preamps

3 Core FET

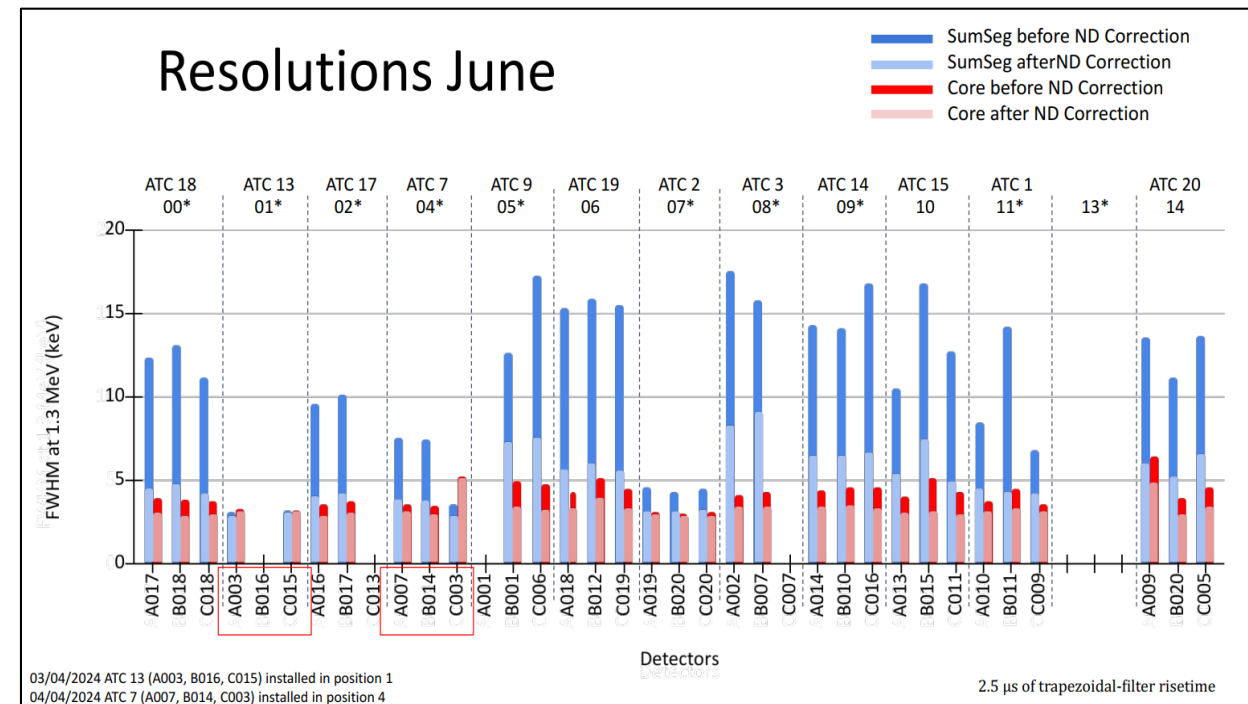
No segment FET

1 (on ATC 07 - due to humidity)

What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair

- ❖ Cryostat issues
- ❖ Electronical issues
- ❖ Capsule issues: Neutron damage



What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair

- ❖ Cryostat issues
- ❖ Electronical issues
- ❖ Capsules issues: Neutron damage - Vacuum leak - leakage current

3 Core FET

A021 in the new ATC22

What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair
- Dismounted for annealing
 - ✓ Disassembled capsules ATC 06 & 12 (2023/12)
 ATC 10 & 11 (2024/07)
 - ✓ Capsules transported to Mirion for annealing A001, A006, A008, A010
 B004, B005, B006, B009
 C001, C010, C012, C014

What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair
- Dismounted for annealing
 - ✓ Disassembled capsules ATC 06 & 12 (2023/12)
ATC 10 & 11 (2024/07)
 - ✓ Capsules transported to Mirion for annealing A001, A006, A008, A010
B004, B005, B006, B009
C001, C010, C012, C014
 - ✓ Cryostat annealing @ LNL ATC 06 & 12

What about ATCs out of the structure

➤ In preparation or in test

➤ Faulty and under repair

➤ Dismounted for annealing

- ✓ Disassembled capsules ATC 06 & 12 (2023/12)
 ATC 10 & 11 (2024/07)
- ✓ Capsules transported to Mirion for annealing A001, A006, A008, A010
 B004, B005, B006, B009
 C001, C010, C012, C014
- ✓ Cryostat annealing @ LNL ATC 06 & 12
- ✓ Transport of the annealed capsules to LNL A006, B005, C001
- ✓ Re - Assembly of ATC 12
- ✓ Test

What about ATCs out of the structure

- In preparation or in test
- Faulty and under repair
- Dismounted for annealing
 - ✓ Disassembled capsules ATC 06 & 12 (2023/12)
ATC 10 & 11 (2024/07)
 - ✓ Capsules transported to Mirion for annealing A001, A006, A008, A010
B004, B005, B006, B009
C001, C010, C012, C014
 - ✓ Cryostat annealing @ LNL ATC 06 & 12
 - ✓ Transport of the annealed capsules to LNL A006, B005, C001
 - ✓ Re - Assembly of ATC 12
 - ✓ Test

Next ATC to be annealed: ATC 15 - it is in cold condition since December 2021

Mobile analog test bench

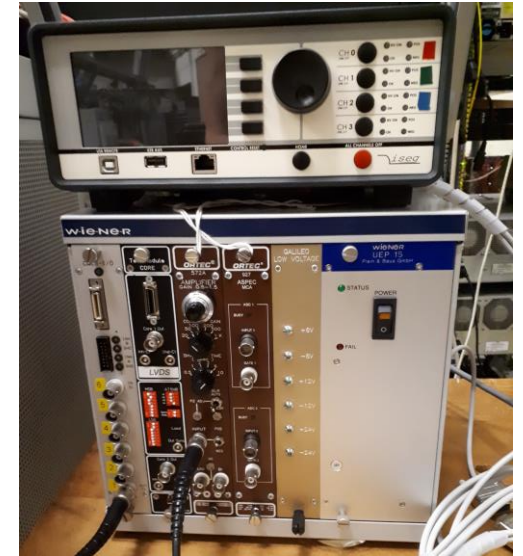
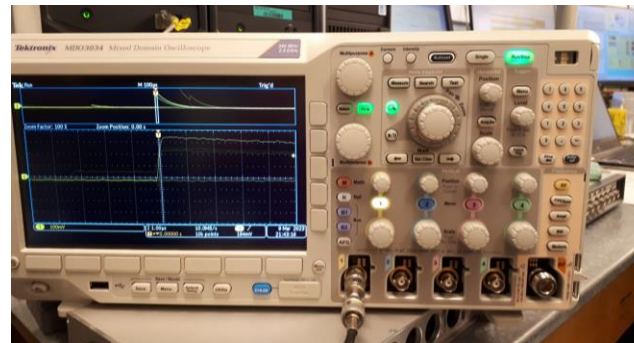
Complete since this year



- ✓ Electronic and mechanical dummies
- ✓ Pumping group system
- ✓ 5 meters MDR cables
- ✓ Iseg power supply
- ✓ Portable Nim Crate with

Main amplifier, converter boxes, pulser device, low voltage supply

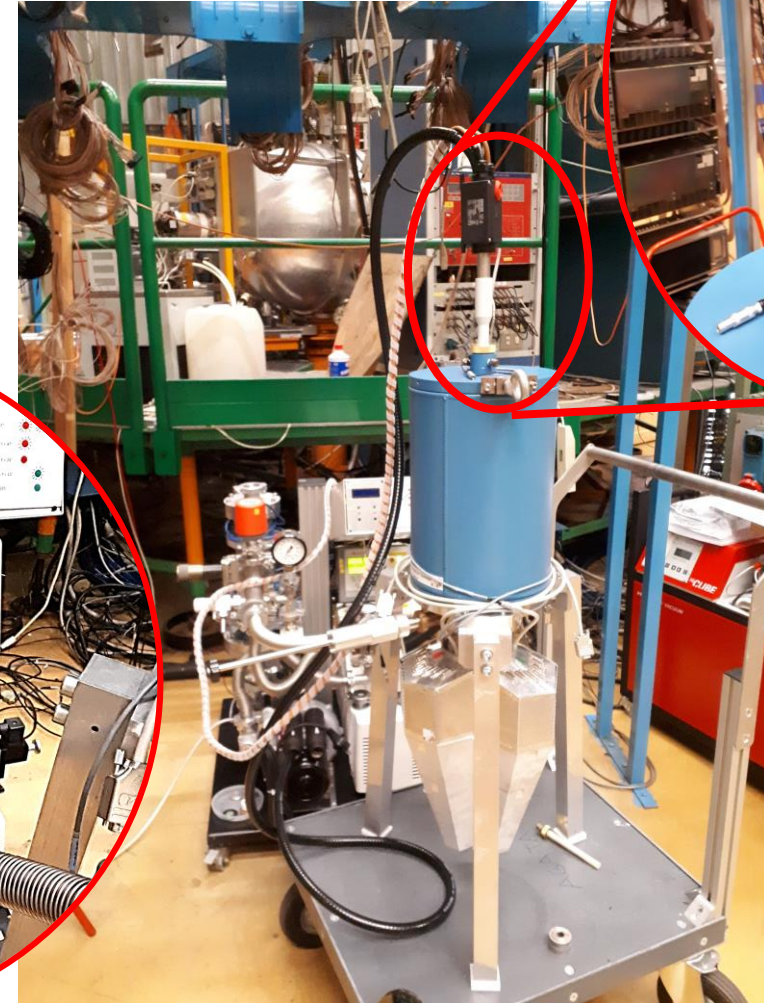
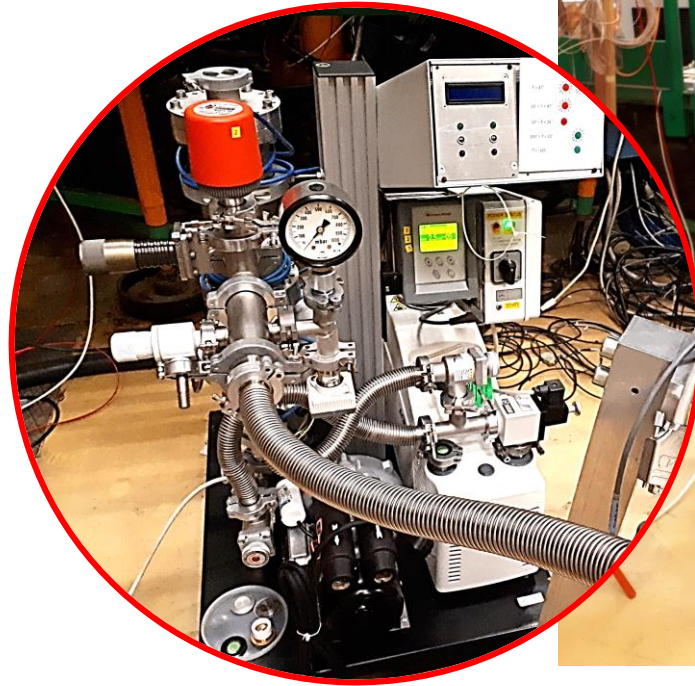
- ✓ Ortec MCA 2 channels
- ✓ Oscilloscope



Mobile analog test bench

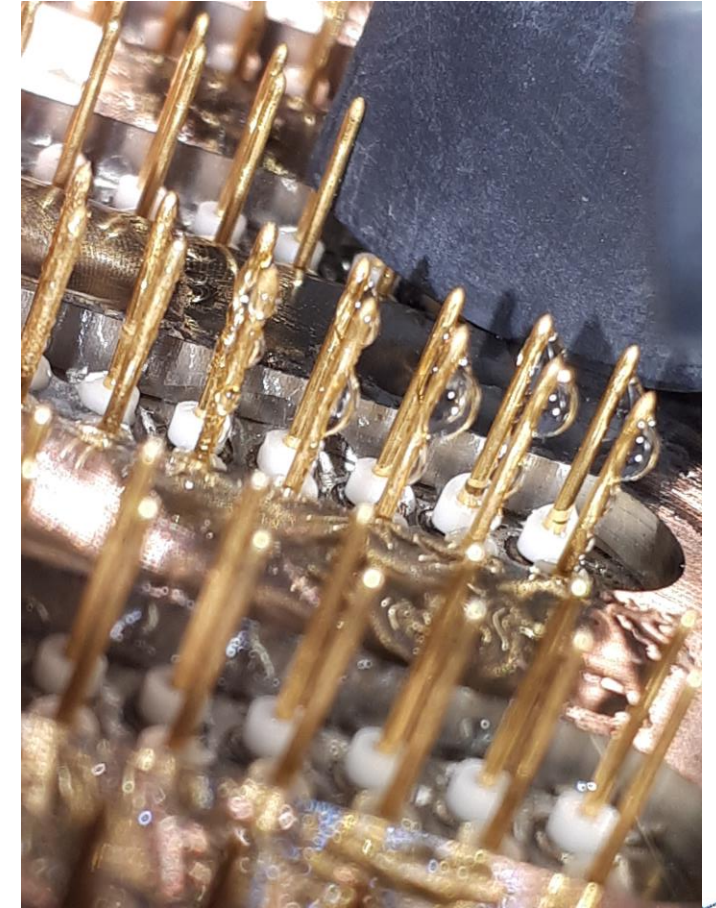
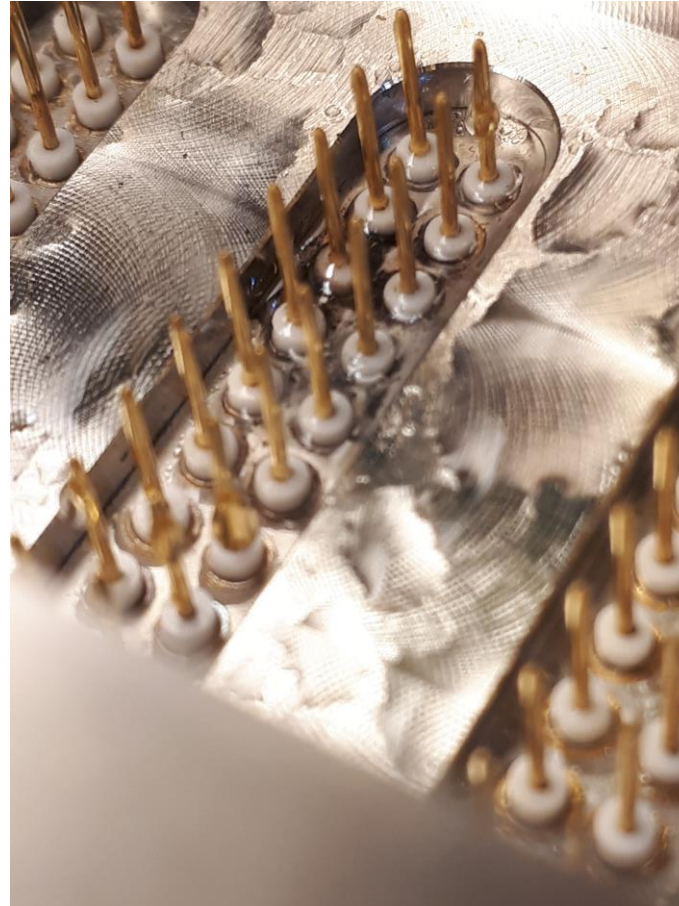
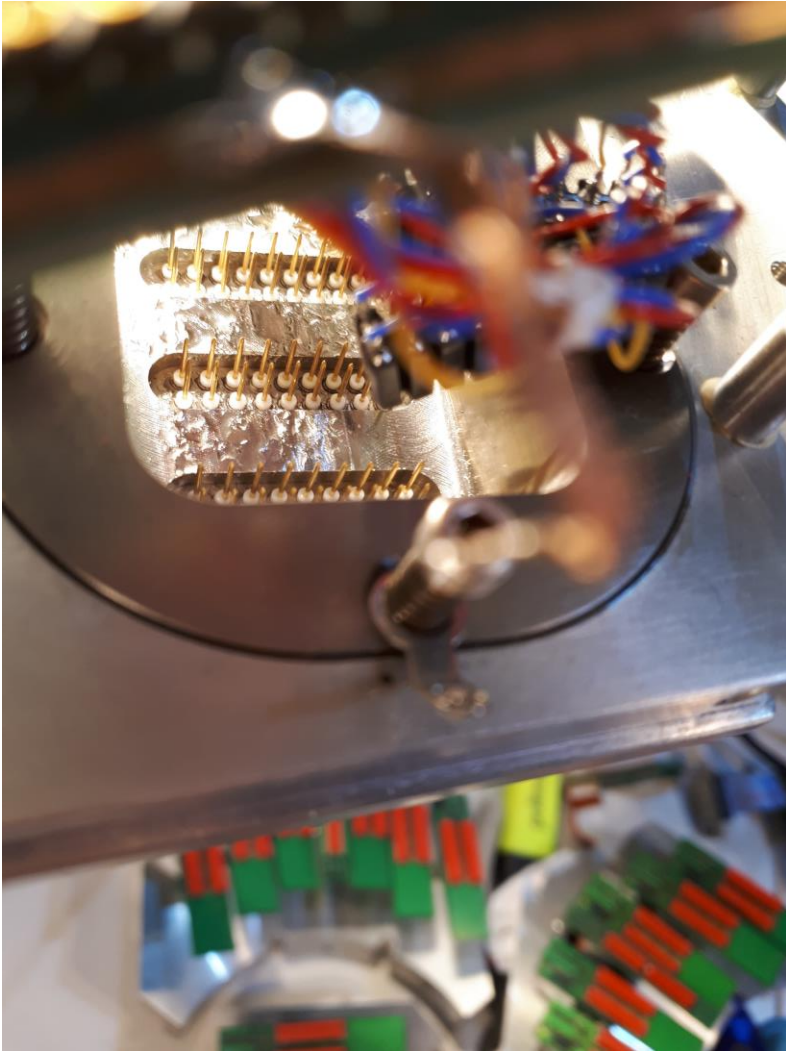
Complete since this year

- ✓ Oven for getter annealing
- ✓ A cryostat annealing bench (Pump - Leister)



Humidity problems

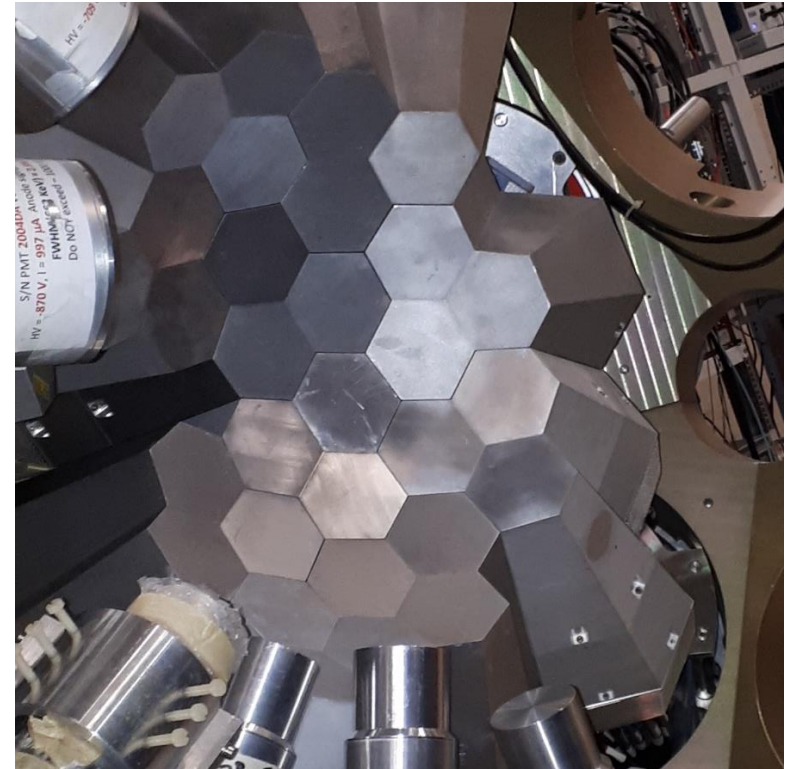
Currently the problem of humidity is not solved !



Conclusion

19 ATCs are at LNL

- Since more than 2 years between 11 and 13 ATCs are mounted on the structure
- 6 are or were more than 2 years on the array without dismounting



Outlook

- Within 7 months, ATC 12 was completely refurbished and reassembled, it will be tested in the next weeks
- ATC 6 - 10 - 11 are waiting on their annealed capsules
- ATC 22 is awaiting on A021 which has been dismantled to be repaired by Mirion
- ATC 21 & ATC 23 are fully operational in the detector lab and can be used as spare
- ATC 16 & ATC24 are expected in the first half of 2025

We should have enough ATCs to ensure the best array resolution in this configuration with 13 ATCs in the structure.

Each capsule and each cryostat should be refurbished every 2 years.

This routine, started in Dec 23 should continue during the whole campaign in Legnaro.



Thank you !