Status of AGATA detectors and cryostats

University of Cologne

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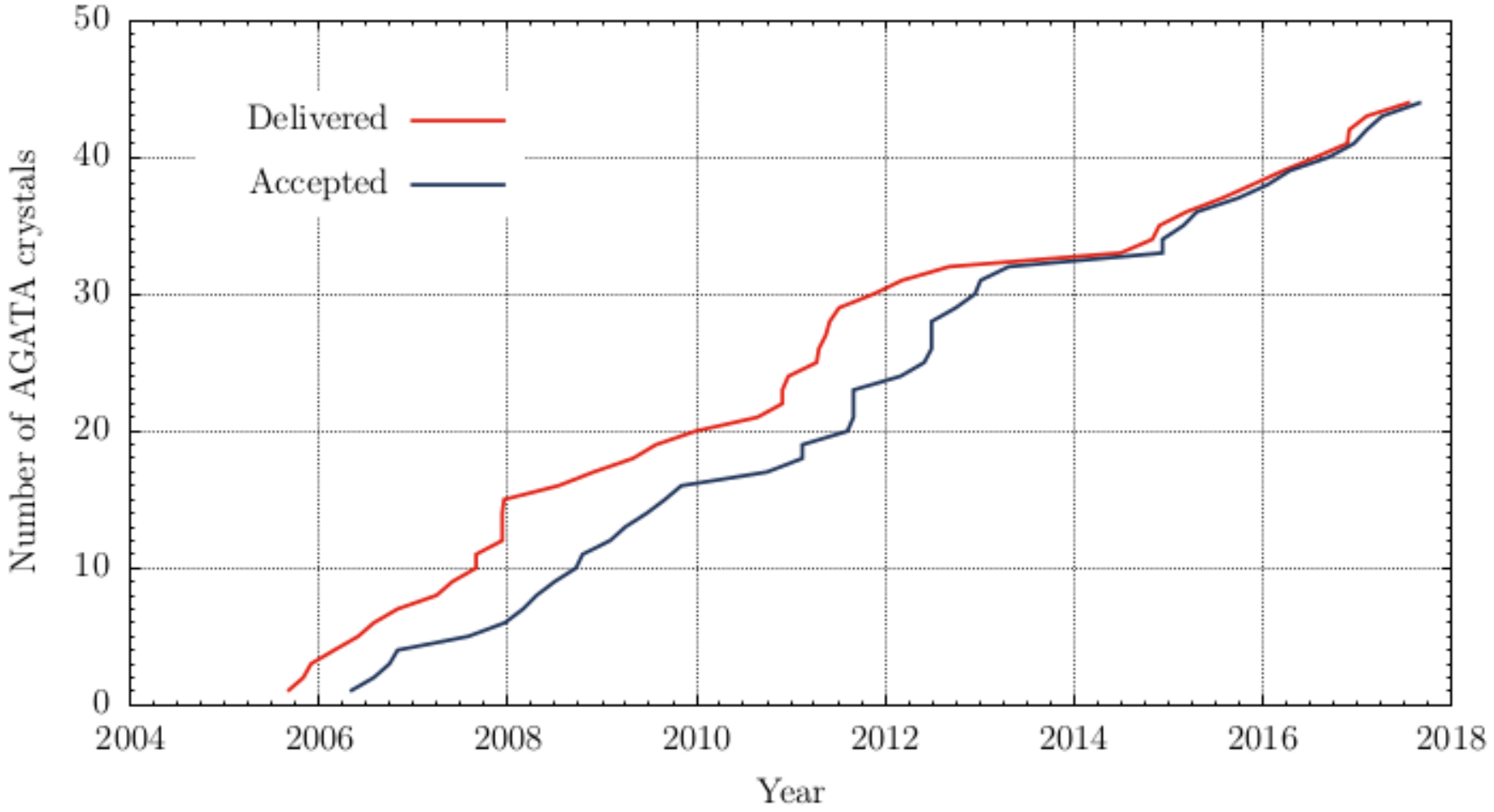
Status Capsules



Activities on capsules since last AGATA week

B016 : deliv. Nov 2016, accepted in Dec 2016 by IKP Cologne

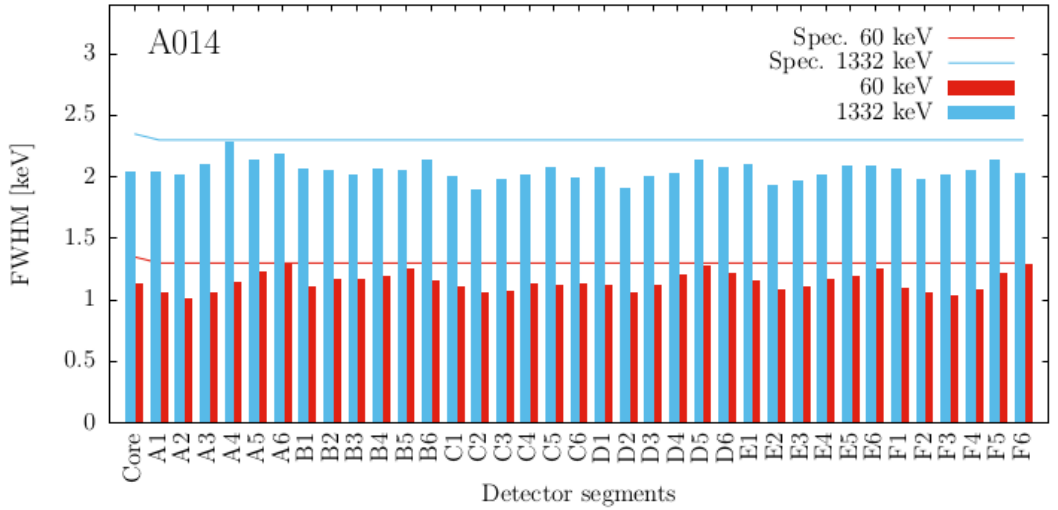
A014 : deliv. Dec 2016, accepted in Feb 2017 by IKP Cologne

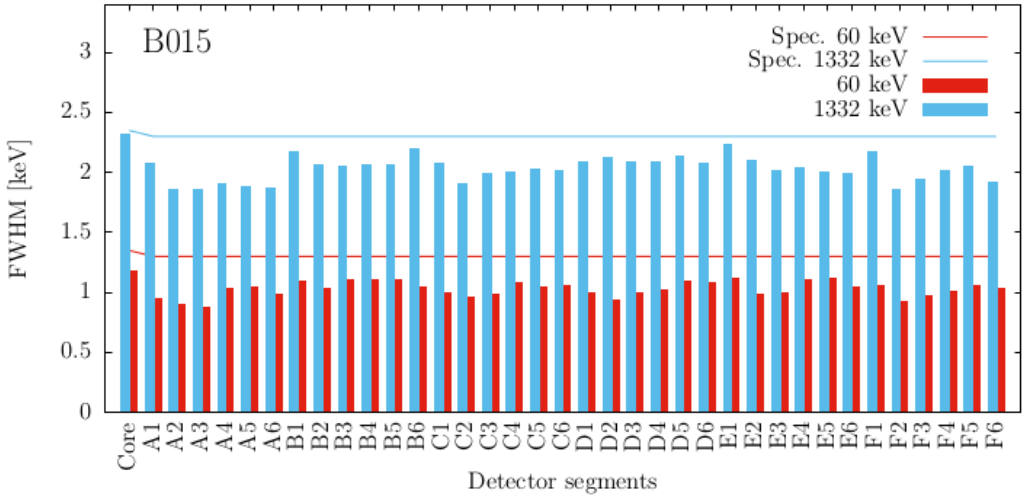
C016 : deliv. Feb 2017, accepted in Apr 2017 by IKP Cologne

B015 : deliv. Jul 2017, accepted in Sep 2017 by IKP Cologne

CAT of A014 & B015 (new encapsulation)

FWHM Core A014:
@ ^{241}Am Core 1.13 keV
Segment average 1.142 keV
@ ^{60}Co Core 2.04 keV
Segment average 2.048 keV

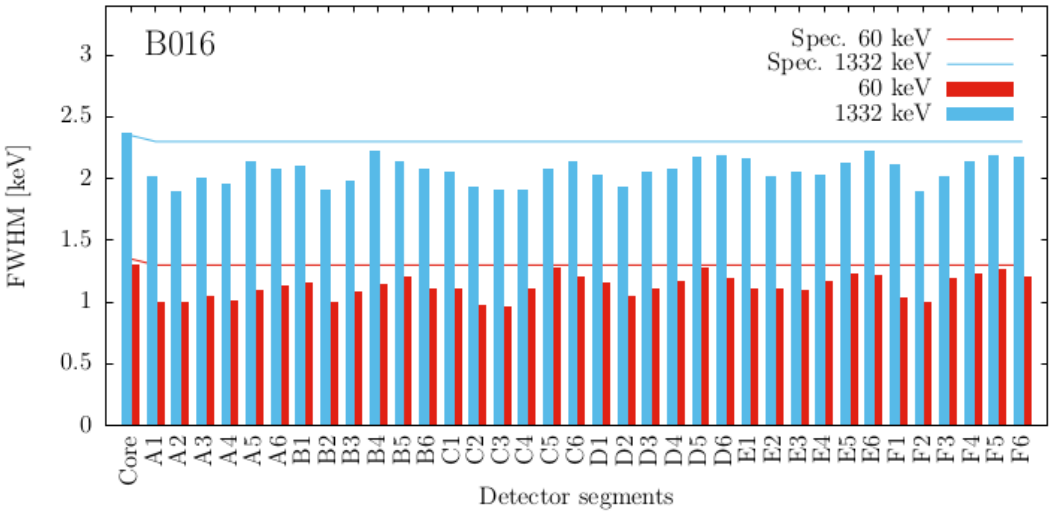


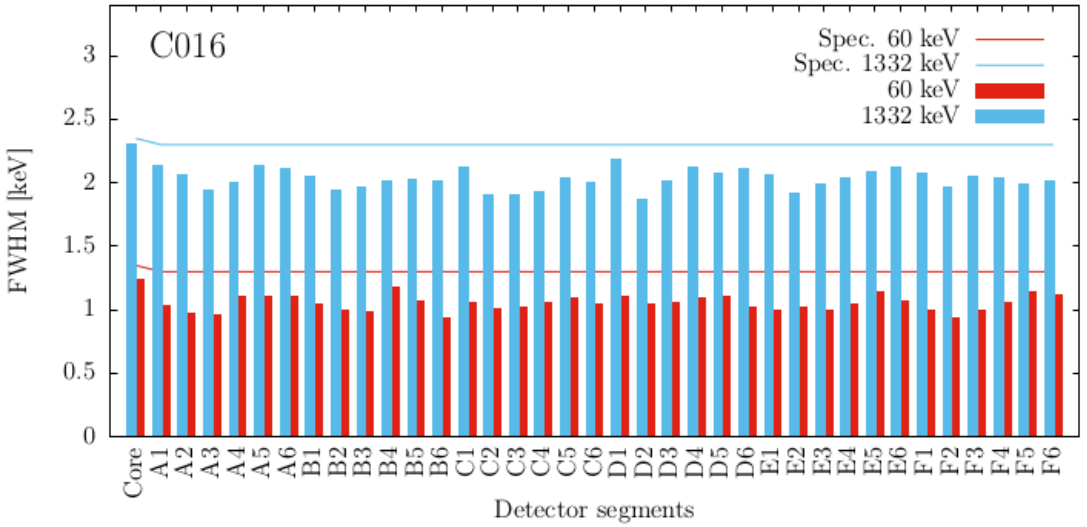


FWHM Core B015:
@ ^{241}Am Core 1.18 keV
Segment average 1.024 keV
@ ^{60}Co Core 2.32 keV
Segment average 2.028 keV

CAT of B016 & C016 (new encapsulation)

FWHM Core B016:
@ ^{241}Am Core 1.30 keV
Segments average 1.111 keV
@ ^{60}Co Core 2.36 keV
Segment average 2.057 keV





FWHM Core C016:
@ ^{241}Am Core 1.24 keV
Segment average 1.047 keV
@ ^{60}Co Core 2.30 keV
Segment average 2.028 keV

New AGATA Triple Cryostats ATC11 & ATC13

ATC11 equipped with
A011, B006, C012

Assembled by CTT
Feedthroughs: Ceramic

FWHM Core (^{241}Am/^{60}Co):
A011: 1.34/2.26 keV
B006: 1.32/2.45 keV
C012: 1.46/2.28 keV

Delivered Nov. 2016

ATC13 equipped with
A014, B016, C016
(new encapsulation)

Assembled by CTT
Feedthroughs: Ceramic

FWHM Core (^{241}Am/^{60}Co):
A014: 1.26/2.29 keV
B016: 1.27/2.32 keV
C016: 1.15/2.24 keV

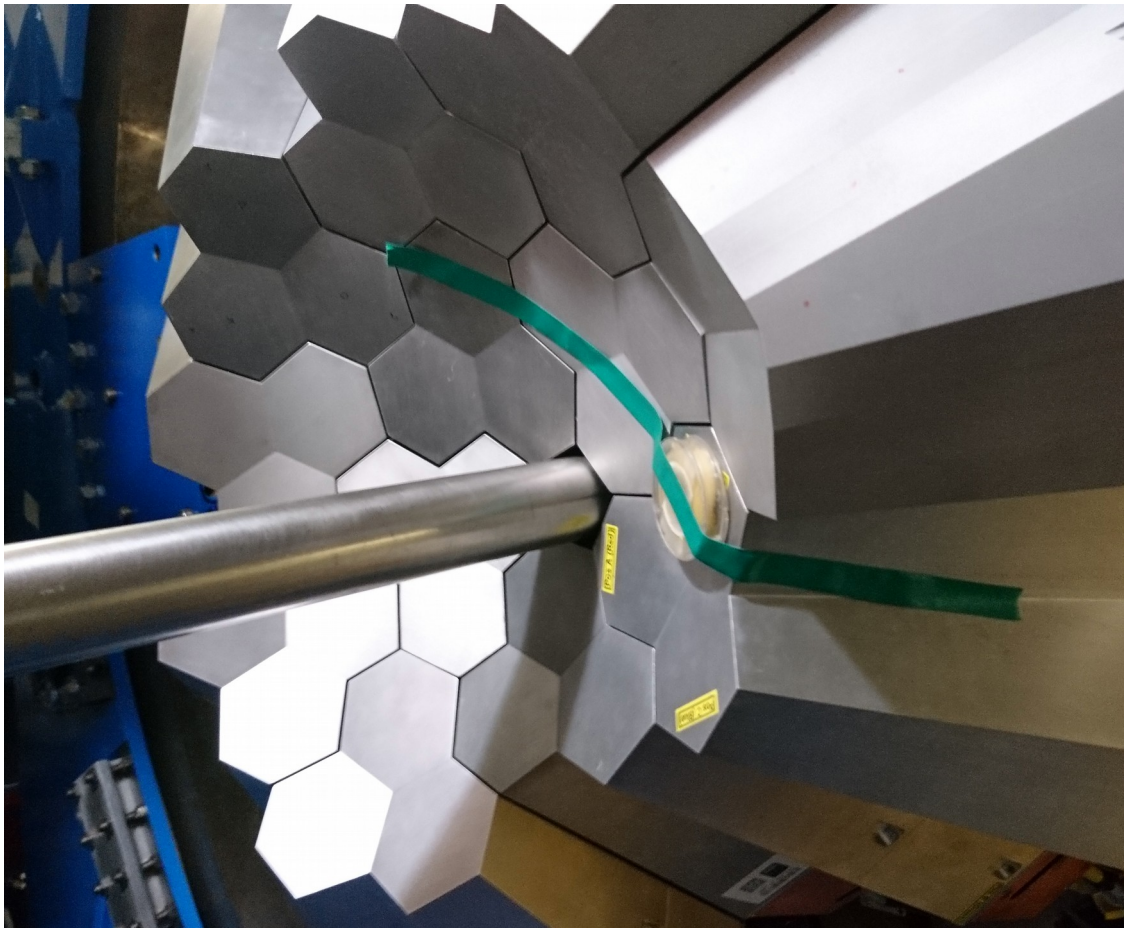
Delivered Mar. 2017

Detectors in GANIL begin of March

38 out of 43 detectors with 1406 working channels in GANIL for physics campaign

ATC01: A012, B001, C004
ATC02: A003, B003, C005
ATC03: A002, B010, C001
ATC04: A007, B007, C007
ATC05: A005, B002, C009
ATC06: A001, B004, C010
ATC07: A006, B013, C006
ATC08: A009, B005, C008
ATC09: A004, B008, C002
ATC10: A010, B012, C014
ATC11: A011, B006, C012
ATC13: A014, B016, C016

ADC03: - B011, C011



Status Capsules September 2017

44 detectors deliverd to AGATA community

35 detectors in GANIL

9 detectors:
B015: Cologne, assembly of ATC12

B014: Salamanca, scanning
Begonia Quintana: Status and preliminary results of the B014 capsule characterization with SALSA

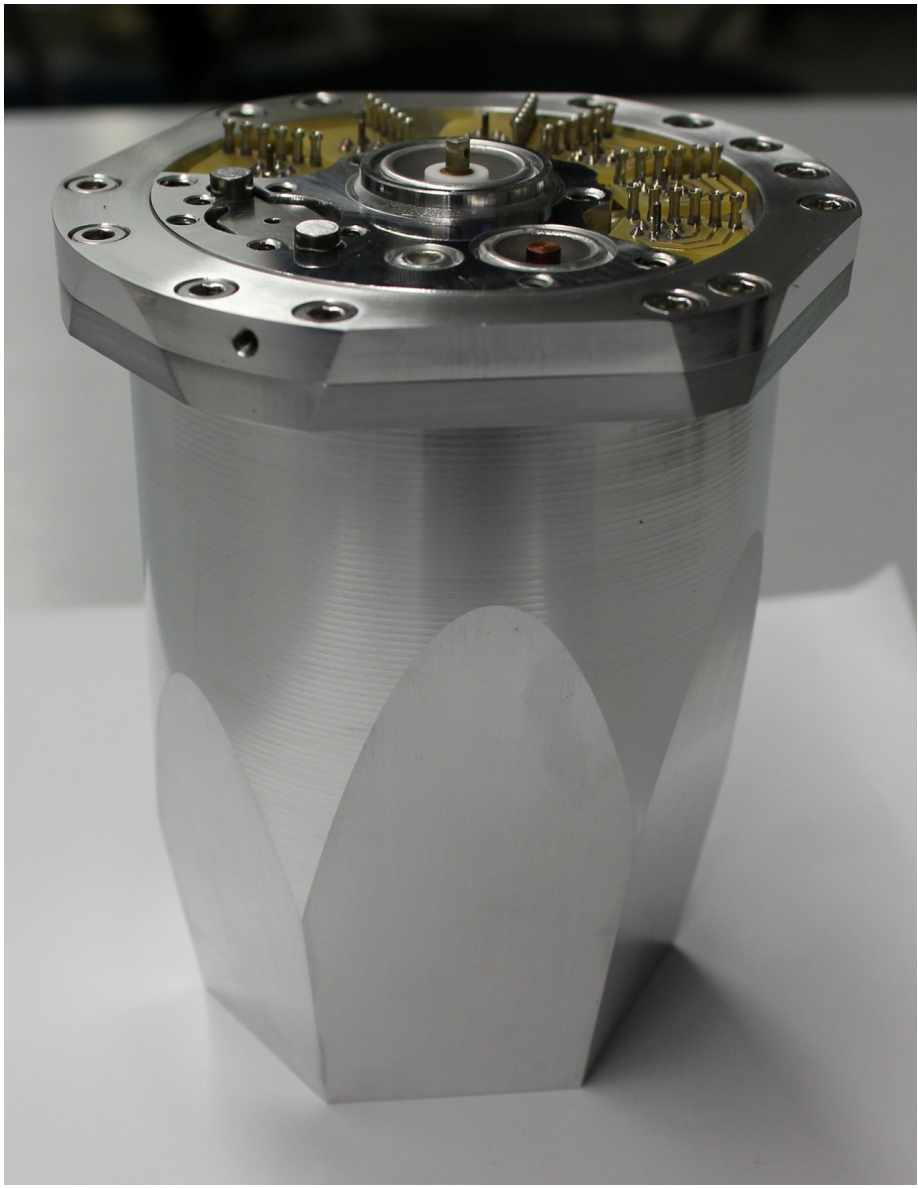
A002, A008: IPHC Strasbourg, scanning & waiting for transport to Cologne
Marie-Hélène Sigward: AGATA Customer Acceptance Tests at IPHC

Broken detectors:

B010: Liverpool, leakage current after annealing

C001: CEA Saclay, leakage current after annealing
Magda Zielinska: Report from the AGATA detector lab at Saclay

MIRION under repair:
B009: leakage current (within warranty)
C003: leakage current after annealing
C013: HV instabilities due to a vacuum leak



Maintenance of AGATA Triple Cryostat

ATC01 (Nov. 16 – Mar. 17):

A008: was replaced by A012
B001: was replaced by B009
C003: was replaced by C004

ATC01 glued feedthroughs were replaced by ceramic ones

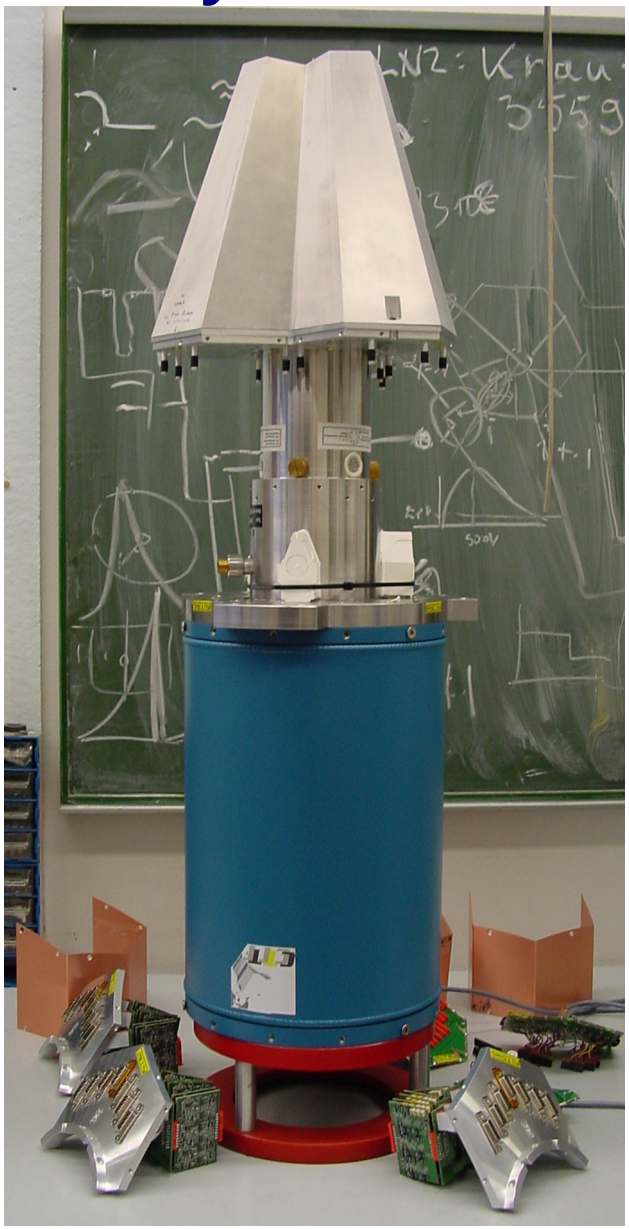
B009: was replaced by B001 due to leakage current (I)
Jean-Andre Ropert, Laurent Menager, Marc Karolak, Christophe Theisen, Magda Zielinska, Marie-Hélène Sigward, Michel Filliger

ATC09 (February 17):
C013 replaced with C002
due to HV instabilities (II)

Maintenance of AGATA Triple Cryostats

ATC03 (July):
Vacuum breakdown during the physics campaign due to a leak between dewar and back flange
→ replaced by ATC10
→ transported to Cologne for repair

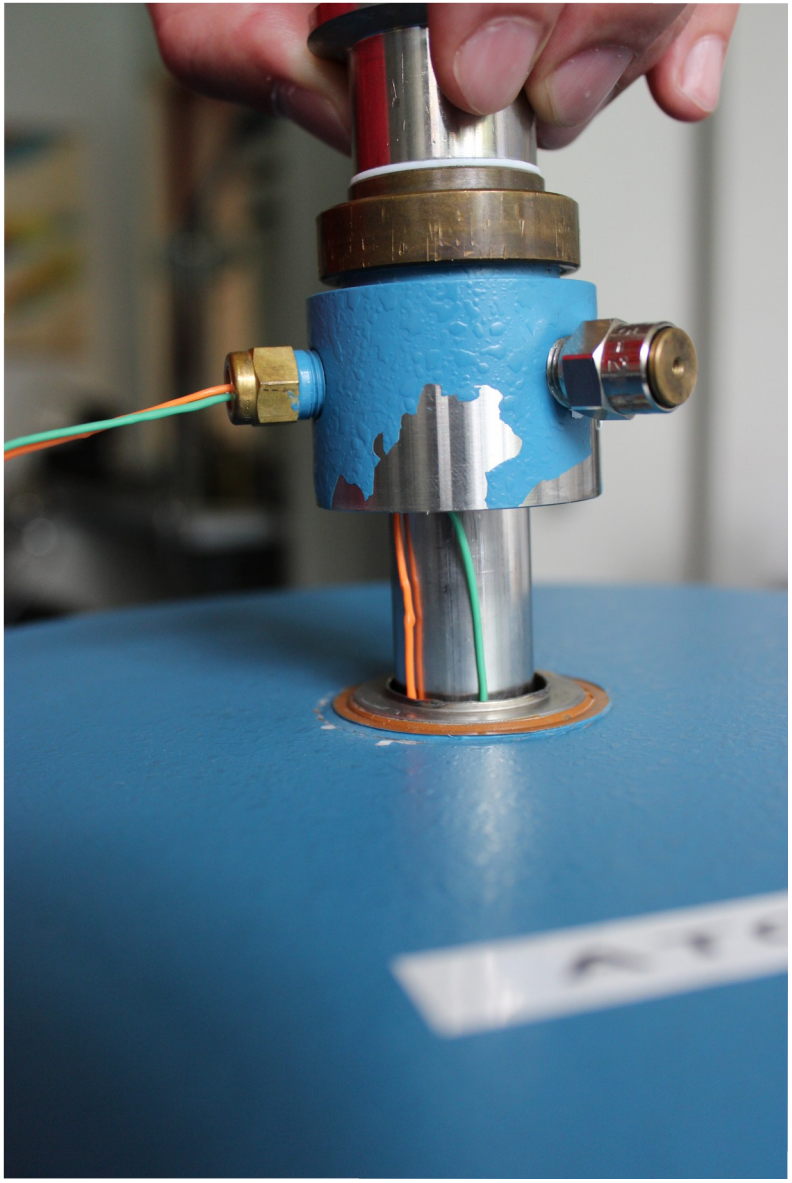
- leak meanwhile repaired by CTT
- glued feedthroughs will be replaced by ceramic ones



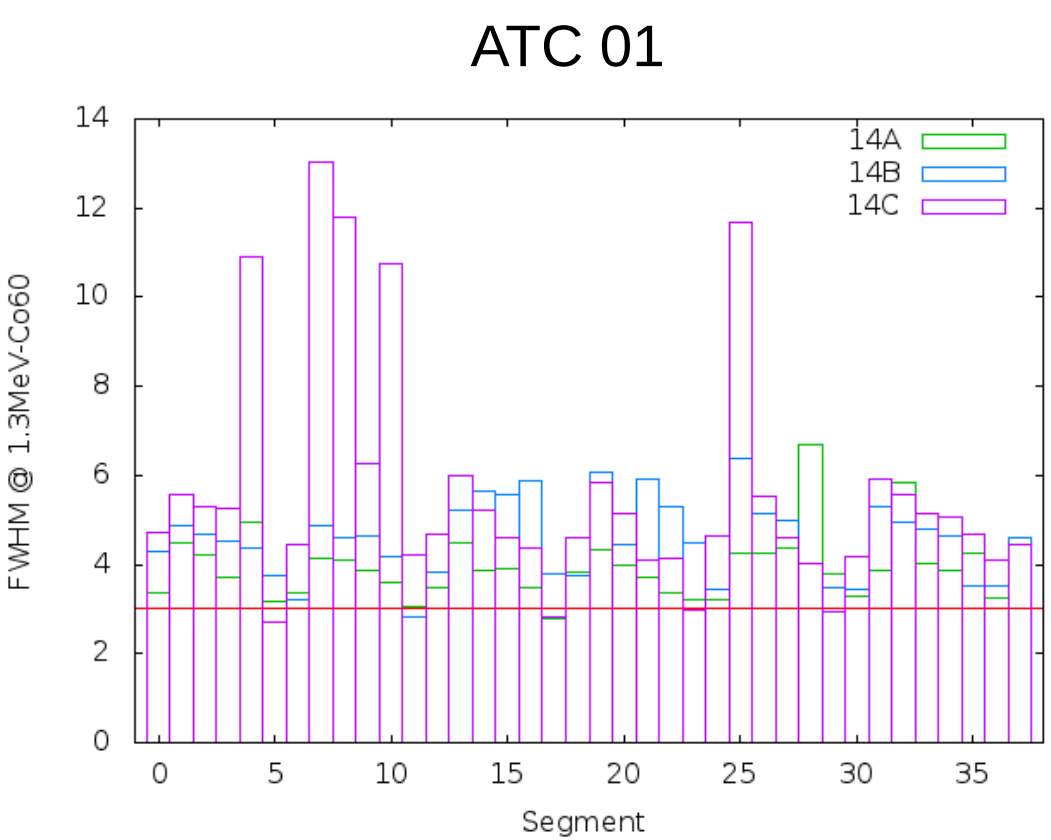
Maintenance of AGATA Triple Cryostats

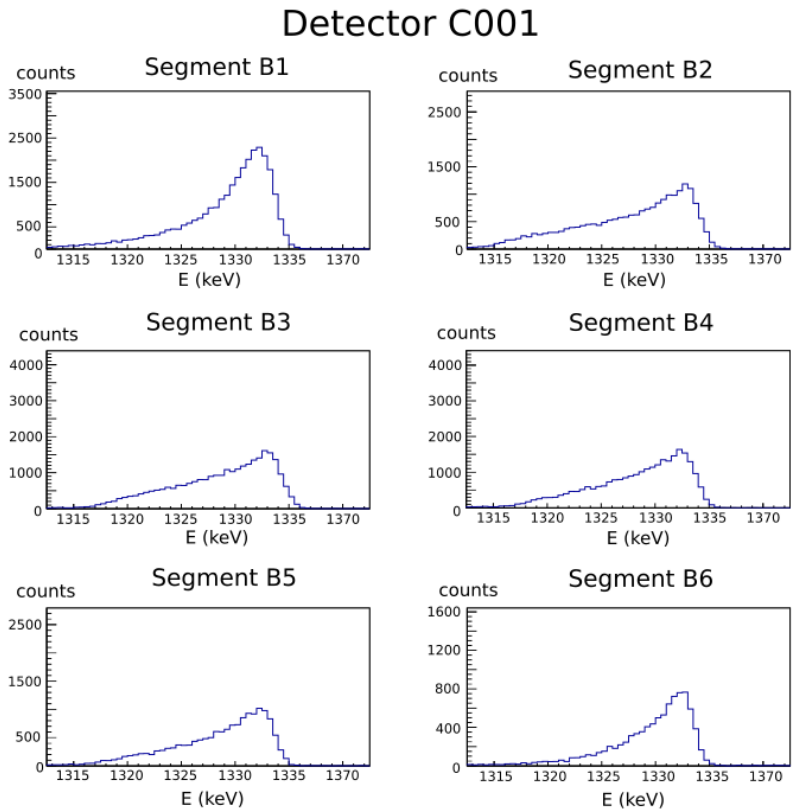
ATC04 (July):
broken filling nozzle
→ dewar has to be replaced by CTT
will be transported to Cologne

Details will be discussed
on Thursday
in the Detector WG
meeting - parallel session



Neutron damage and annealing of detectors





Hole trapping due to neutron damage
→ all segments are affected

→ annealing of the detectors of ATC01 and ATC03

Annealing of detectors during the GANIL campaign

ATC01:
A008, B001, C003 annealed in a vacuum oven
→ individually tested in TC
(Saclay, Liverpool, Strasbourg)

→ C003 leakage current after annealing (III)

ATC03:
A002, B010, C001 annealed in a vacuum oven
→ individually tested in TC
(Saclay, Liverpool, Strasbourg)

→ B010, C001 leakage current after annealing (IV + V)

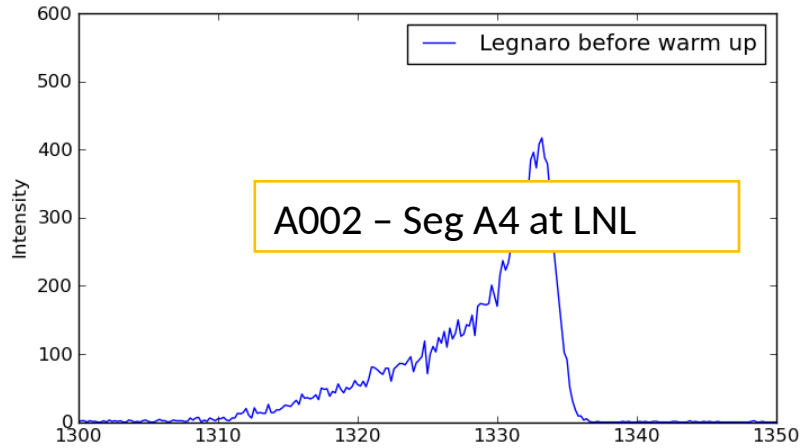
Summary of annealing of AGATA detectors

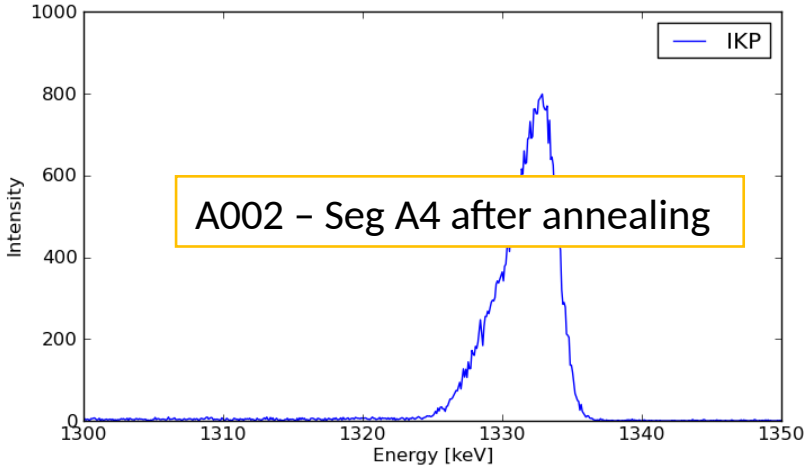
After LNL campaign 11 detectors were annealed
3 detectors showed leakage current after annealing

During GANIL campaign 6 detectors were annealed
3 detectors showed leakage current after annealing

120 h at 102°C is not sufficient to restore
the original performance of the segments (n-type)

Yield of successful annealing to low
→ further detector developments in cooperation with MIRION
ARE URGENTLY NEEDED!

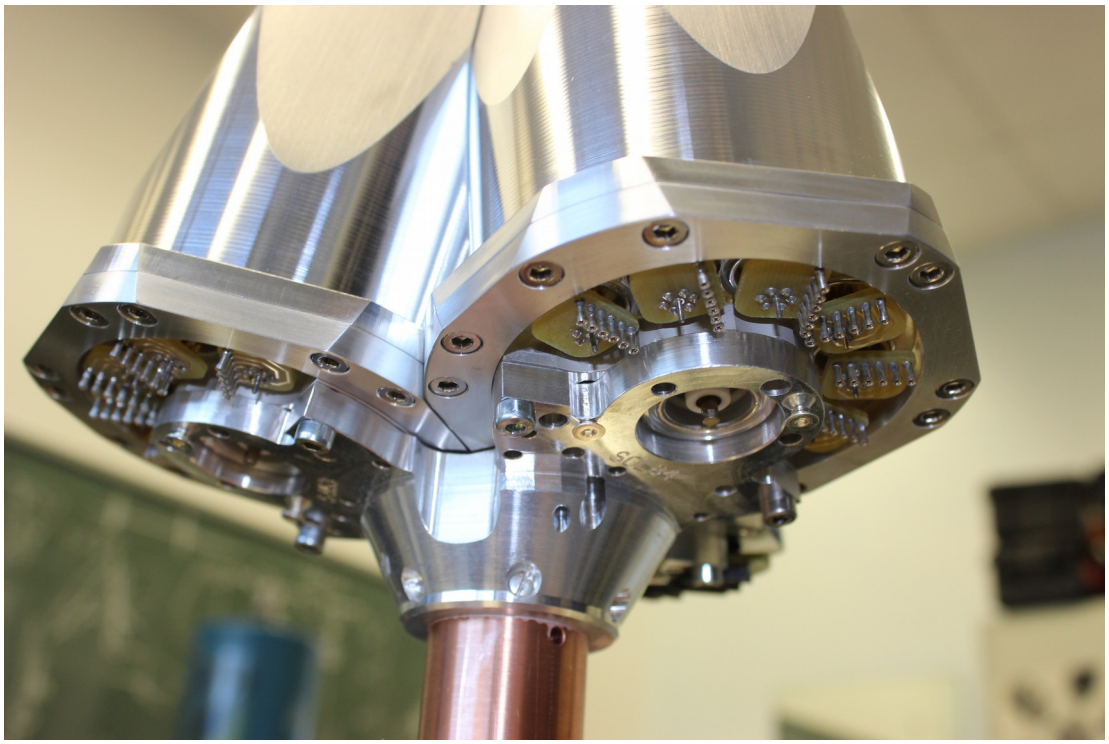




Ongoing orders and assembly of detectors

A013 (TU Darmstadt): September 2017
C015 (TU Darmstadt): October 2017
A015 (IPHC): September 2017
ATC12 (TU Darmstadt): Under construction by CTT

15 x A-Type: A001 - A015
16 x B-Type: B001 - B016
16 x C-Type: C001 - C016



Summary

38 detectors were operational at the beginning of the physics campaign 2017

44 detectors available for AGATA (13 A-type, 16 B-type, 15 C-type)

5 detectors broken (2 B-type, 3 C-type)

7 detectors distributed to the detector labs (3 A-type, 3 B-type, 1 C-type)

2 ATC under repair

1 ATC under construction

10 x ATC + 1 x ADC available Nov. 2017

THANK YOU !!!

UNIVERSITY OF LIVERPOOL