AGATA Steering Committee Report

- News from ASC meetings
- Memorandum of Understanding
- Physics case
- Future host laboratories

Peter Reiter
Institute of Nuclear Physics University of Cologne

19th AGATA week
Strasbourg 11.9. – 14.9.2018

AGATA steering committee report

Appointment of chair and vice chair

P.R. is chairing the ASC up to March 31, 2020
John Simpson as UK representative is vice chair

AGATA steering committee

A. Atac (Turkey), P. Bednarcyck (Poland), A. Bracco (Italy),
B. Cederwall (Sweden), G. de Angelis (Italy), Z. Dombradi (Hungary),
G. Duchêne (France), J. Gerl (Germany), P. Greenlees (Finland),
P. Nolan (UK), B. Quintana (Spain), P. Reiter (Germany), J. Simpson (UK),
Ch. Theisen (France), D. Tonev (Bulgaria)

AGATA management board

AGATA Management Board and Teams

A. Gadea (Project Manager)
A. Boston, B. Million, A. Korichi, F. Recchia, H. Hess, P. Reiter (ASC) and W.Korten (ACC)
J. Gerl (LCM-GSI), E. Clement (LCM-GANIL)

AGATA Working Groups	AGATA Teams			
Detector Module H.Hess	Detector & Cryostat (tbd)	Detector CAT &Testing H. Boston	R & D on gamma Detectors & Applications	
Front-end Electronics A. Gadea	Pre-Amplifier Digitizer A. Pullia	Global Trigger & Synchronization M. Bellato	Pre-processing I. Lazarus	
Data Processing A.Korichi	Hard/Software DAQ Support G. Lalaire	Slow Control & FEE Monitoring E. Legay	Data Analysis & Tracking O. Stezowski A. Lopez-Martens	GRID Data managing and Analysis
PSA & Characterization A.Boston	PSA Algorithm Development L. J. Harkness	Detector Characterisation (J.Simpson)		
Infrastructure. Comp. Det. B.Million	Detector array Infrastructure R.Menegazzo	Complementary Detectors J.J. Valiente	Mechanical Infrastructure A.Grant	
Performance and Simulation F.Recchia	AGATA Performance C.Michelagnoli J.Ljungvall	AGATA Commissioning P.R. John	AGATA Physics & exp. Simulation M. Labiche	
Technical Coordinator Engineering Advi.	Compatibility EMC, Interfacing	Specification control	Quality Control	Documentation

AMB Chairman
Project Manager
A.Gadea

Resource Manager
(G.D., A.G, B.M.)

Local Campaign Managers (LCM)

INFN-LNL	GSI	GANIL-SPIRAL2
Legnaro	Darmstadt J.Gerl	Caen E.Clement

AGATA steering committee report

- AGATA installation at GANIL
- Budget & resource manager discussion
- AGATA common account at IPHC, responsible person G. Duchêne
- Signature of the AGATA MoU prolongation (until 31.12.2020)
  All partners signed except the two bulgarian institutions.
  Signatories: JYFL, IN2P3, CEA/DRF/IRFU, GSI, INFN, COPIN, MICINN, Valencia Univ., Salamanca Univ., KTH, Ankara Univ. and STFC.
- AGATA Phase 2
  - Wolfram Korten as ACC chair supervises the writing of the White Book
- Project definition is task of AMB (A. Gadea)
- Draft of the new AGATA MoU
- Future AGATA host labs

AGATA steering committee report

- PSeGe ENSAR2
- DEGAS-AGATA collaboration agreement
- AGATA-GRETA collaborations
- Data Management Program
- Open Access Policy of AGATA publications

AGATA steering committee report

DEGAS-AGATA collaboration agreement

2. Points of agreement

2.1 The sales contract with MIRION TECHNOLOGIES (CANBERRA) SAS for each DEGAS detector has to include the standard AGATA prorated warranty scheme negotiated with the company.

2.2 The assembly of the triple-cluster detectors will be responsibility of the DEGAS collaboration.

2.3 Customer acceptance test (CAT) of individual germanium detectors will be performed by the AGATA collaboration using AGATA test cryostats (without cross-talk test). Acceptance test of the assembled triple-cluster is responsability of the DEGAS collaboration. The AGATA collaboration will perform fast performance tests prior mounting the triple cluster on the array.

2.4 Additional operational costs (OC) incurred by the use of DEGAS detectors at AGATA will be paid by the DEGAS partners for the period of use calculated in the same manner as in the AGATA MOU. Financial details for period 2016-2020 are given in the Annex.

2.5 Maintenance of the DEGAS detectors will be performed by the AGATA collaboration when they are used at AGATA. They will be subject to the same

AGATA steering committee report

DEGAS-AGATA collaboration agreement

routines for safe handling, use and documentation as for dedicated AGATA detectors.

2.6 The AGATA collaboration takes full responsibility for the detectors during their use by the AGATA collaboration and that they are returned to the DEGAS partner/FAIR fully operational. i.e. fulfilling the required detector specifications at the date required by the DESPEC/DEGAS partner. Both parties are aware that usage of the detectors leads to inevitable but tolerable performance losses. The AGATA collaboration will do its best to minimize these losses.

3 Signatures

Date: 05/09/2017
Location: Strasbourg, France

By:
Gilbert Duchene
Chair AGATA Steering Committee

Date: 04/09/2017
Location: GUILDFORD, UK

05/09/17
MUMBAI, INDIA

By:
Zsolt Podolyak / Rudrajyoti Palit
DESPEC Spokesperson / DEGAS WG Chair

AGATA steering committee report

AGATA-GRETA collaboration





Second AGATA-GRETINA collaboration meeting was held at Orsay in April 2018.
Devoted to discussions about common challenges related to tracking arrays, including the physics, technical details and analysis of data from these arrays.
We intend to organize this collaboration meeting on a yearly or bi-yearly basis, alternating between meeting places in the US and the EU.
We hope these collaboration meetings will foster collaborations between the AGATA and GRETINA communities and help define and accomplish our common goals.
It was great to see you in Orsay and Thank you for your inputs!

Amel Korichi: **Amel.Korichi@csnsm.in2p3.fr**
Torben Lauritsen: **torben@anl.gov**

AGATA steering committee report

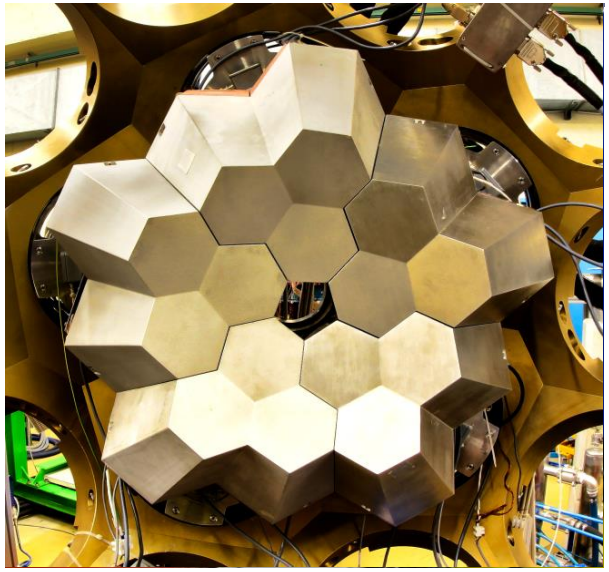
- New Memorandum of Understanding
- AGATA Physics case
- Future AGATA host labs

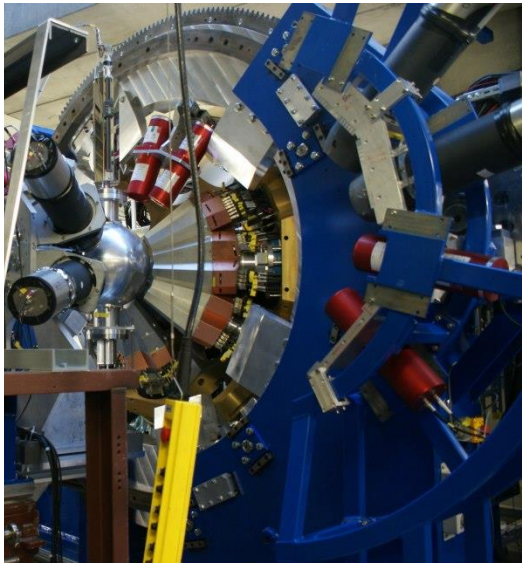
From the Demonstrator to AGATA 4π

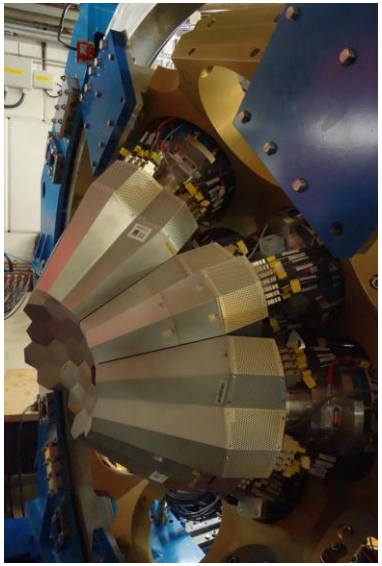
LNL: 2009-2011
15 crystals (5TC)
Total Eff. ~6%

GSI: 2012-2014
24 crystals (3DC+6TC)
Total Eff.~9%

GANIL: 2014-2020
45 crystals (15 TC)
Total Eff. ~15%







Demonstrator + PRISMA

AGATA + FRS

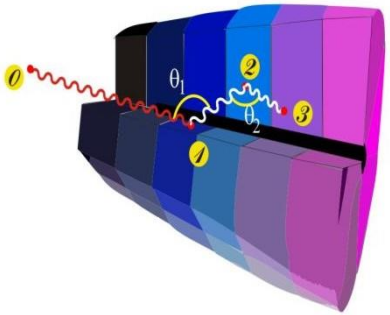
AGATA @ G1

47 crystals available in summer 2018

Ingredients of Gamma-Ray Tracking

1

Highly segmented HPGe detectors



2

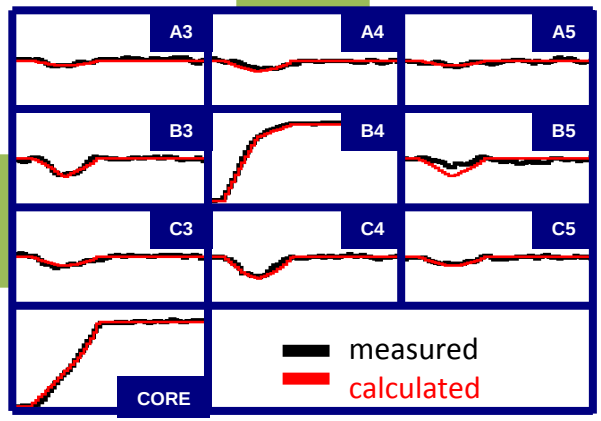
Digital electronics to record and process segment signals

Identified interaction points

$(x,y,z,E,t)_i$

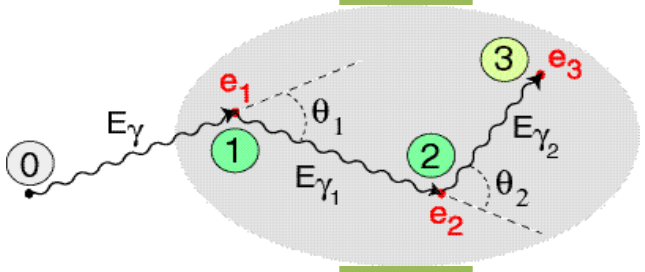
Pulse Shape Analysis to decompose recorded waves

3



4

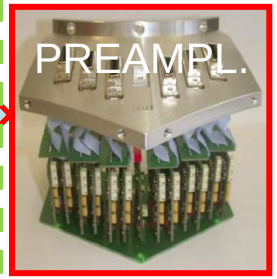
Reconstruction of tracks evaluating permutations of interaction points



Reconstructed γ-rays

Digital electronics and DAQ







Fast 1st Level Trigger

Other Detectors

Diff. Fast-reset-TOT
INFN-MI/GANIL/KÖLN

75.5db SNR
IPHC/Liverpool/
STFC

12.2 ENOB

200MB/s/
segment

GL Trigger

Clock
100 MHz
T-Stamp

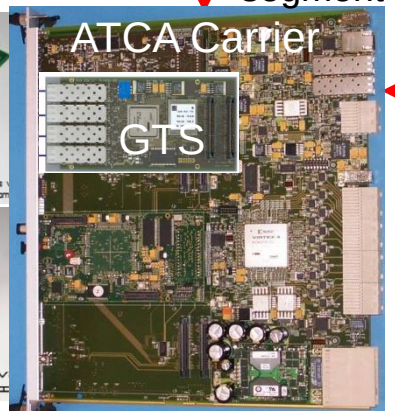
Other
detectors

GTS
INFN-Pd

Detector Level







PSA
FARM

Core +
36 seg.

100MB/s/
detector

HIGH THROUGHTPUT
PRE-PROCESSING
CARRIER / MEZZANINES
IPNO/CSNSM/INFN-Pd

Global Level

EVENT
BUILDER

TRACKING

Control,
Storage…

DAQ-NARVAL
RUN- & SLOW-Control
IPNO/CSNSM/
LNL/GANIL/IFJ-PAN

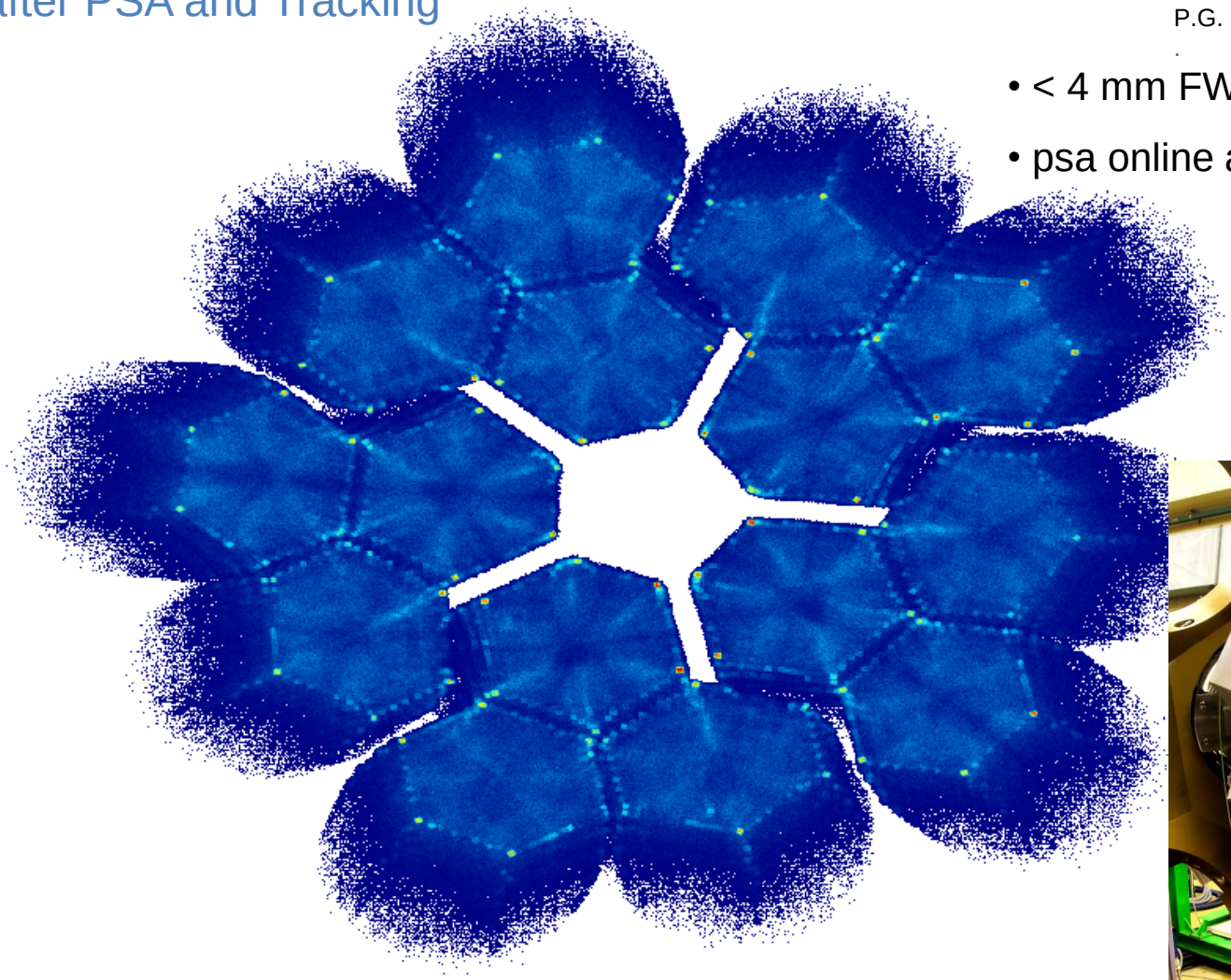
Other
detectors

interface to GTS, merge time-stamped data into event builder, prompt local trigger from digitisers

Result of AGATA tracking

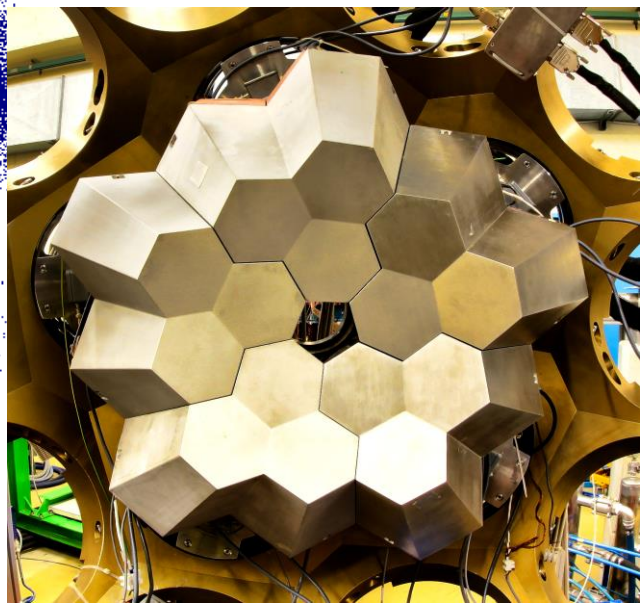
Reconstructed initial gamma rays with: - gamma ray energy
- 1st interaction position → Doppler correction
- 2nd interaction position → Polarization

1st interaction positions
after PSA and Tracking



B. Alikhani, NIM A, 675(0):144 (2012)
P.G. Bizzeti et al., Eur. Phys. J. A (2015) **51**: 49

- < 4 mm FWHM resolution obtained
- psa online at rates > 5kHz per crystal



Scientific results

$^{96}Kr_{60}$–Low-Z boundary of the island of deformation at N=60
J. Dudouet, et al.;
Phys. Rev. Lett. 118, 162501 (2017)

Role of the Δ Resonance in the Population of a Four-Nucleon State in the $^{56}Fe \rightarrow {}^{54}Fe$ Reaction at Relativistic Energies
Zs. Podolyák, et al.;
Phys. Rev. Lett. 117, 222302 (2016)

Superdeformed and Triaxial States in ^{42}Ca
K. Hadyńska, et al.,
Phys. Rev. Lett.117, 062501 (2016)

Isospin mixing in ^{80}Zr: from finite to zero temperature
S. Ceruti, et al.;
Phys. Rev. Lett. 115, 222502 (2015)

Isospin character of low-lying pygmy dipole states in ^{208}Pb via inelastic scattering of ^{17}O ions
F.C.L. Crespi, et al.;
Phys. Rev. Lett. 113, 012501 (2014)

Pygmy Dipole Resonance in ^{124}Sn populated by inelastic scattering of ^{17}O
L. Pellegri, et al.;
Phys. Lett. B 738 (2014) 519

AGATA scientific publications

45 publications

2011 - 2018

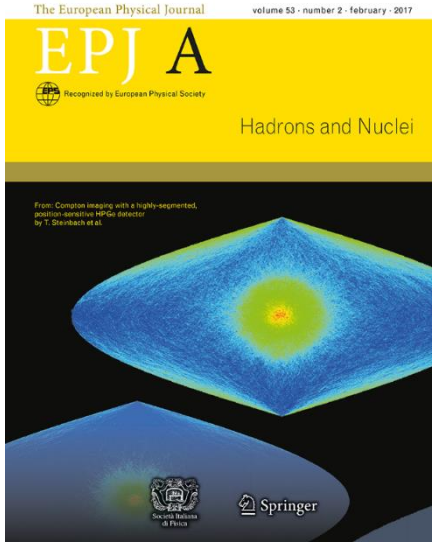
https://www.agata.org/

AGATA technical publications

85 publications

1999 - 2017

https://www.agata.org/



NuPECC Long Range Plan 2017



SUMMARY AND RECOMMENDATIONS

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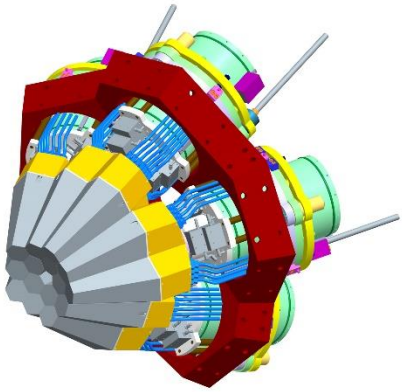
Support to the completion of AGATA in full geometry

AGATA represents the state-of-the-art in γ-ray spectroscopy and is an essential precision tool underpinning a broad programme of studies in nuclear structure, nuclear astrophysics and nuclear reactions. AGATA will be exploited at all of the large-scale radioactive and stable beam facilities and in the long-term must be fully completed in full 60 detector unit geometry in order to realise the envisaged scientific programme. AGATA will be realised in phases with the goal of completing the first phase with 20 units by 2020.

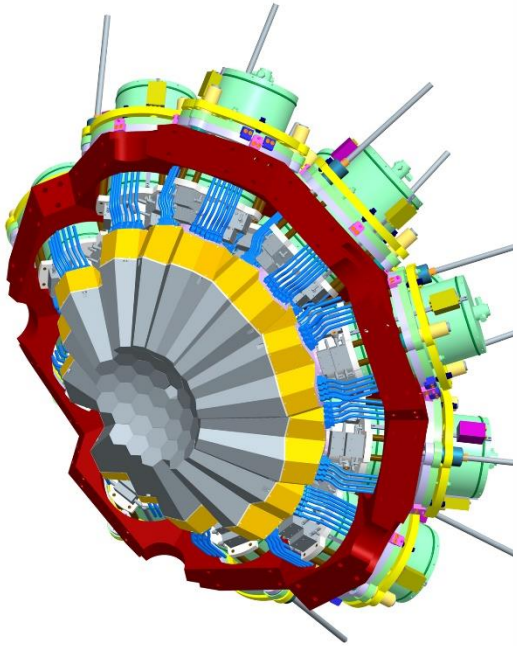
....

Memorandum of Understanding

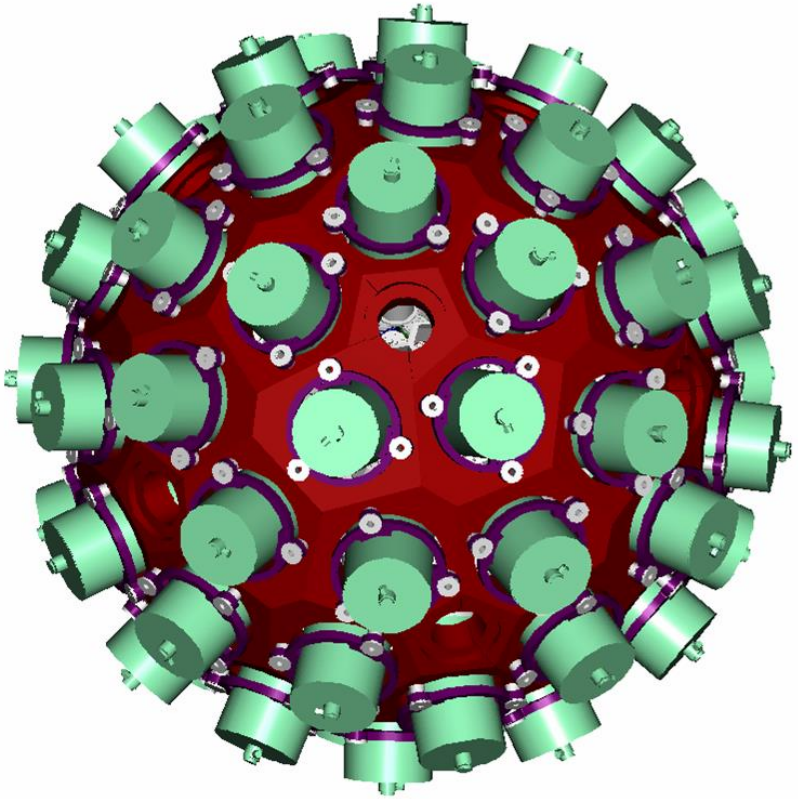
I MoU
AGATA 15
Demonstrator



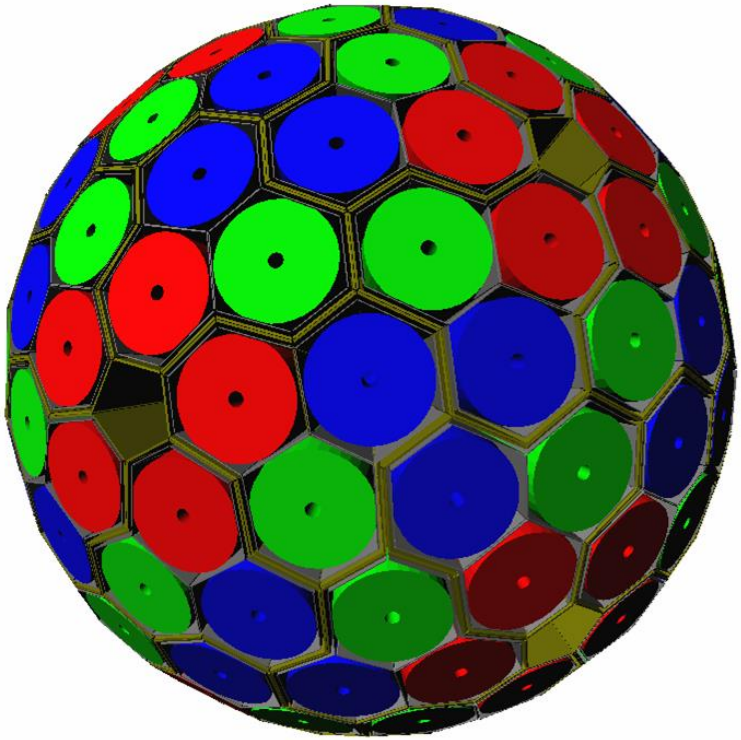
II MoU
AGATA 60



III MoU
AGATA 180 = 4π



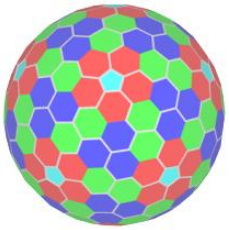
Advanced GAmma Tracking Array



180 crystals **60** triple-clusters
36-fold segmentation **6480** segments
Solid angle coverage ~4π

- Efficiency
- Peak/Total
- Position resolution
- Energy resolution
- High energy efficiency
- Polarization sensitivity
- Resolving power
- Count rate capability

Memorandum of Understanding



MoU for AGATA 4π configuration has to be based on a strong, convincing physics case!

Five working groups are established.

AGATA@FAIR	A. Jungclaus
AGATA@GANIL	Ch. Theisen
AGATA@HIE-ISOLDE	M. Zielinska
AGATA@LNL/SPES	S. Leoni
AGATA@JYFL	P. Greenlees

W. Korten as head of ACC is taking care of physics case document.

Future host labs beyond 2020



AGATA steering committee inquired interest of various laboratories to host AGATA beyond 2020 in summer 2017.

Letters from directors (ISOLDE group leader, ISCC head) were received in September 2017.

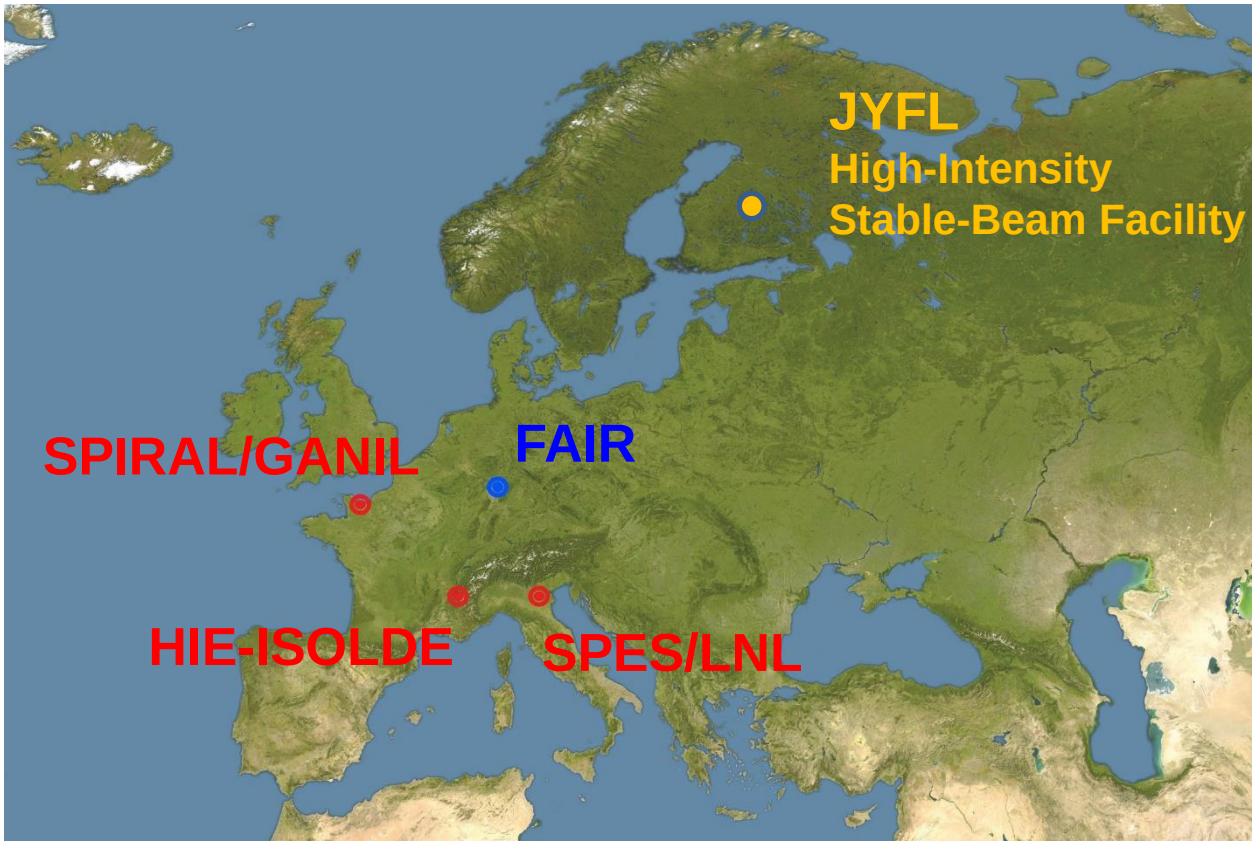
Following laboratories expressed interest to host AGATA beyond 2020

- FAIR
- GANIL
- ISOLDE
- JYFL
- SPES

Face-to face meeting at GANIL February 2018 organized by S. Lenzi.
Participants:

- J. Gerl for P. Giubellino, FAIR
- N. Alahari, GANIL
- B. Blank, ISOLDE, ISCC
- D. Bettoni, INFN, LNL

Future host labs beyond 2020



ISOL Facilities

Reaccelerated RIBs:

- Coulomb Excitation, Direct Reactions, MNT, Deep Inelastic, CN
- **Direct and inverse kinematics β ~ 10%**

In-Flight Facility

In-flight RIBs:

- Relativistic Coulomb Excitation, Knock-out, Fragmentation …
- **Inverse kinematics β ~ 50%**

High-Intensity Stable-Beam Facility

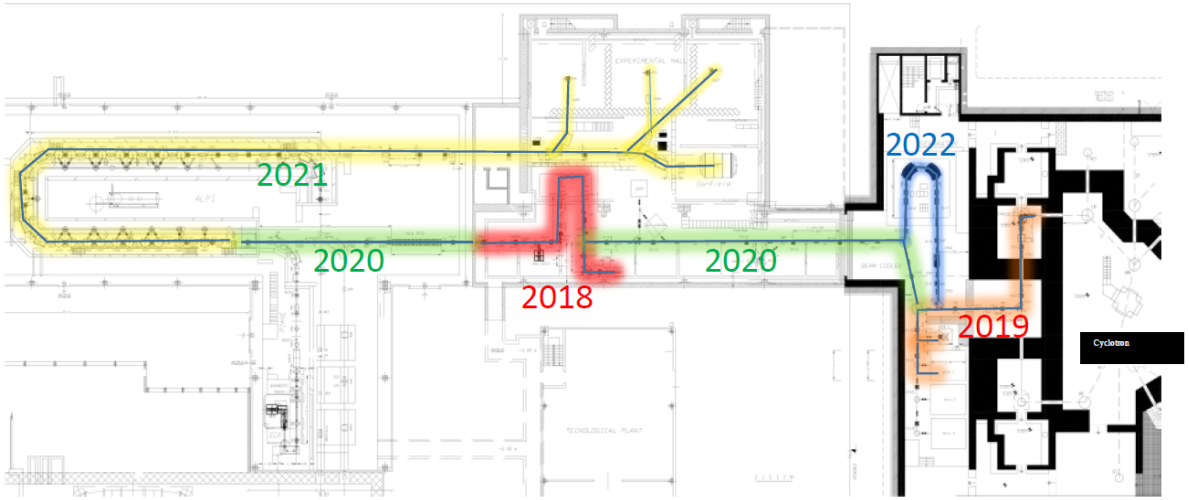
GANIL a future host lab beyond 2020

Perspectives of AGATA
- VAMOS & MUGAST 2019-2020

- SPIRAL1 beams (Coulex)
- VAMOS (Fission and MNT) 2021?
- VAMOS (SF of 250Cm) 2021?
- VAMOS (VAMOS-Gas-Filled)
- PARIS
- NEDA & DIAMANT

SPES a future host lab beyond 2020

SPES installation phases



Main Tasks	2017				2018				2019				2020				2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
PHASE 2a: CHARGE BREEDER & MRMS installation																								
PHASE 2B: ISOL SYSTEM and wien filter																								
PHASE 2B: 1+ beam line operation																								
PHASE 3A: 1+ beam line up to Charge Breeder																								
PHASE 3B: bunchers & RFQ																								
PHASE 3A: BEAM COOLER																								
PHASE 3A: HRMS																								

Experiments with non-reaccelerated beams 2020

installation Hardware commissioning Beam commissioning

SPES experiments with reaccelerated beams from ALPI projected for 2021
Stable beams are available before provided by LNL accelerator facility

HIE-ISOLDE a future host lab beyond 2020

- ✓ Cryo-module 4 installed in winter shutdown 2017- 2018
- ✓ Experiment start in July 2018 with E up to 10 MeV/u
- ✓ All experiments in place
- ✓ ISS operational in 2018
- ✓ Phase 2 completed !

XT01

XT02

XT03

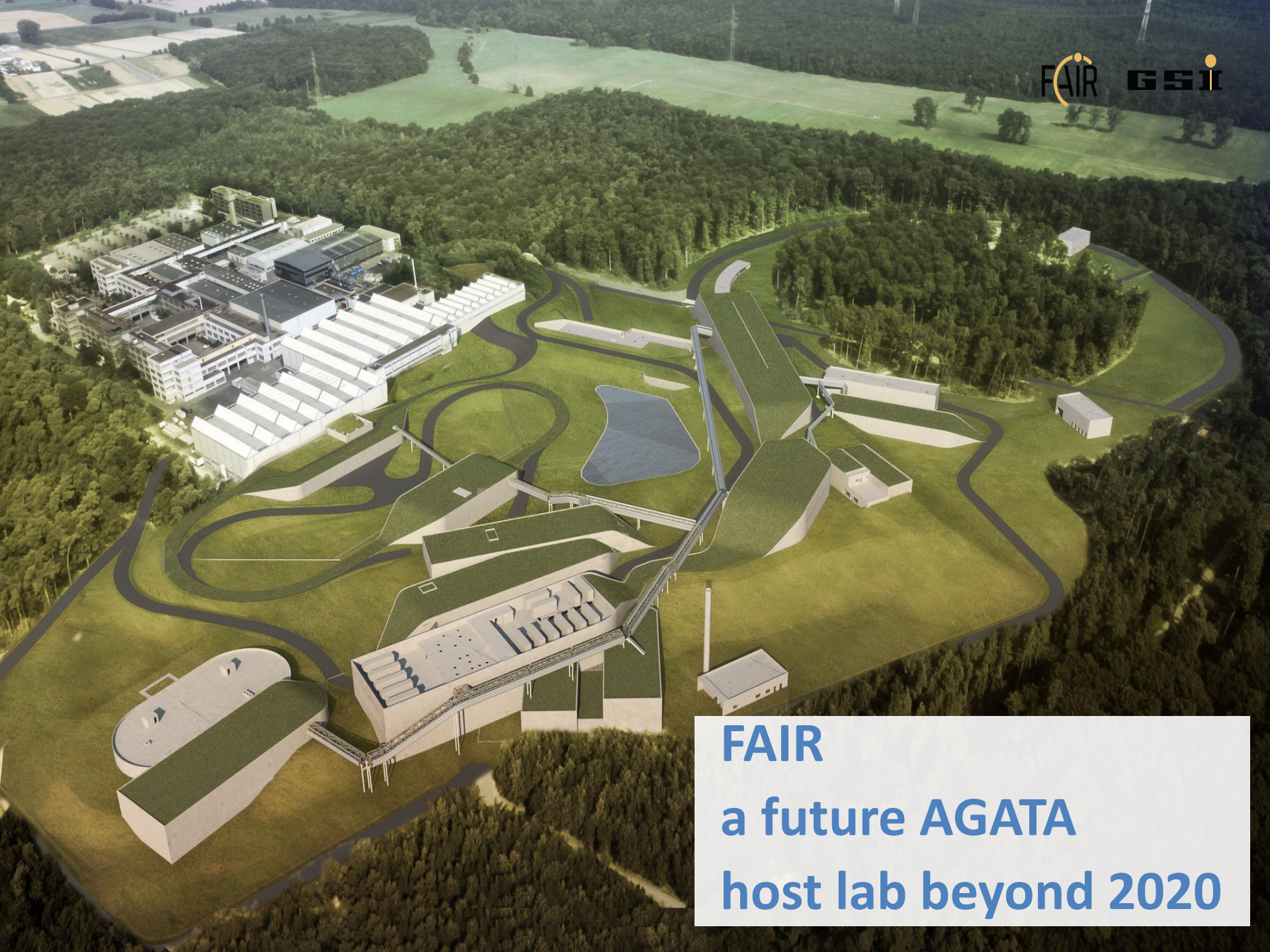
MINIBALL

- ❖ Cd-Si
- ❖ Detector
- ❖ T-REX
- ❖ SPEDE

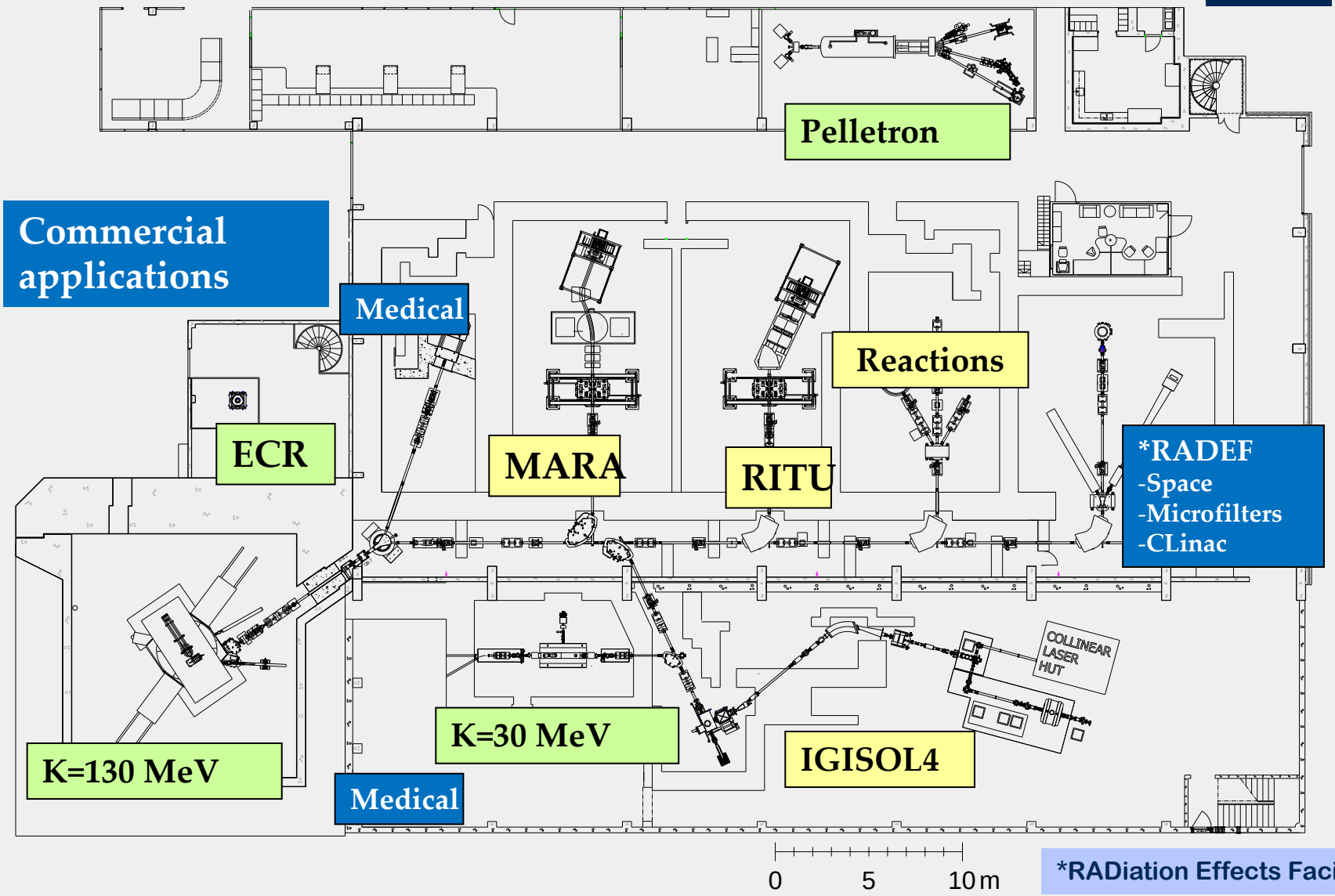


Multipurpose Scattering chamber

ISOLDE Solenoidal Spectrometer ISS


FAIR
GSI
FAIR
a future AGATA
host lab beyond 2020

JYFL Accelerator Laboratory



*RADiation Effects Facility

Future AGATA campaigns



AGATA MoU

For the duration of this MoU the AGATA system is expected to be sited for at least 25% of its total operation time each at GANIL/SPIRAL2 (Caen, France), GSI/FAIR (Darmstadt, Germany), LNL/SPES (Legnaro, Italy).

The host collaborating institutions GANIL, GSI and LNL (hereinafter “Host” or “AGATA Host”) have agreed to host AGATA. AGATA will be an essential instrument for the future facilities FAIR, SPES and SPIRAL2.

Campaigns at any other host laboratory, in particular outside of the Collaborating Institutions, are subject to negotiations within the AGATA Steering Committee.

Future AGATA campaigns



Letters received from potential future host labs:

• GANIL	now – 2020
• GANIL	period 2021-2025
• LNL	period 2023-2025
• JYFL	period 2024-2026/27
• ISOLDE	period 2026-2028 after LS3
• FAIR NUSTAR	period 2026/27

Schedule of future campaigns will be subject of ASC meeting in October 2018.

Project definition of 4π configuration should take into account future host sites and specific conditions.

Summary

- Overview AGATA steering committee news
- Next MoU: 4π γ-ray tracking array
- *special role of future RIB facilities*
- White book with convincing physics case
- Project definition