AGATA
Collaboration Council

ACC meeting 12th September 2024

Silvia Leoni (Milan University and INFN)

AGATA Collaboration Memberships

Steering Committee Chairperson: A. Bracco (since March 2022)

Bulgaria:	**Univ. Sofia, INRNE Sofia**
Finland:	**Univ. Jyväskylä**
France:	**GANIL Caen, IP2I Lyon, IJC Orsay, IPHC Strasbourg, DRF/IRFU Saclay**
Germany:	**GSI Darmstadt, TU Darmstadt, Univ. zu Köln**
Hungary:	**ATOMKI Debrecen**
Italy:	**INFN Firenze, Legnaro, Milano, Padova**
Poland:	**IFJ PAN Krakow, University of Warsaw (HIL)**
Spain:	**CSIC-Universidad de Valencia, Instituto de Fisica Corpuscular**
	Universidad de Valencia, Escuela Tecnica Superior de Ingenieria
	CSIC, Instituto de Estructura de la Materia, Madrid
	Universidad de Salamanca, Laboratorio de Radiaciones Ionizantes
Sweden:	**Lund Univ., KTH Royal Institute of Technology Stockholm, Uppsala Univ, Stockholm Univ.**
Turkey:	**Univ's Ankara, Istanbul, Kocaelli, Bitlis Eren**
UK:	**Univ's Brighton, Birmingham, Edinburgh, Liverpool, Manchester, West of Scotland,**
	Surrey, York, UKRI-STFC Daresbury
Romania:	**IFIN-HH Bucharest**
Slovenia:	**Ljubljana**

13 Countries

41 Institutions

ACC meeting November 2021
16 Reports (15 from GANIL, 1 from GSI)

ACC meeting June 2022
5 Reports (from GANIL)

Full review of AGATA@GANIL (unpublished) data

ACC meeting October 2023
Reports from AGATA@LNL
13 experiments already performed

Discussion on AGATA location from 2026

16.00- 16.20	AGATA Location from 2026: possible campaign at LNL *J.J. Valiente Dobon (LNL, Italy)*
16.20- 16.40	AGATA Location from 2026: possible campaign at GANIL *E. Clement (TBC) (GANIL, France)*
16.40- 17.00	AGATA Location from 2026 *General discussion*
17.00-18.30	AGATA Collaboration Council Meeting (Closed Session)

07.11.23
ASC granted AGATA@LNL until end 2026

for a scientific program with stable beams as requested by the collaboration

ACC meeting 12-13th September 2024, MILANO

Reports from 17 experiments from the LNL campaign (2022-2023)

Thursday 12th 14:40

ACC (12 Sept 2024, 14:40 - 15:30)

[77] Welcome from ACC Chair (14:40, 5 minutes)

Presenter: LEONI, Silvia (University of Milano and INFFN Milano)

[78] News from AGATA Steering committee (14:45, 15 minutes)

Presenter: GORSKA, Magdalena (GSI Darmstadt)

REPORTS EXP – 15.00-15.30

- 60Ni Coulex, HADYNSKA-KLEK (HIL, Warsaw)
- EXP 23.7 and 23.09: 56Ni, 60Zn, BALOGH (INFN)

COFEE BREAK

ACC (12 Sept 2024, 16:00 - 18:00) **AGATA from 2027**

[79] AGATA Location from 2027 : Possible campaign at LNL (16:00, 20 minutes)

[80] AGATA Location from 2027 : Possible campaign at GANIL (16:20, 20 minutes)

Presenter: FARGET, Fanny (GANIL)

[81] AGATA Location from 2027 : Open discussion - Public (16:40, 20 minutes)

Presenter: LEONI, Silvia (University of Milano and INFFN Milano)

[82] AGATA Collaboration Council Meeting (Closed Session) (17:00, 1 hour)

Friday 13th 9:00

- Lifetime measurement of 6.793 MeV state of 15O, PILOTTO (Padua Un.)
- Spectroscopy/lifetimes toward the Island of Inversion GENNA (Milano Un.)
- Lifetime measurements towards the island of inversion along N = 20 NICOLÁS DEL ÁLAMO (Padua Un.)
- Report on AGATA experiment 001 phase 2, ZAGO (Padua Un.)
- Report on the AGATA experiment number 011, ANDREETTA (Padua Un.)
- Report on the AGATA experiment number 22.18, KJUS (CEA Saclay)
- Two-Phonon Octupole excitation in 96Zr, STRAMACCIONI (Padua Un.)
- Lifetime/transition-probability measurements in 96Zr, AHMED (Guelph Un.)

COFFEE BREAK 11.00-11.30

- Shape coexistence in Z≈N A≈70 nuclei: Coulex of 74Se, KJUS (CEA Saclay)
- Shape Coexistence in ^{110}Cd, Coulomb Excitation, PIĘTKA (HIL, Warsaw Un.)
- Report on experiment EXP_009 (22.23), ANGELINI (Padua Un.)
- Report on the AGATA@Legnaro EXP 22.04, ABELS (University of Cologne)
- Report on EXP-017 and EXP-022: SULLIVAN (University of Liverpool)
- Decay-out of highly-deformed bands in ^{136,137}Nd, PETRACHE (IJClab, Orsay)
- Search for octupole correlations in ^{232,234}Pu isotopes, AYATOLLAHZADEH, (University of the West of Scotland)

1. AGATA Collaboration Meetings
2. **AGATA Science Dissemination**
3. AGATA in LRP2024
4. AGATA from 2027
5. Open Issues

AGATA web page

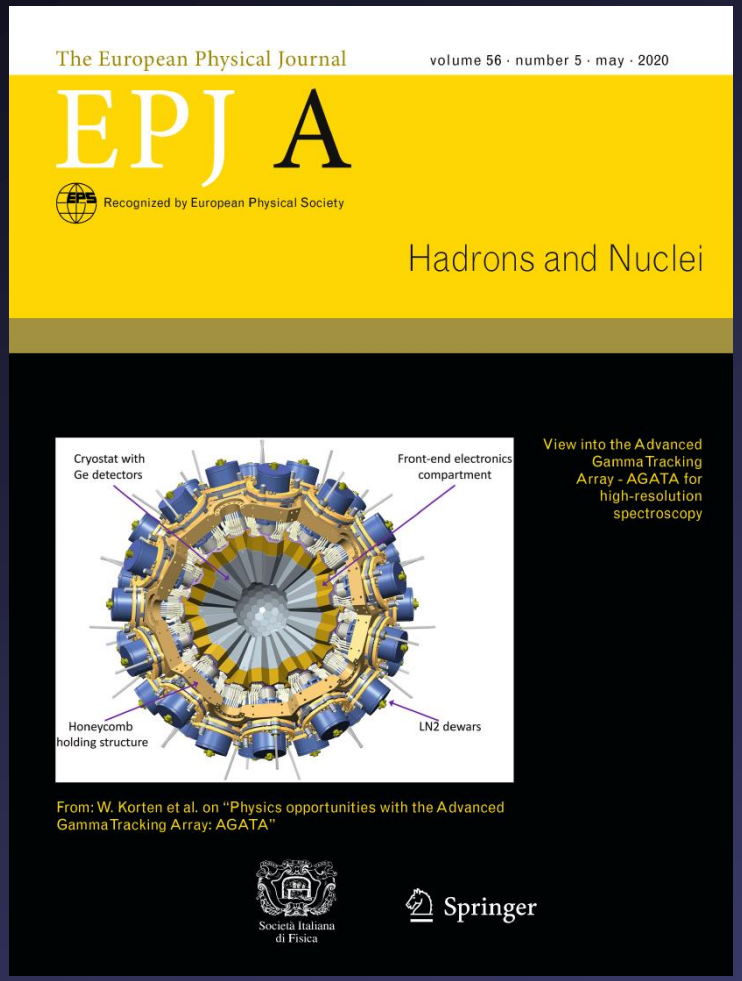
https://www.agata.org

Organigram,
Meetings,
Publications,
Theses,
Talks
Approved experiments,
...

maintained by Johan Nyberg
fully updated

AGATA Science Review Papers

AGATA Science WHITE Book
Physics Opportunity (EPJA, 2020)



W. Korten et al., EPJA56, 137(2020)

Eur. Phys. J. A (2020) 56:137
https://doi.org/10.1140/epja/s10050-020-00132-w
THE EUROPEAN PHYSICAL JOURNAL A
Review

Physics opportunities with the Advanced Gamma Tracking Array: AGATA

W. Korten[9,a], A. Atac[30,35], D. Beaumel[23], P. Bednarczyk[14], M. A. Bentley[34], G. Benzoni[21], A. Boston[17], A. Bracco[20,21], J. Cederkäll[18], B. Cederwall[30], M. Ciemała[14], E. Clément[1], F. C. L. Crespi[20,21], D. Curien[31], G. de Angelis[15], F. Didierjean[31], D. T. Doherty[10], Zs. Dombradi[6], G. Duchêne[31], J. Dudek[31], B. Fernandez-Dominguez[27], B. Fornal[14], A. Gadea[33], L. P. Gaffney[17], J. Gerl[4], K. Gladnishki[28], A. Goasduff[25], M. Górska[4], P. T. Greenlees[12], H. Hess[13], D. G. Jenkins[34], P. R. John[5], A. Jungclaus[19], M. Kmiecik[14], A. Korichi[22], M. Labiche[3], S. Leoni[20,21], J. Ljungvall[22], A. Lopez-Martens[22], A. Maj[14], D. Mengoni[24,25], B. Million[21], A. Nannini[8], D. Napoli[15], P. J. Nolan[17], J. Nyberg[32], A. Obertelli[5], J. Pakarinen[11,12], N. Pietralla[5], Zs. Podolyák[10], B. Quintana[26], R. Raabe[16], G. Rainovski[28], F. Recchia[24,25], P. Reiter[13], D. Rudolph[18], J. Simpson[3], Ch. Theisen[9], D. Tonev[29], A. Tumino[2,7], J. J. Valiente-Dobón[15], O. Wieland[21], K. Wimmer[19], M. Zielińska[9], the AGATA Collaboration

Progress in Particle and Nuclear Physics 121 (2021) 103887
Contents lists available at ScienceDirect
Progress in Particle and Nuclear Physics
journal homepage: www.elsevier.com/locate/ppnp
ELSEVIER

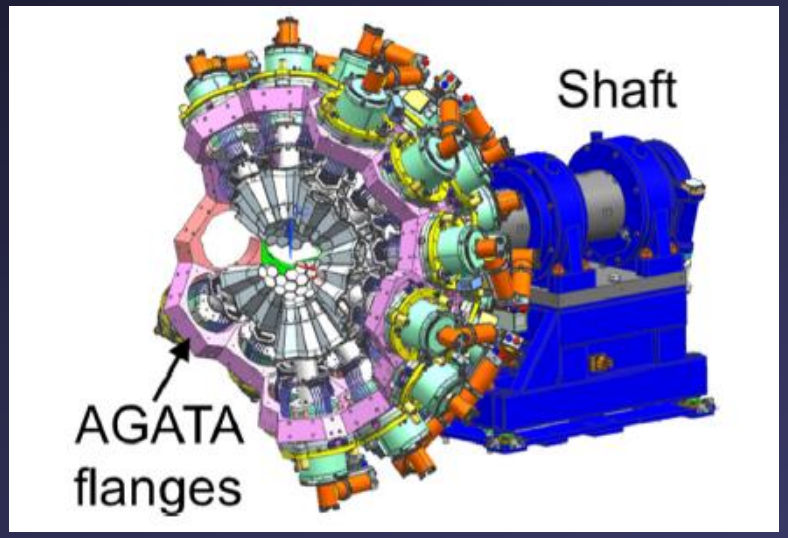
Review

Gamma spectroscopy with AGATA in its first phases: New insights in nuclear excitations along the nuclear chart

A. Bracco[a,b,*], G. Duchêne[c], Zs. Podolyák[d], P. Reiter[e]

[a] Dipartimento di Fisica dell'Università degli Studi di Milano, Italy
[b] INFN, Sezione di Milano, Italy
[c] Université de Strasbourg, CNRS, IPHC UMR 7178, F-67000 Strasbourg, France
[d] Department of Physics, University of Surrey, Guildford, GU2 7XH, United Kingdom
[e] Institute of Nuclear Physics, University of Cologne, 50937 Cologne, Germany

NIMA 1049(2023)168040



Nuclear Inst. and Methods in Physics Research, A 1049 (2023) 168040

Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

journal homepage: www.elsevier.com/locate/nima

Full Length Article

Conceptual design of the AGATA 2π array at LNL

J.J. Valiente-Dobón [a,*], R. Menegazzo [b], A. Goasduff [a], D. Agguiaro [b], P. Aguilera [b], F. Angelini [a,c], M. Balogh [a], D. Bazzacco [b], J. Benito [b,c], G. Benzoni [d], N. Bez [b], M. Bolognesi [c], S. Bottoni [e], D. Brugnara [a], S. Carollo [b,c], P. Cocconi [a], A. Cogo [a], J. Collado [a,f], F.C.L. Crespi [e], A. Ertoprak [a], R. Escudeiro [b,c], F. Galtarossa [a,c], E.R. Gamba [e], A. Gambalonga [a], B. Góngora Servín [a,g], A. Gottardo [a], A. Gozzelino [a], M. Gulmini [a], Z. Huang [b,c], T. Marchi [a], D. Mengoni [b,c], P. Modanese [a], D.R. Napoli [a], J. Pellumaj [a,g], R.M. Pérez-Vidal [a,h], S. Pigliapoco [b,c], E. Pilotto [a,c], L. Ramina [b], M. Rampazzo [b], W. Raniero [a], M. Rebeschini [b], K. Rezynkina [b], D. Rosso [a], M. Scarcioffolo [c], D. Scarpa [a], M. Sedlák [a], R. Smith [i], N. Toniolo [a], F. Veronese [b], V. Volpe [a], L. Zago [a,c], I. Zanon [a], G. Zhang [b,c], R. Abels [j], M.L. Allegrini [a], C. Aufranc [k], G. Baulieu [k], C. Belkhiria [l], M. Benettoni [b], D. Benini [a], M. Bentley [u], M. Biasotto [a], M. Blaizot [l], J. Blasco Miquel [h], C. Boiano [d], A. Boston [m], H. Boston [m], A. Boujrad [l], P. Bourgault [l], A. Bracco [d,e], S. Brambilla [d], I. Burrows [i], F. Camera [d,e], S. Capra [d,e], A. Capsoni [d], R. Cash [i], J.V. Civera [h], E. Clément [l], S. Coelli [d], M. Cordwell [i], L. Corradi [a], S. Coudert [l], G. De Angelis [a], L. De Ruvo [a], G. Debras [n], M. Del Fabbro [b,c], J. Diklić [o], N. Dosme [p], G. Duchene [q], B. Duclos [l], J. Dudouet [k], J. Eberth [j], S. Elloumi [p], C. Everett [m], S. Fantinel [a], M. Fillinger [q], E. Fioretto [a], C. Fransen [j], A. Gadea [h], L. Gibelin [p], V. González [f], J. Goupil [l], C. Görgen [j], A. Grant [i], K. Green [m], J. Ha [b,c], T. Hartnett [i], K. Henseler [j], H. Hess [j], R. Hirsch [j], C. Houarner [l], J. Jacob [p], T. Joannem [n], D.S. Judson [m], N. Karkour [p], M. Karolak [n], M. Kebbiri [n], J. Kieffer [n], M. Labiche [i], X. Lafay [p], P. Le Jeannic [p], A. Lefevre [l], E. Legay [p], F. Legruel [l], S. Lenzi [c,b], S. Leoni [e,d], D. Linget [p], M. Liptrot [i], A. López-Martens [p], A. Lotodé [n], L. Manara [d], L. Ménager [l], T. Mijatović [o], B. Million [d], A. Minarello [a], G. Montagnoli [c,b], P. Morrall [i], I. Mullacrane [i], J. Nyberg [t], G. Philippon [p], M. Polettini [e], F. Popieul [n], A. Pullia [e,d], F. Recchia [b,c], P. Reiter [j], G. Richardt [j], M. Rocchini [r], A. Roger [n], F. Saillant [l], E. Sanchis [f], Md.S.R. Laskar [d], G. Secci [e,d], M.-H. Sigward [q], J. Simpson [i], N. Solenne [n], F. Spee [j], A.M. Stefanini [a], O. Stézowski [k], S. Szilner [o], N. Templeton [i], Ch. Theisen [n], S. Thiel [j], F. Tomasi [d], S. Tzvetkov [n], D. Vigano [d], E. Viscione [d], O. Wieland [d], K. Wimmer [s], G. Wittwer [l], M. Zielińska [n]

[a] Istituto Nazionale di Fisica Nucleare (INFN), Laboratori Nazionali di Legnaro, Legnaro, Italy
[b] Istituto Nazionale di Fisica Nucleare (INFN), Sezione di Padova, Padova, Italy
[c] Dipartimento di Fisica, Università di Padova, Padova, Italy
[d] Istituto Nazionale di Fisica Nucleare (INFN), Sezione di Milano, Milano, Italy
[e] Dipartimento di Fisica, Università degli Studi di Milano, Milano, Italy
[f] Departamento de Ingeniería Electrónica, Universitat de Valencia, Burjassot, Valencia, Spain
[g] Dipartimento di Fisica e Scienze della Terra, Università di Ferrara, Ferrara, Italy
[h] IFIC, CSIC - Universitat de València, Spain
[i] Science and Technology Facilities Council (STFC), Daresbury Laboratory, Keckwick Lane, Warrington, UK
[j] Institut für Kernphysik, Universität zu Köln, Köln, Germany
[k] Université Lyon, Université Claude Bernard Lyon , CNRS/IN2P3, IP2I Lyon, France
[l] Grand Accélérateur National d'Ions Lourds (GANIL), CEA/DRF-CNRS/IN2P3, Caen, France
[m] Oliver Lodge Laboratory, University of Liverpool, Liverpool, UK
[n] IRFU, CEA, Université Paris-Saclay, Gif-sur-Yvette, France
[o] Ruđer Bošković Institute, Zagreb, Croatia

Topical Issue on AGATA in EPJA (1 year preparation, due by end of 2022)

Advancements in science and technology

Managing Editors: M. Borge, N. Alamanos

Guest Editors: A. Bracco, E. Clement, A. Gadea, S. Leoni, W. Korten, J. Simpson

1) Preface
Editors: S. Leoni, W. Korten, E. Clement, A. Gadea, A. Bracco, J. Simpson

2) Science advancements with AGATA

2.1 Nuclear structure advancements with multi-nucleon transfer reactions
Lead Author: A. Gadea

2.2 Nuclear structure advancements with fission
Lead Author: A. Lemasson

2.3 Nuclear structure advancements with fusion reactions
Lead Authors: J. Nyberg, J.J. Valiente-Dobon

2.4 Nuclear structure advancements with direct reactions
Lead Authors: W. Catford, D. Beaumel, D. Mengoni

2.5 Nuclear structure advancements with relativistic beams
Lead Authors: M. Bentley, G. Benzoni, K. Wimmer

2.6 Nuclear structure advancements with high energy gamma rays
Lead Author: F. Camera

3) Technical advancements with AGATA

3.0 Advancements on detector technologies
Lead Authors: IKP Cologne, Padua University: P. Reiter, XXX

3.1 Mechanical implementations and infrastructures
Lead Authors: J. Simpson, B. Million

3.2 Electronics
Lead Authors: A. Gadea, E. Clement

3.3 Software developments
Lead Authors: O. Stezowski, J. Dudouet

4) Performances of AGATA

4.1 Review of the last decade Pulse Shape Analysis activities
Lead Authors: A. Boston, P. Reiter

4.2 Performances of tracking algorithms
Lead Authors: J. Ljungvall, F. Crespi

4.3 System performances under different conditions
Lead Authors: A. Korichi, A. Goasduff

4.4 Simulations of AGATA response and couplings with ancillaries
Lead Author: M. Labiche

4.5 Organization of the collaboration and physics campaigns
Lead Author: E. Clement

15 papers + preface

After internal review by Guest Editors

All 15 Paper Submitted by 25th March 2023

NOW FULLY PUBLISHED

AGATA Focus Issue 2024: Advancement in Science and Technology

The European Physical Journal A

special issue · january · 2024

Topical Collection on AGATA: Advancements in Science and Technology

Edited by
Nicolas Alamanos, Maria Jose Garcia Borge, Angela Bracco, Emmanuel Clement, Andres Gadea, Wolfram Korten, Silvia Leoni and John Simpson

(Continuation on the reverse page)

Printed on acid free paper

EPJ.org
your physics journal

The European Physical Journal

special issue · january · 2024

EPJ A

Recognized by European Physical Society

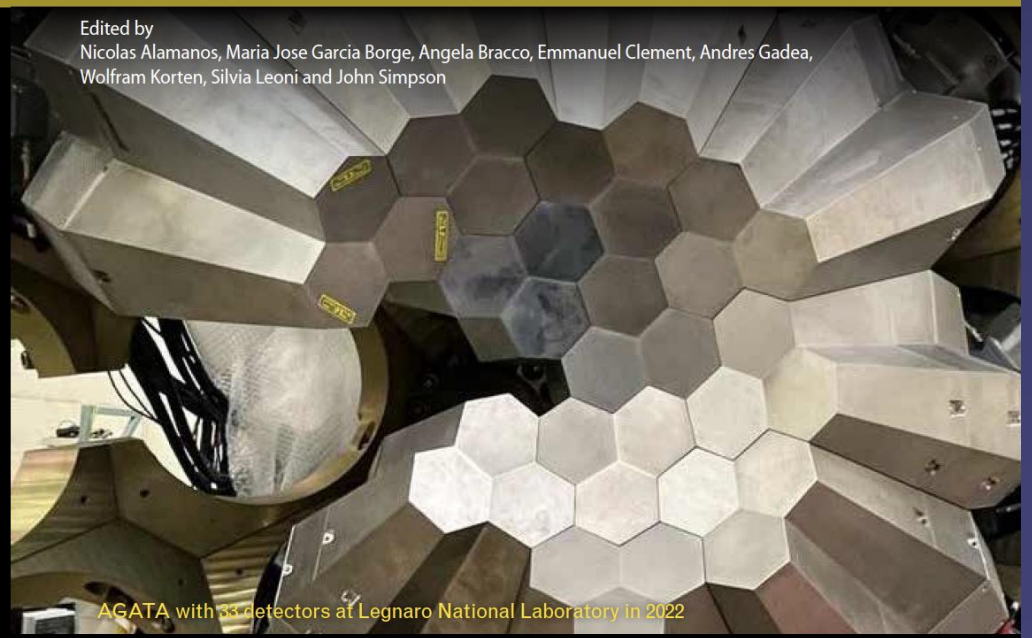
Hadrons and Nuclei

The European Physical Journal A

special issue · january · 2024

Topical Collection on AGATA: Advancements in Science and Technology

Edited by
Nicolas Alamanos, Maria Jose Garcia Borge, Angela Bracco, Emmanuel Clement, Andres Gadea, Wolfram Korten, Silvia Leoni and John Simpson



AGATA with 33 detectors at Legnaro National Laboratory in 2022

Società Italiana di Fisica

Springer

1. AGATA Collaboration Meetings
2. AGATA Science Dissemination
3. **AGATA in LRP2024**
4. AGATA from 2027
5. Open Issues

Long Range Plan Perspectives in Nuclear Physics

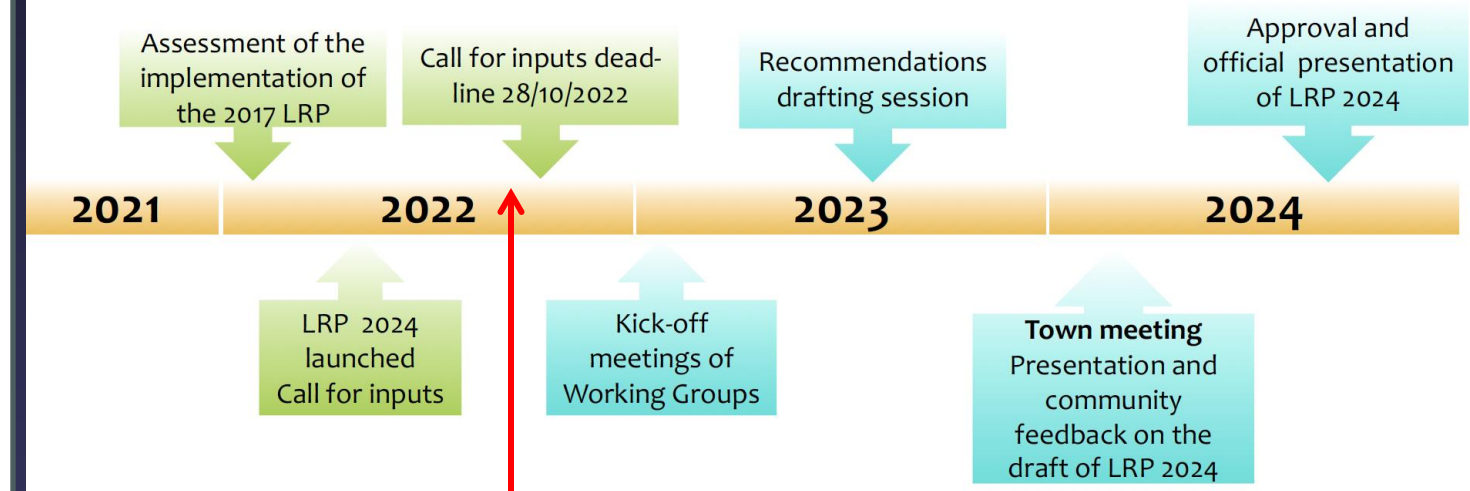
LAST LRP in 2017

A. Bracco
NuPECC Chair

AGATA is strongly supported

LRP2024 Timeline

M. Lewitowicz - NuPECC Chair



AGATA Abstract

Scientific and technological challenges of the AGATA tracking array in the next decade

Contact person:

Silvia Leoni (AGATA Spokesperson, on behalf of the collaboration)

prepared by A. Bracco, E. Clement, S. Leoni, B. Million, W. Korten
revised by AMB

Town Meeting Bucharest 15-17 April 2024

FINAL Recommendations Frozen
and LRP document presented and accepted by the NuPECC Community

LRP2024 soon available in final graphics format

19th November 2024 in Brussels: Presentation Symposium of the NuPECC Long Range Plan 2024

NuPECC Long Range 2024

NuPECC Long Range Plan 2024

Thematical Working Groups

1. **Hadron Physics**
   - Coordinators:
     - Karin Schönning (Uppsala University)
     - Constantia Alexandrou (University of Cyprus)
   - NuPECC Liaisons:
     - Diego Bettoni (INFN Ferrara)
     - Dave Ireland (University of Glasgow)
   - Members
   - Indico Site
2. **Strongly Interacting Matter under Extreme Conditions**
   - Coordinators:
     - Laura Fabbietti (TU München)
     - Urs Wiedemann (CERN Geneva)
   - NuPECC Liaisons:
     - Gert Aarts (Swansea)
     - Raimond Snellings
   - Members
   - Indico Site
3. **Nuclear Structure and Reaction Dynamics**
   - Coordinators:
     - Silvia Leoni (Univ. Milano)
     - Tomas Rodriguez (UCM)
   - NuPECC Liaisons:
     - Adam Maj
     - Jelena Vesic
   - Members
   - Indico Site
4. **Nuclear Astrophysics**
   - Coordinators:
     - Anu Kankainen (JYFL)
     - Jordi Jose (Barcelona)
   - NuPECC Liaisons:
     - Daniel Bemmerer
     - Sandrine Courtin
   - Members
   - Indico Site
5. **Symmetries and Fundamental Interactions**
   - Coordinators:
     - Pierre Delahaye (GANIL)
     - Paolo Crivelli (ETH)
   - NuPECC Liaisons:
     - Eberhard Widmann
     - Klaus Kirch
   - Members
   - Indico Site
6. **Infrastructures**
   - Coordinator:
     - Wolfram Korten (CEA, Saclay)
   - NuPECC Liaisons:
     - Joaquin Gomez Camacho
     - Patricia Roussel-Chomaz
   - Members
   - Indico Site
7. **Applications and Societal Benefit**
   - Coordinators:
     - Thomas Cocolios (KU Leuven)
     - Charlot Vandevoorde (GSI)
   - NuPECC Liaisons:
     - Lucia Popescu
     - Vladimir Wagner
   - Members
   - Indico Site
8. **Nuclear Physics Tools**
   - Detectors and experimental techniques
   - Computing, Machine Learning and Artificial Intelligence
   - Coordinators:
     - Silvia Dalla Torre (INFN)
     - Thorsten Kollegger (GSI/FAIR)
     - Jana Guenther (U. Wuppertal)
   - NuPECC Liaisons:
     - Eugenio Nappi
     - Hervé Moutarde
   - Members
   - Indico Site
9. **Open Science and Data**
   - Coordinator:
     - Antoine Lemasson (GANIL)
   - NuPECC Liaison:
     - Marek Lewitowicz
   - Members
   - Indico Site
10. **Nuclear Science - People and Society**
    - Training, Careers & Diversity
    - Education and Outreach
    - Coordinators:
      - María García Borge (Madrid)
      - Christian Diget (York)
    - NuPECC Liaison:
      - Rolf-Dietmar Herzberg
      - Yvonne Leifels
    - Members
    - Indico Site

O. Stezowski is group member
Discussions on AGATA open data soon resumed

10 Thematical Working Groups

https://indico.ph.tum.de/category/61/

Recommendations for Nuclear Physics Infrastructures

The NuPECC Long Range Plan 2024 resulted in the following main recommendations for infrastructures of importance for nuclear physics:

- The first phase of the international **FAIR** facility is expected to be operational by 2028, facilitating experiments with SIS100 using the High-Energy Branch of the Super-FRS, the CBM cave and the current GSI facilities. Completing the full facility including the **APPA**, **CBM**, **NUSTAR** and **PANDA** programs will provide European science with world-class opportunities for decades and is highly recommended.
- At **GANIL/SPIRAL2** the Super-Separator Spectrometer **S^3** is in an advanced stage of completion and the low-energy **DESIR** facility and heavy-ion injector **NEWGAIN** will be operational from 2027/28. The refurbishing of the cyclotrons will ensure their operation for the next decades. Timely completion and full exploitation of these GANIL/SPIRAL2 projects is recommended. The plan for the evolution of the infrastructure towards a very high-intensity reaccelerated RIB facility of up to 100 MeV/u should be actively pursued.
- Nuclear physics opportunities at **CERN** constitute a world-leading research programme. The construction of **ALICE 3** as part of the **HL-LHC** plans is strongly recommended. Continued support for exploitation and new developments are recommended to maximise the scientific output of **ISOLDE**, **n_TOF**, **SPS fixed-target program** and **AD/ELENA**. As the roadmap for the post-LHC future of CERN is developed, a strategy should be prepared to secure future opportunities for continuing world-leading nuclear-physics programmes that are unique to CERN.
- At **ELI-NP** studies will focus on addressing key topics, such as laser-driven ion and electron acceleration. Implementing the gamma beam system to achieve the full completion of the facility and allow breakthrough results in the field of nuclear photonics is of high importance and is strongly recommended.
- Timely completion of the **SPES** facility and continuing coordinated efforts in developing the **ALTO, IGISOL, ISOLDE, SPES, and SPIRAL ISOL facilities** in Europe, will be key to maintaining their world-leading position in many areas of radioactive isotope science and are strongly recommended. Extending these efforts towards future facilities, such as **ISOL@MYRRHA, TATTOOS@PSI,** and **RIB@IFIN-HH**, together with the development of common instrumentation, will secure the European leading position for radioisotope production, separation, and acceleration techniques, and create new avenues for the future and should therefore be actively pursued.
- The exploitation of large-scale **stable beam** facilities, such as **FAIR/GSI**, **GANIL/SPIRAL2, IFIN, JYFL-ACCLAB, LNL, LNS, NLC (SLCJ and IFJ-PAN),** and smaller ones, such as tandems, underground facilities, and AMS systems, should be maximised. It is recommended that synergies between all these facilities, irrespective of size, be reinforced. Developments of novel and more intense beams and capabilities are also recommended to open new opportunities for basic science and applications.
- It is strongly recommended to complete the **AGATA** gamma-ray tracking array to its full configuration as a key instrument for studying atomic nuclei in both stable and radioactive ion beam facilities.
- Exploitation and optimisation of the European **lepton beam facilities**, including **ELSA, MAMI, and S-DALINAC**, are needed to realise their full physics potential. The completion of the **MESA** facility and the **High-Intensity Muon Beams** project at **PSI**, are recommended.
- Neutron facilities play a significant role in nuclear fundamental research and applications, producing unique and valuable experimental results. The new **NFS** facility, located at SPIRAL2, provides a highly intense neutron flux of fast neutrons, attracting a broad scientific community. It is crucial and strongly recommended to maintain the operation of exceptional neutron facilities like **ILL** and **n_TOF** at CERN. **ESS** facility and the future infrastructure **IFMIF-DONES** will provide advanced tools for interdisciplinary research and their unique capabilities to serve advances in nuclear physics should be explored.
- Theory groups and centres should be strongly supported throughout Europe to ensure the fundamental contribution of theory to nuclear physics. An important role is played by the European Centre for Theoretical Studies (**ECT***, Trento, Italy), which is a unique centre dedicated to theoretical nuclear physics and related areas. Stronger pan-European support is needed to ensure that ECT* activities continue to play a strategic role in the development of nuclear physics in Europe.
- Collaboration with **non-European infrastructures** should be fostered in all areas of nuclear research to seize unique scientific opportunities and synergies that complement scientific programmes based in Europe. In particular, European participation in the construction of the **ePIC** experiment at the future international flagship facility **EIC** is recommended.

EXECUTIVE SUMMARY

AVAILABLE AT NUPECC WEB PAGE

https://www.nupecc.org/lrp2024/Draft_Executive_Summary_LRP2024.pdf

Recommendations - from Nuclear Structure and Reaction Dynamics (TWG3)

Nuclear Structure and Reaction Dynamics

The main challenges in Nuclear Structure and Reaction Dynamics in the next decade are the following: *How do nuclei and nuclear matter emerge from the underlying fundamental interactions? What is the limit of nuclear existence? How are nuclear shells evolving across the nuclear landscape, what kind of shapes nuclei can take, and what is the role of nuclear correlations? What are the mechanisms behind nuclear reactions and nuclear fission? How can we probe the equation of state with nuclear structure observables, such as resonances? How can nuclear structure and reaction dynamics contribute to astrophysics, hadron physics and fundamental symmetries?*

- **Support of existing facilities and experiments**
  - To ensure complementarity in experimental programs, it is essential to strongly support to *large- and small-scale facilities* which guarantee access to the whole community, allow detector testing and exploratory experiments in preparation of more complex future experiments, and play a key role in training of new generations of physicists.
  - The co-ordinated effort amongst the *ISOL facilities* in Europe has been key to securing a world-leading position in many areas of radioactive beam science. Reinforcing this collaboration on radioisotope production, separation, and acceleration techniques, together with the exploitation of common instrumentation and a stream of new ideas, will secure the leading position of Europe in the future.
  - To push the frontiers of spectroscopy and lifetime measurements at the limits of energy and production, superb resolution and high-efficiency for gamma-ray spectroscopy is essential. It is therefore mandatory to recommend the *full completion of the European flagship gamma spectrometer AGATA-4π (with ancillaries)* which is and will stay the major workhorse for nuclear structure gamma-spectroscopy and nuclear astrophysics precision physics, at both radioactive and stable ion-beam facilities.

- **Future flagship facilities and experiments**
  - Unique insights into Nuclear Structure and Reaction Dynamics can only be obtained via the urgent completion of the *FAIR facility, including the Low-Energy-Branch, SPIRAL2, SPES, ELI-NP, ISOL@MYRRHA, and ISOLDE upgrades*, as unique laboratories for studying reactions of very exotic nuclei, and for the exploration of the nuclear chart towards the driplines.
  - The world leadership of Europe in the use of heavy ion storage rings -as key precision instruments for the study of nuclear masses and radii, nuclear resonances, isomers, and fission- should be maintained by the construction of future rings at FAIR and HIE-ISOLDE.

- **Theory developments**
  - It is mandatory to establish efficient interfaces between theories based on different degrees of freedom, to assess and reduce theoretical uncertainties, to improve the efficiency of many-body methods to provide a good description of spectroscopic observables, to improve time-dependent methods and reaction calculations, and, to use advanced methods like Bayesian inference in combination with new computational techniques (e.g., Artificial Intelligence, Quantum Computing).
  - Nuclear theory is crucial for interpreting experimental results and guiding future research. Excellence programs to train, attract and keep talent within the field should be pursued. *Theory centres should be strongly supported throughout Europe,* in particular the European Centre for Theoretical Studies (*ECT**), and to support emerging *virtual access facilities* providing theory results for experimentalists (e.g., *Theo4Exp VA facility in the EURO-LABS project*).

in Chapter *“Detectors and experimental techniques”*

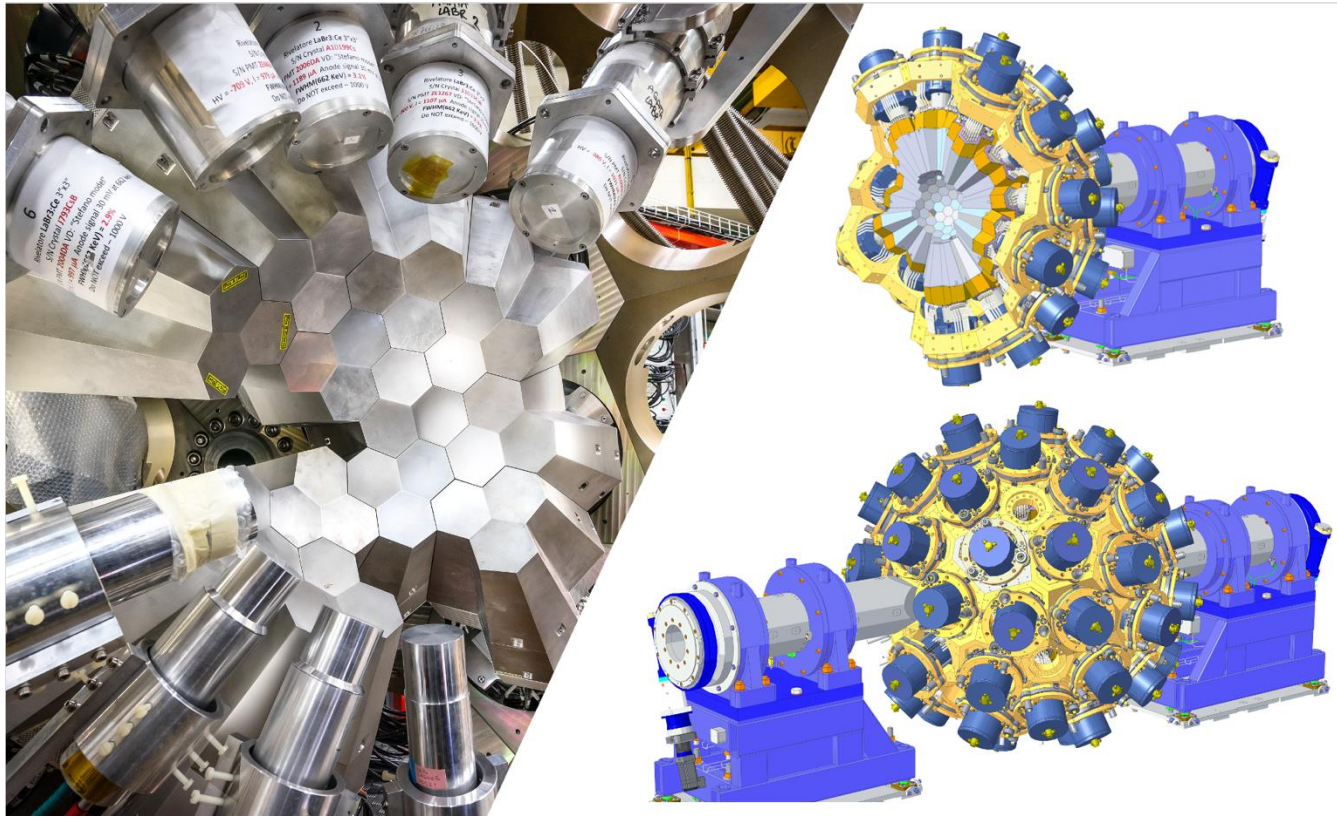
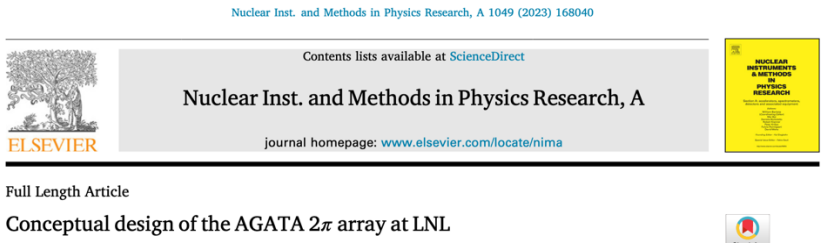


Figure xx *Rendering view (right) of the 2π and 4π AGATA spectrometer showing the cryostat dewars (blue) of the HPGe detectors (grey). On the left a current view of the AGATA HPGe detectors from the target position. AGATA is conceived to be coupled to different complementary detectors: large volume LaBr3:Ce scintillators are present in the picture.*

1. AGATA Collaboration Meetings
2. AGATA Science Dissemination
3. AGATA in LRP2024
4. **AGATA from 2027**
5. Open Issues

Two different configurations

LNL: new data centre, new targets ^{9}Be, ^{232}Th, ^{238}U and new ^{238}U beam


Nuclear Inst. and Methods in Physics Research, A 1049 (2023) 168040

Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

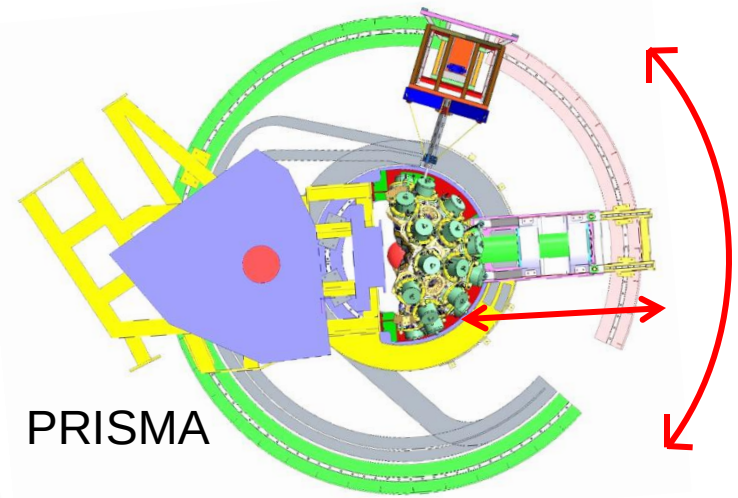
journal homepage: www.elsevier.com/locate/nima

Full Length Article

Conceptual design of the AGATA 2π array at LNL

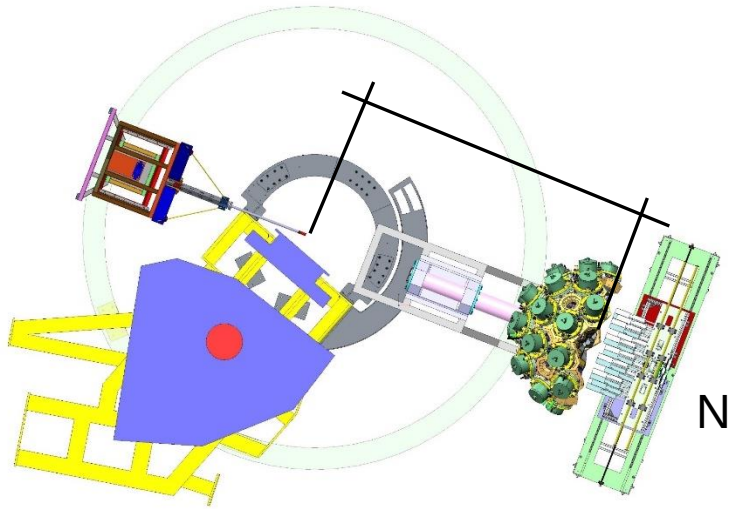
current configuration

AGATA coupled with PRISMA



Current configuration

AGATA zero degrees

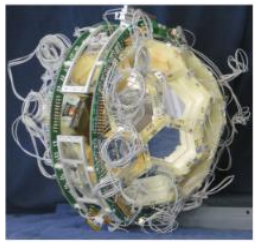


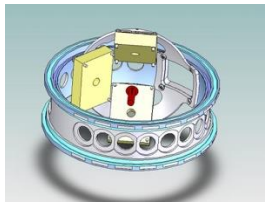
Summary AGATA@Legnaro physics campaigns

AGATA takes ~ 83% of the beam time

PRISMA@LNL
heavy ions
magnetic spectrometer

EUCLIDES
light charged
particles

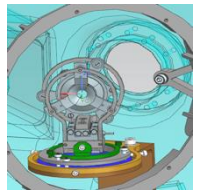




DANTE
heavy ions

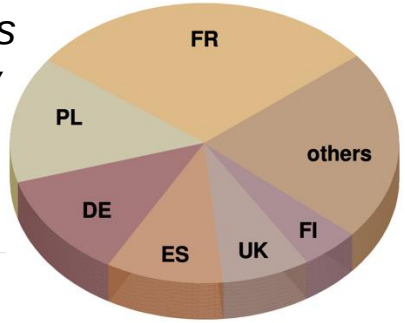
SPIDER
light and heavy ions

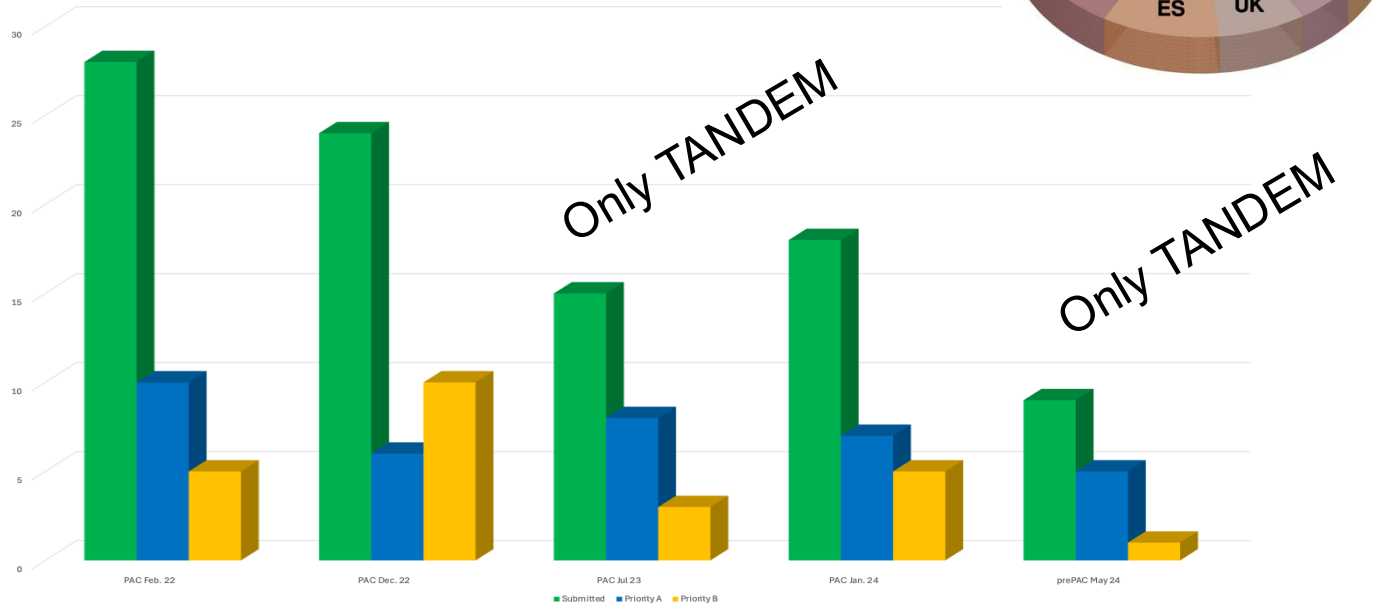
SLICES
Internal conversion
electrons detector



PLUNGER
Lifetime measurements

non-italian spokersons
institution nationality





29 + 3 experiments performed and 1 exp. high energy γ rays
Starting middle of October next campaign

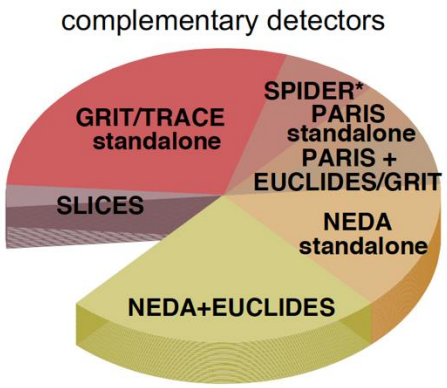
AGATA Campaign at LNL

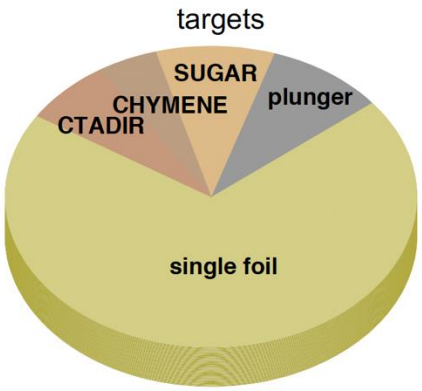
Third Pre-PAC Workshop and

Zero-Degree Campaign Workshop

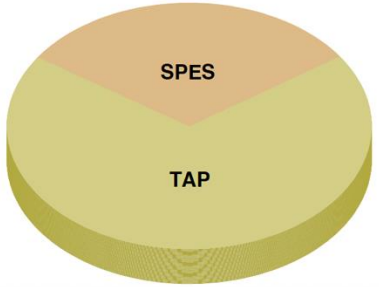
LNL, April 19th-21st, 2023

Large Variety of complementary detectors





- there is no "preferred" set-up (in contrast to the PRISMA campaign)
- fewer plunger measurements, fair interest in studies using gas/cryogenic targets
- enthusiastic reception of SPES beams



Strong response from the community

- stable beams from the Tandem-ALPI-PIAVE complex or first SPES beams
- complementary set-ups compatible with AGATA at zero degrees: NEDA, PARIS, GRIT, TRACE, gas/cryogenic targets (SUGAR, CTADIR, CHYMENE) but also some that are used in the present campaign: EUCLIDES, SPIDER, DANTE
- overwhelming response from the community: **42 "physics" LoIs + 4 umbrella proposals** (13 for SPES)

Spokespersons:

18 France
13 Poland
6 Spain
3 UK
2 Germany
10 Others

large majority (33) with at least one Italian spokesperson; percentage of Italian co-spokesperson consistent with earlier AGATA Pre-PACs at LNL

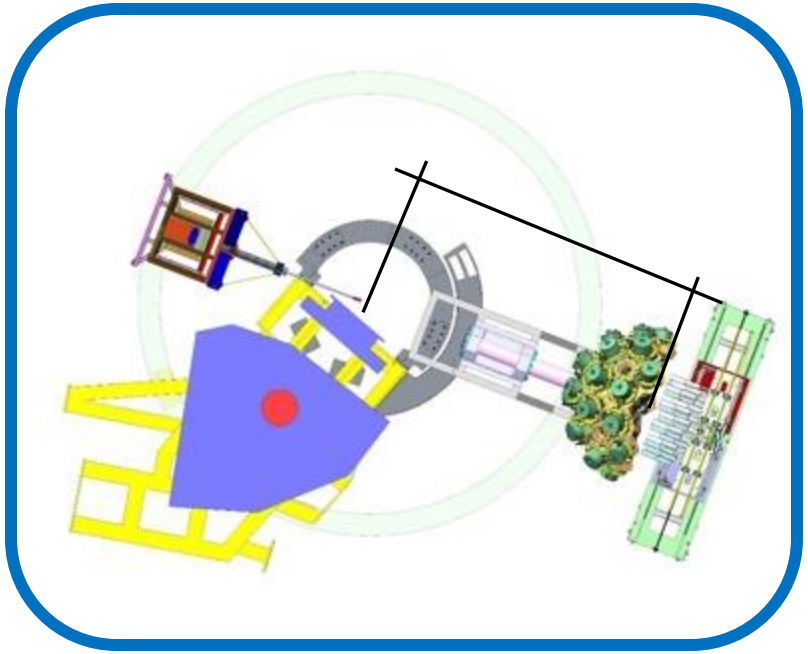
particularly strong representation of France and Poland

co-spokespersons from outside the AGATA collaboration: Mexico, US, Korea, Brazil

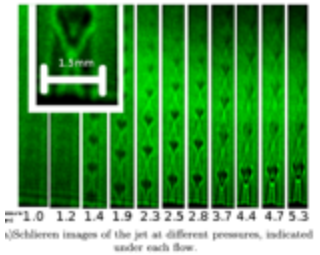
Enough requests for AGATA operation at LNL (with STABLE beams) – up to mid 2028

Complementary detectors 0 degrees

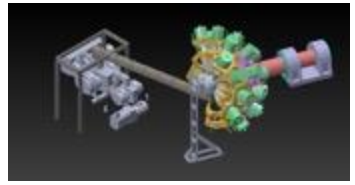
AGATA zero degrees



Targets: CTADIR + SUGAR

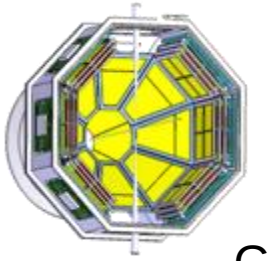


PARIS



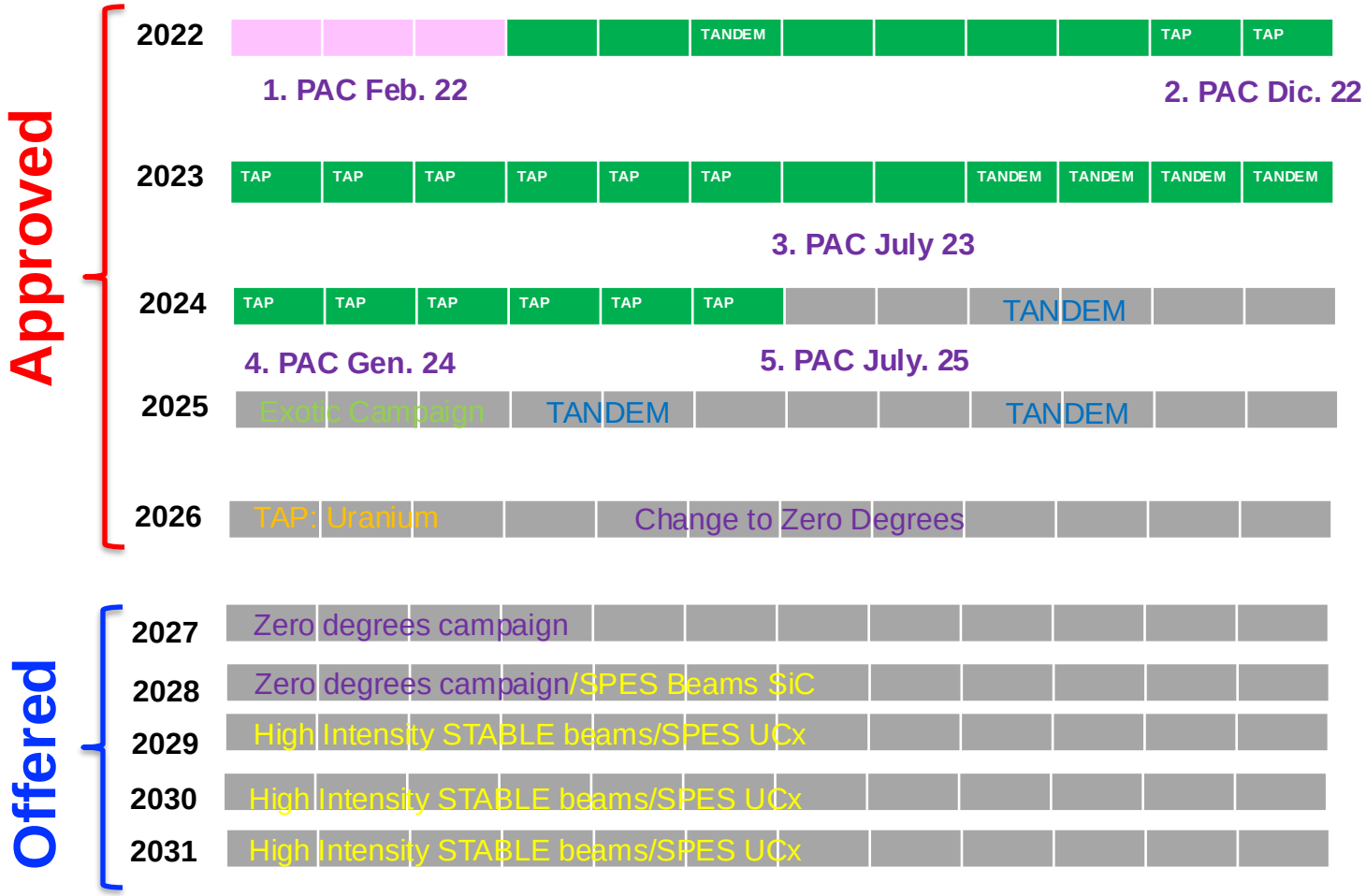
SLICES
CHYMENE
TRACE

NEDA



GRIT

AGATA@Legnaro Physics campaigns



1. AGATA Collaboration Meetings
2. AGATA Science Dissemination
3. AGATA in LRP2024
4. **Open Issues**

AGATA Collaboration Council meeting, 10-12/11/2021 Legnaro

Open science, open data
Data Management Plan
for AGATA Phase 2

O.Stézowski
On behalf of the Data Processing Group
Work from dedicated DMP meetings March 2021 ☞ June 2021

we need to define a DATA Management Plan

(it will be requested at various levels: European call, funding Agency, etc...)

- dedicated Data Processing Group
- few decisions to be taken in ACC and AMB

detailed documentation is being prepared by Data Processing Group

2 drafts already available:

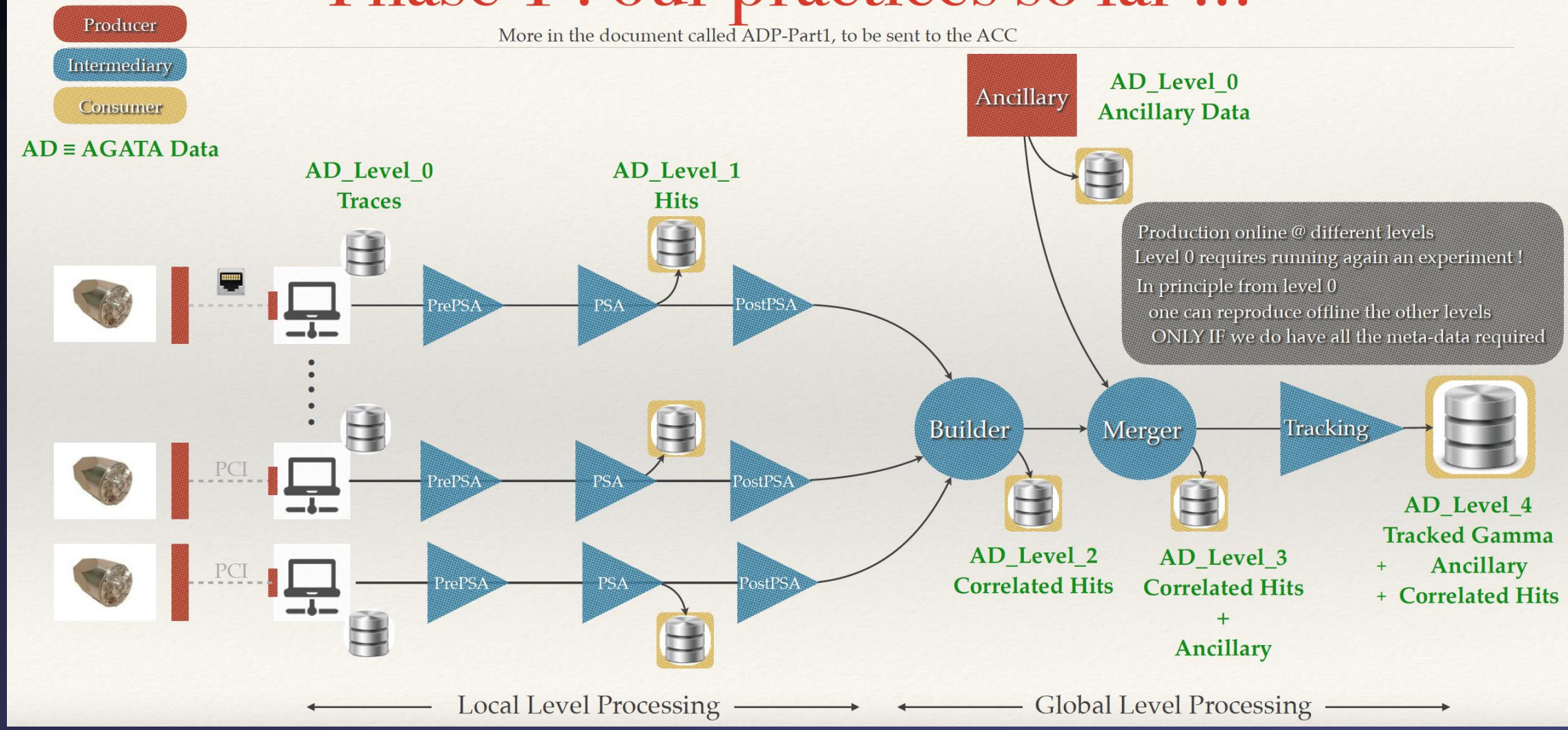
- Critical Analysis of our way to manage data: **here**
- Our first Data Management Plan: **here**

Discussions will be soon resumed also in connection with LRP TWG9 "Open Science and Data"

O. Stezowski is group member

Phase 1 : our practices so far …

More in the document called ADP-Part1, to be sent to the ACC



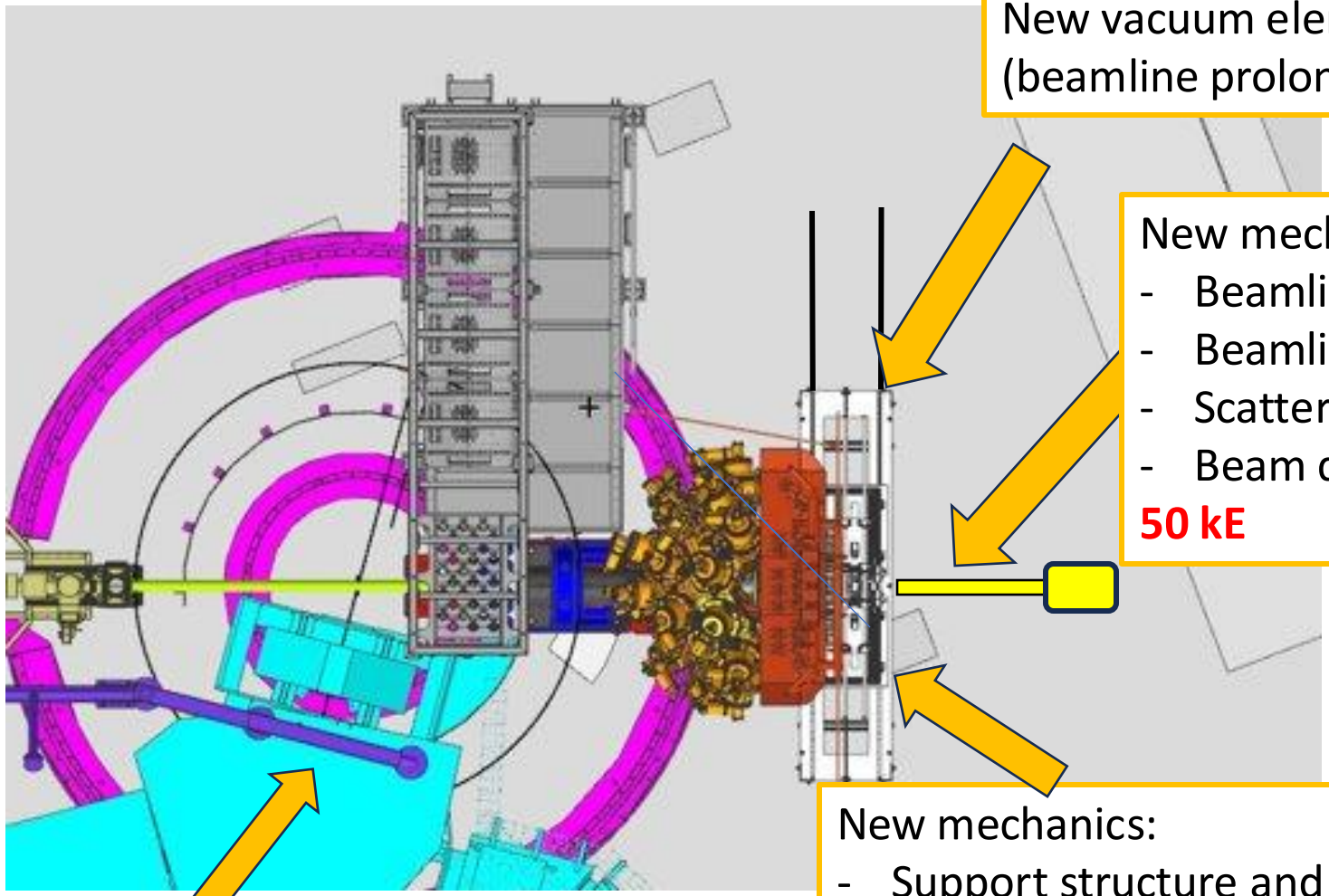
we need now to be **FAIR:** **F**indability, **A**ccessibility, **I**nteroperability, **R**eusability

Thank you

INFN costs for Zero Degrees configuration (115 kE) – approved

in addition to original installation costs (~570 kE)

preparation started



New vacuum elements
(beamline prolonged by > 5m) **25 kE**

New mechanics:
- Beamline elements upstream
- Beamline elements downstream
- Scattering chamber
- Beam dump

50 kE

New mechanics:
- Support structure and movements of ancillary detectors **30 kE**

Prolongation of LN2 distribution line: **10 kE**