



The NUPECC Long Range Plan 2024

Diego Bettoni

EIC RRB – Rome, Italy 6/5/2024

NUPECC LRP Timeline



Steering Committee of NuPECC LRP 2024

28 members

**NuPECC Members
Associated Members
and Observers**

Name	Country/Institution
Gert Aarts	UK/ECT*
Daniel Bemmerer	Germany
Diego Bettoni	Italy
Sandrine Courtin	France
Paolo Giubellino/Yvonne Leifels	Germany
Joaquin Gomez-Camacho	Spain
Paul Greenlees	Finland
Andreas Haungs	APPEC
Rolf-Dietmar Herzberg	UK
Dave Ireland	UK
Karl Jakobs	ECFA
Klaus Kirch	Switzerland
Sissy Koerner	NuPECC
Marek Lewitowicz Chair	NuPECC
Adam Maj	Poland
Ulf Meißner	Germany
Joachim Mnich	CERN
Eugenio Nappi	Italy
Lucia Popescu	Belgium
Patricia Roussel-Chomaz	France
Hervé Moutarde	France
Hiroyoshi Sakurai	Japan
Raimond Snellings	The Netherlands
Martin Venhart	Slovakia
Jelena Vesic	Slovenia
Vladimir Wagner	Czech Republic
Eberhard Widmann	Austria
Gail Dodge	NSAC/US

Community Input



153 total inputs, of which 3 directly related to the EIC:

- n. 64 The Electron Ion Collider – Exploring the mysteries of the building blocks of matter – BNL & JLAB – Contact Elke Aschenauer
- n. 135 The Electron Ion Collider: a U.S. facility for the european community to explore the mysteries of the building blocks of matter EICUG – contact: M. Radici, S. Dalla Torre, D. Sokhan
- n. 143 Input of the INFN community to the NUPECC LRP 2024 included the EIC – INFN – Contact P. Antonioli, M. Radici
- n. 67 French input on Hadron Physics - contact C. Muñoz Camacho

TWG Number	TWG	Coordinators	Coord. e-mails	Liaisons	Liaisons e-mails
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3	Nuclear Structure and Reaction Dynamics	Silvia Leoni (Univ. Milano)	silvia.leoni@mi.infn.it	Adam Maj	adam.maj@ifj.edu.pl
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5	Symmetries and Fundamental Interactions	Pierre Delahaye (GANIL)	pierre.delahaye@ganil.fr	Eberhard Widmann	Eberhard.Widmann@oeaw.ac.at
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6	Infrastructures	Wolfram Korten (CEA, Saclay)	w.korten@cea.fr	Joaquin Gomez-Camacho	gomez@us.es
				Patricia Roussel-Chomaz	patricia.chomaz@ganil.fr
7	Applications and Societal Benefit	Thomas Cocolios (KU Leuven)	thomas.cocolios@kuleuven.be	Lucia Popescu	lucia.popescu@sckcen.be
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8	Nuclear Physics Tools Detectors and experimental techniques Computing, Machine Learning and Artificial Intelligence	Silvia Dalla Torre (INFN)	Silvia.DallaTorre@cern.ch	Eugenio Nappi	Eugenio.Nappi@ba.infn.it
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		Jana Guenther (U. Wuppertal)	jguenther@uni-wuppertal.de		
9	Open Science and Data	Antoine Lemasson (GANIL)	antoine.lemasson@ganil.fr	Marek Lewitowicz	marek.lewitowicz@ganil.fr
10	Nuclear Science - People and Society Training, Careers & Diversity Education and Outreach	María García Borge (Madrid)	mj.borge@csic.es	Rolf-Dietmar Herzberg	rdh@liverpool.ac.uk
		Christian Diget (York)	christian.diget@york.ac.uk	Yvonne Leifels	Y.Leifels@gsi.de

LRP 2024 Town Meeting



LRP2024 Town Meeting 15 April (noon) - 17 April (noon) 2024 in Marriott Hotel, Bucharest

The is meeting aimed to bring together the Nuclear Physics community in Europe to discuss the long-range perspectives in our field and decide how best to develop it in the next ten to fifteen years. A draft of the LRP2024 Report and its Recommendations were presented and discussed during the meeting.

This was an excellent opportunity for you to learn about and discuss the strategic choices of the community for the future of Nuclear Physics research in Europe.

- **Open to all community (142 registered participants)**
- **The meeting was in person only to favour the lively discussion**



Draft of the 2024 LRP Report



Executive Summary

<https://indico.ph.tum.de/event/7598/timetable/?view=nicecompact>

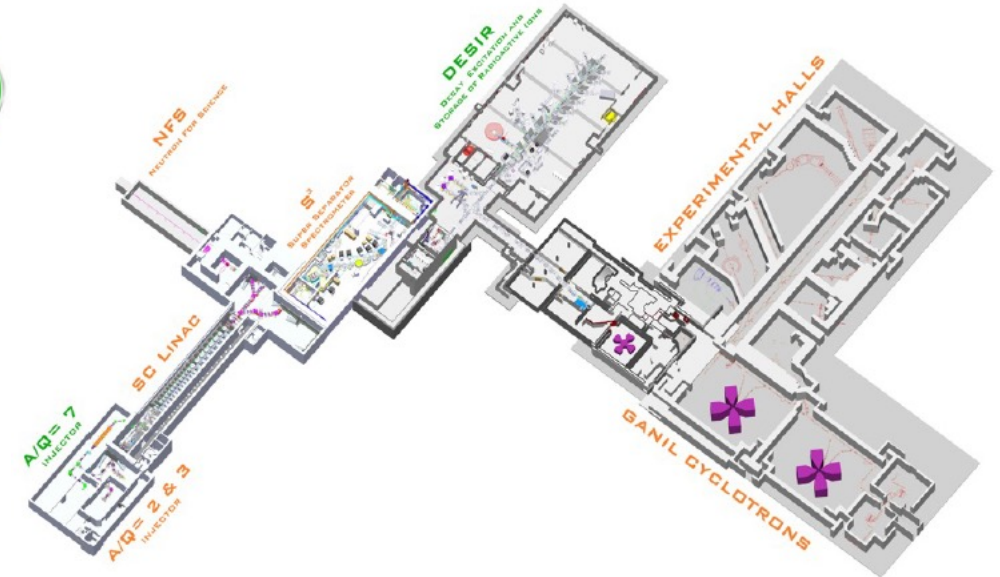
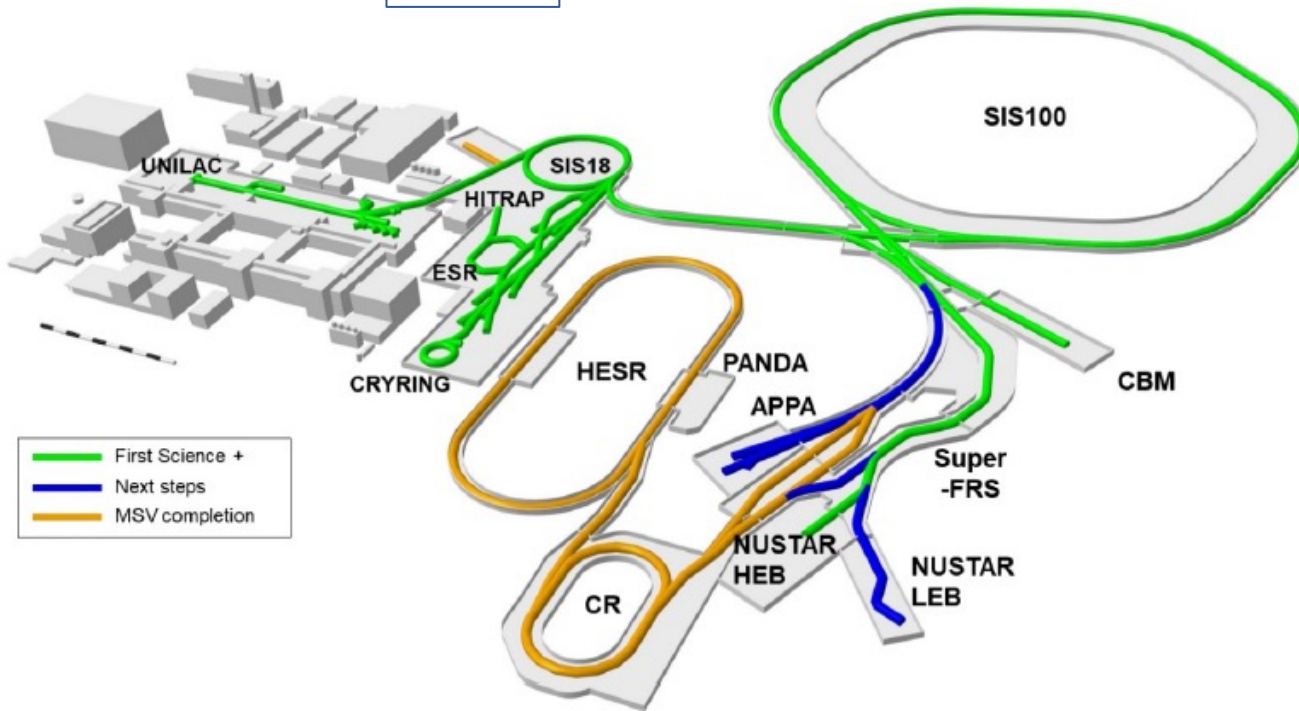
- Introduction
- What does Nuclear Physics stand for?
- Nuclear Physics and Society
- European landscape of nuclear physics
- Recommendations for Nuclear Physics Infrastructures
- International and Interdisciplinary Context
- Main Recommendations
 - Fundamental Nuclear Physics
 - Hadron Physics
 - Strongly Interacting Matter at Extreme Conditions
 - Nuclear Structure and Reaction Dynamics
 - Nuclear Astrophysics
 - Symmetries and Fundamental Interactions
 - Applications and Societal Benefit
 - Nuclear Physics Tools
 - Detectors and experimental techniques
 - Machine learning (ML) and artificial intelligence (AI), Quantum computing (QC), Numerical tools, techniques and resources
 - Open Science and Data
 - Nuclear Science - People and Society
- *Sustainability (to be added by Writing Group)*

Recommendations for Nuclear Physics Infrastructures

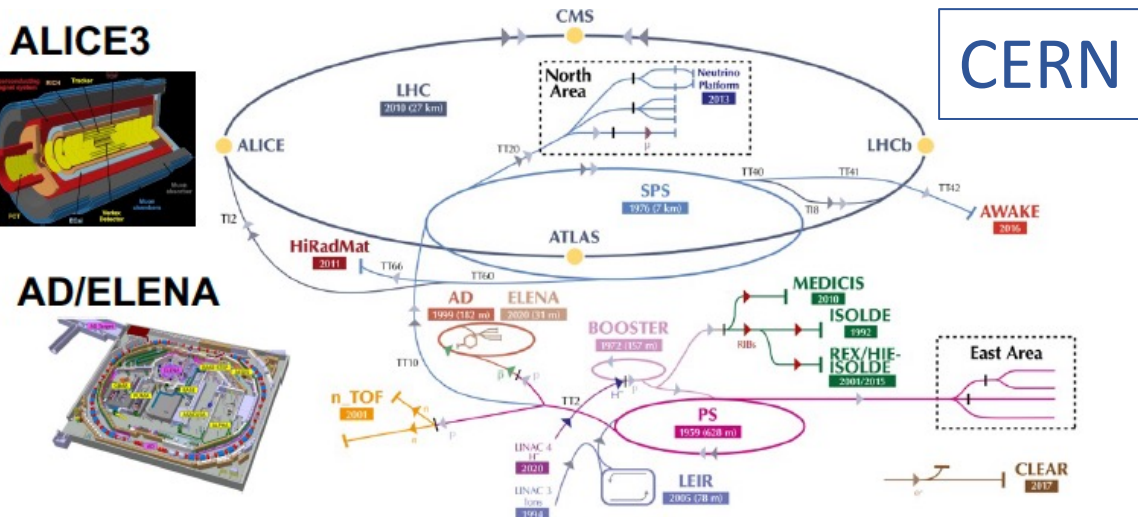


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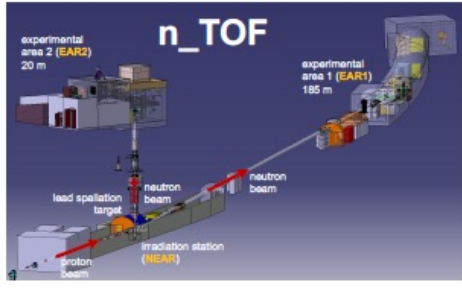
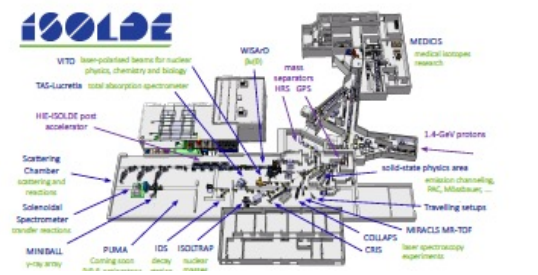
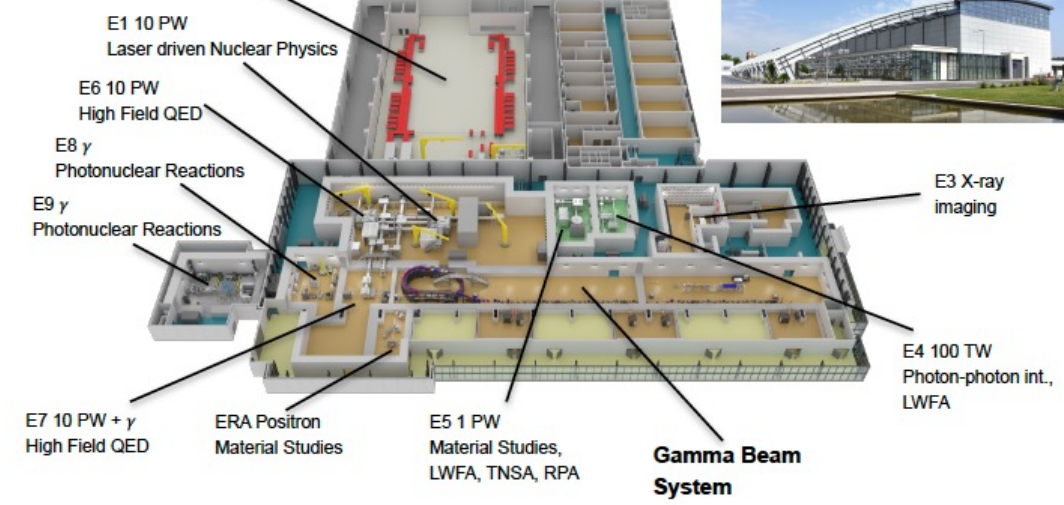


Recommendations for Nuclear Physics Infrastructures



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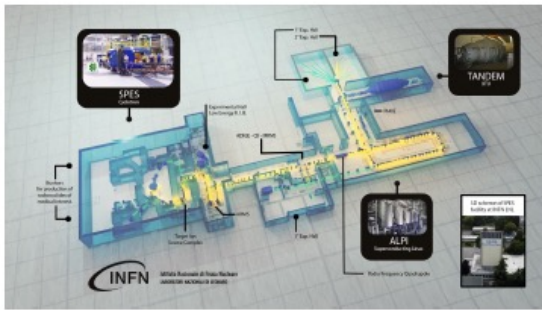
2 x 10 PW High Power Laser System



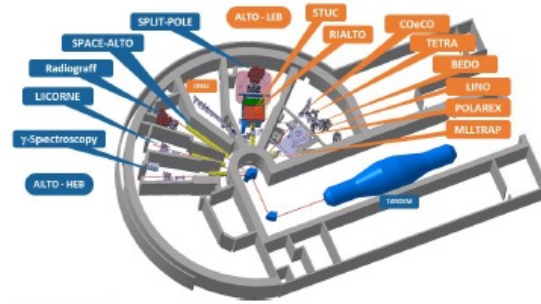
Recommendations for Nuclear Physics Infrastructures



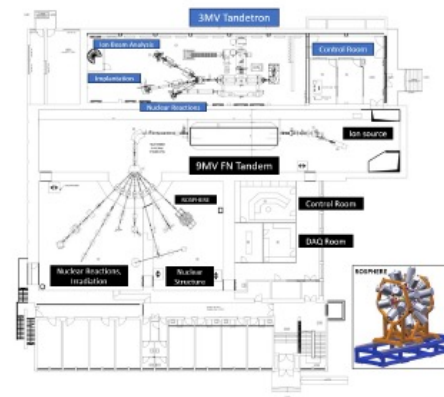
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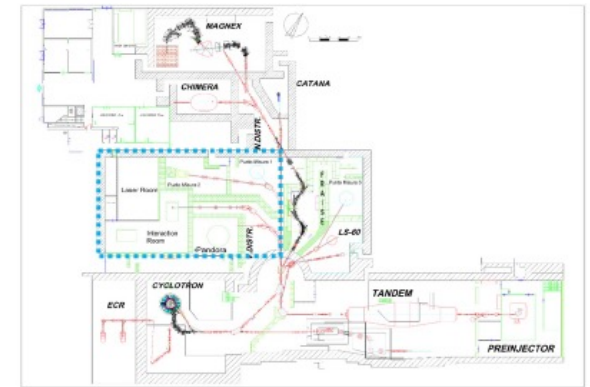
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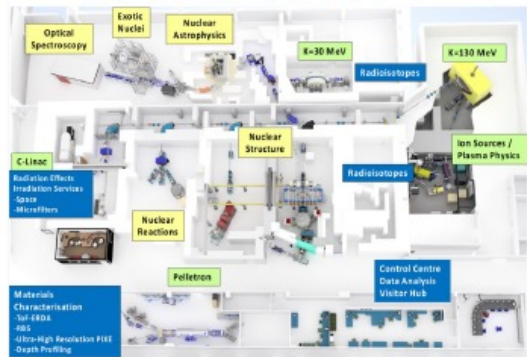
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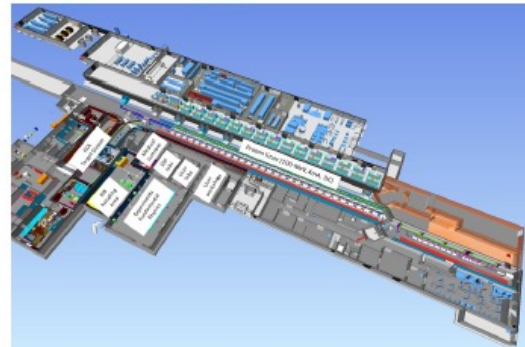
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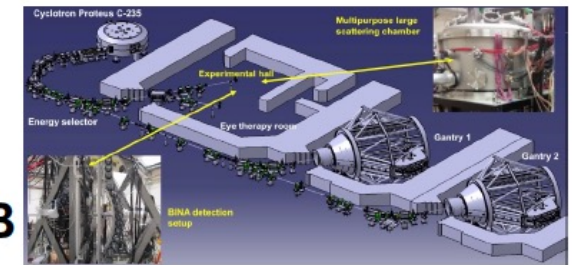
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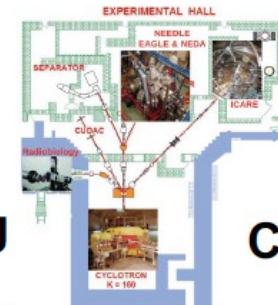
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NLC



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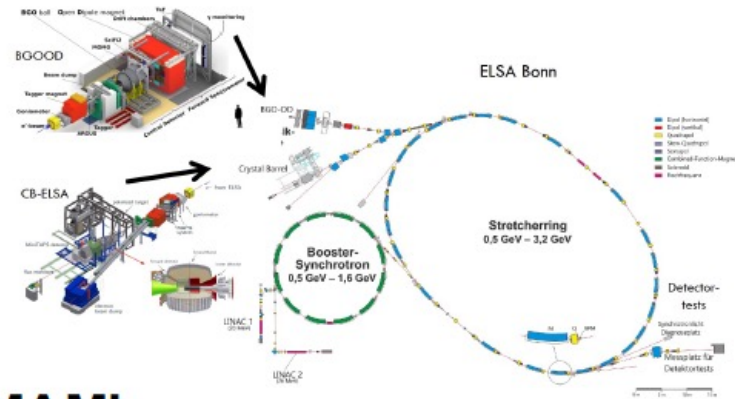


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Recommendations for Nuclear Physics Infrastructures



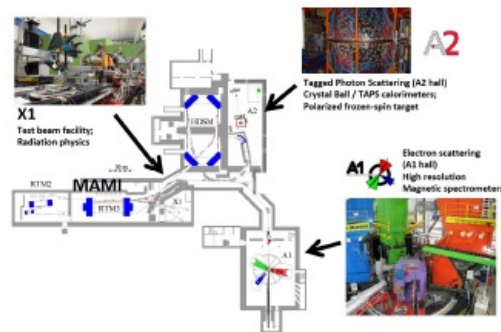
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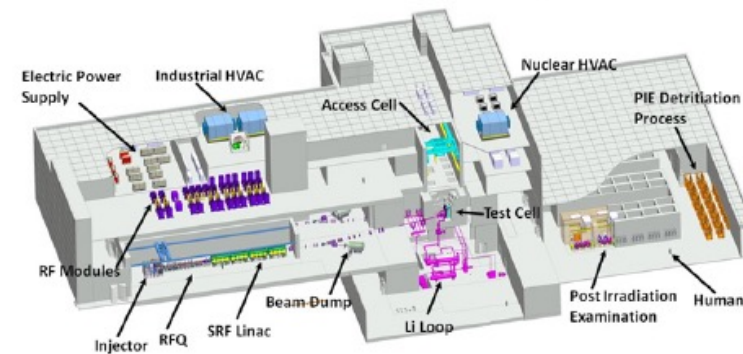


17/04/2024

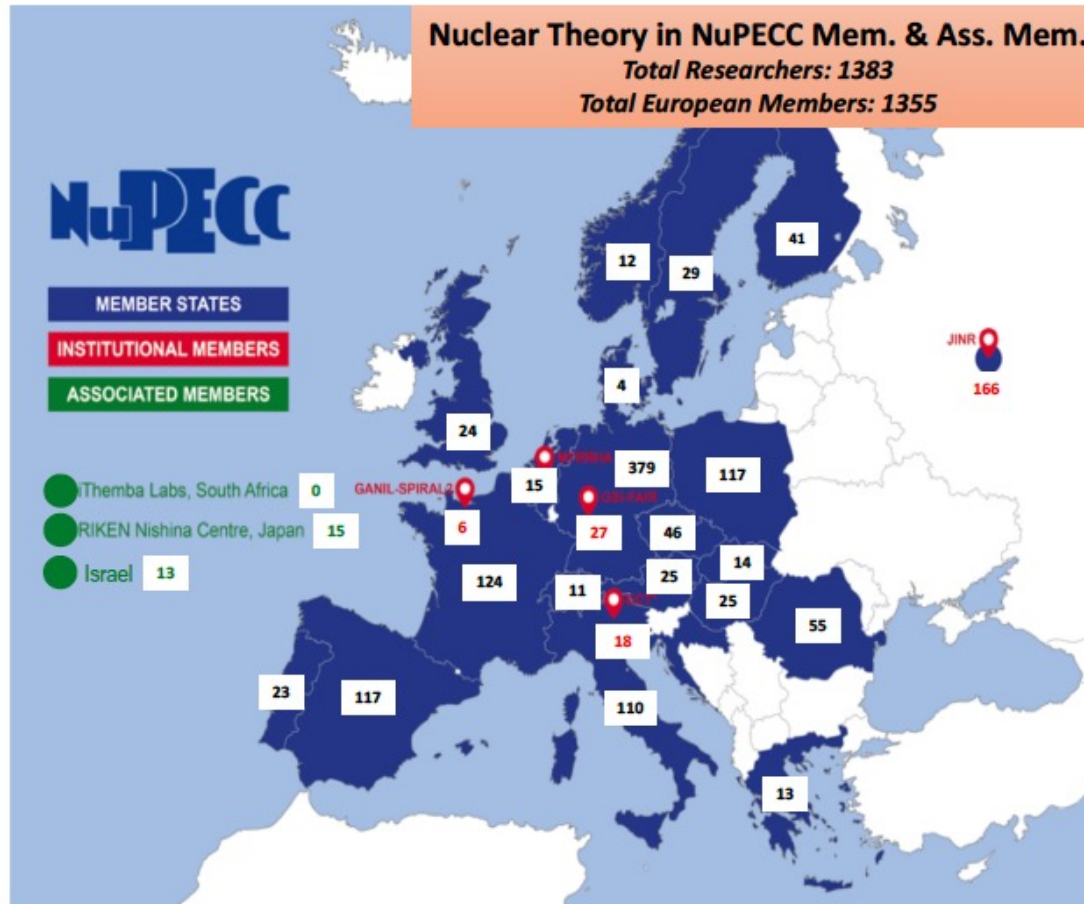
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Recommendations for Nuclear Physics Infrastructures



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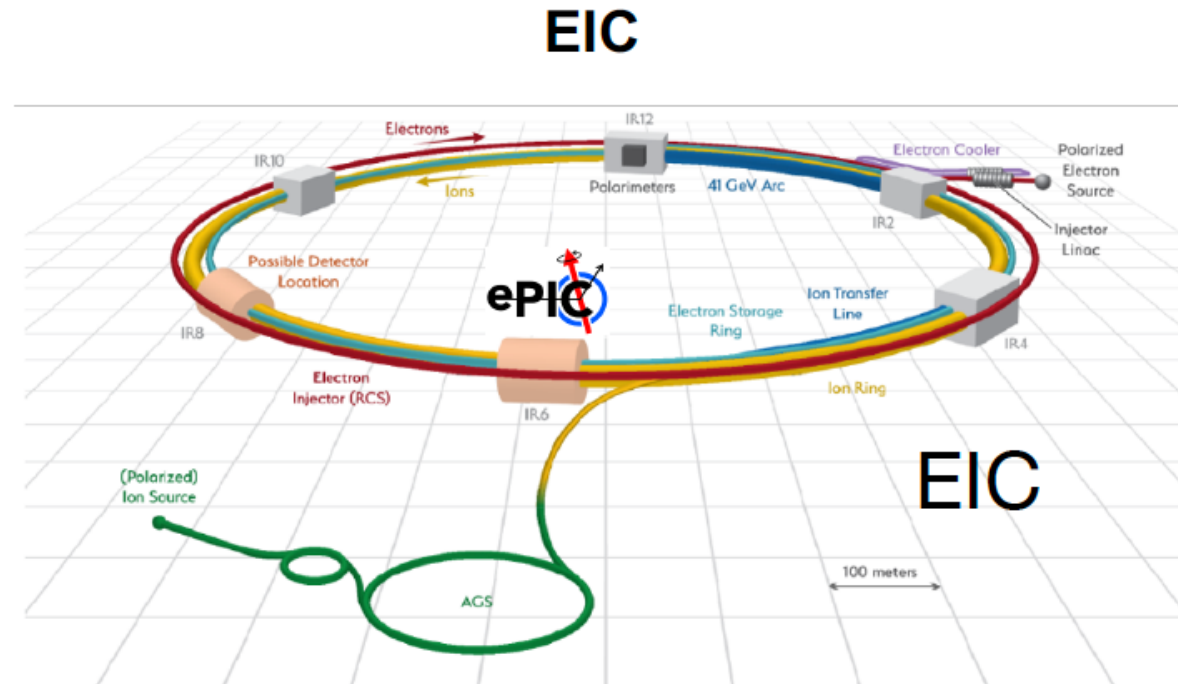
ECT*



Recommendations for Nuclear Physics Infrastructures



- **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 ePIC at the future international flagship facility EIC is recommended.**



Recommendations for Hadron Physics



- **Support of existing facilities and experiments**

We recommend the continuing support of the successful hadron physics programs in Europe and the participation of European groups at global facilities. Particularly important hadron physics facilities are

- **AMBER at CERN**
- **ELSA in Bonn, HADES at GSI, MAMI and MESA in Mainz, all Germany**
- **Jefferson Laboratory in Newport News, USA**

Furthermore, we recommend the support of ongoing hadron physics activities at the multi-purpose facilities Belle II, BESIII and the LHC. As tailored to higher energies, these facilities give access to heavier flavour.

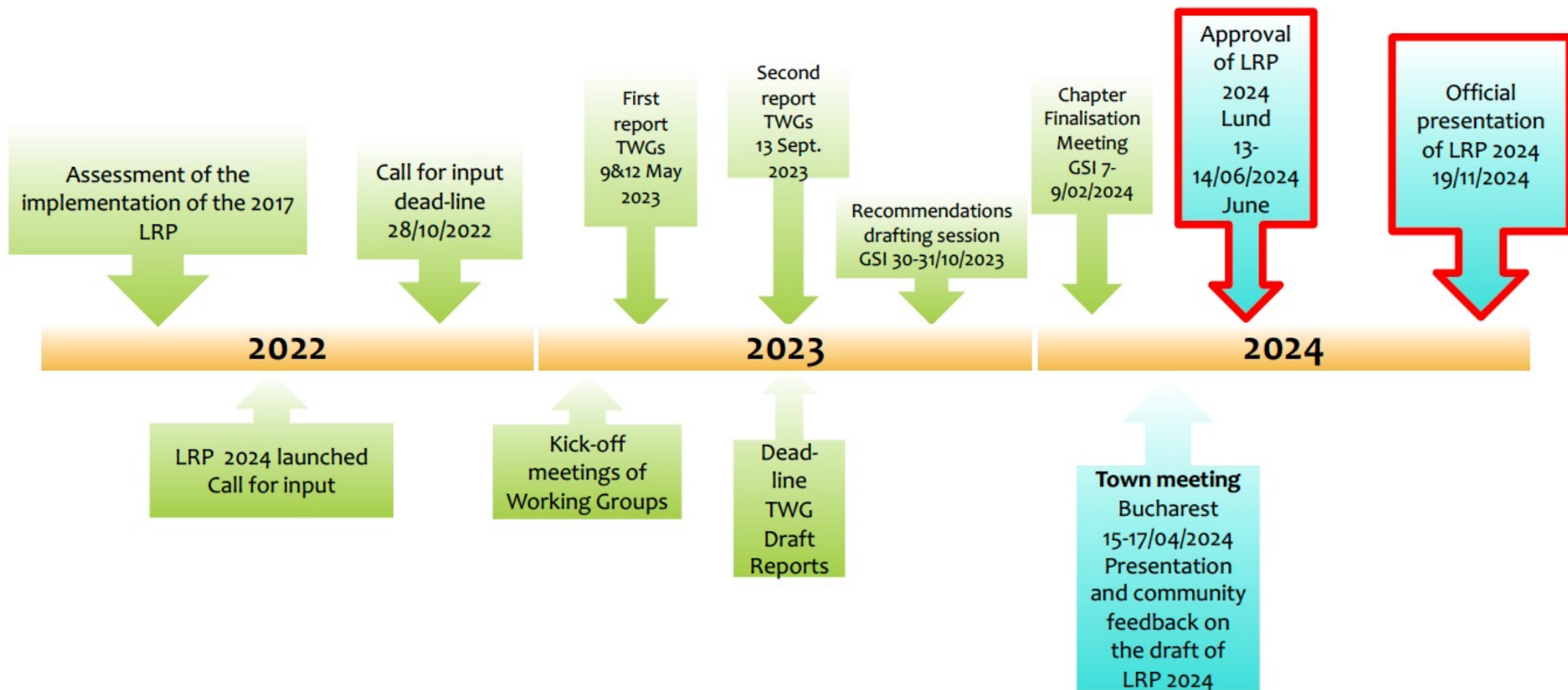
Recommendations for Hadron Physics



- **Future flagship facilities and experiments**

We recommend the expedited realisation of the antiproton experiment PANDA, and the support of European groups to contribute to the electron-ion experiment ePIC. By virtue of their different beam species and energy regimes, PANDA and ePIC will explore complementary physics aspects. In a ten-year perspective, these two next-generation experiments must be made ready to launch.

- **PANDA: The physics program, including the prospect of unravelling exotic matter, remains unique and compelling. PANDA will strengthen the European position on the global scene and act as a unifying force for the community. Therefore, we recommend support for its construction and for the development of instrumentation, software and analysis tools.**
- **ePIC: Here, European researchers will be able to explore unknown features of quarks and gluons inside nucleons and nuclei. We recommend supporting the participation of European groups in ePIC and reinforcing scientific and technological activities which synergize with European projects.**





Thank You