

## Report on the activity of WG9 – Period June 2023- June2024

*Prepared by the chair Angela Bracco*

The activity carried out in this period was concentrated mainly on two issues: i) the update of Report 41, a document which collects information on the laboratories around the world that are involved in nuclear research and ii) the organization of the annual general meeting (AGM). The latter took place in Vancouver (Canada) on June 21, 2024.

Membership changes:

- Haiyan Gao (from BNL) stepped down and Abhay Deshpande will be interim
- Zhiyu Sun is the new HIAF member from China
- Makondelele Victor Tshivhase is the new director of iThemba Labs in South Africa

The chair, the secretary (Iris Dillmann, TRIUMF), the past chair (Robert Tribble, Texas A&M) and some members of WG9 participated also in the open session of C12 held on June 22, 2024.

On October 5 and 6 2023 the WG9 chair attended the IUPAP Executive Council and Commission at CERN and thus a short summary of the relevant information for WG9 was given. The importance to establish ties with WG19 (on Quantum Science and Technology) was discussed. This because at several Nuclear Physics laboratories innovative developments for quantum science are carried out. Since a representative of WG9 participates in the meetings of WG16 (Physics and Industry) a concise report was presented at our meeting in Vancouver. Navin Alahari from GANIL in his presentation at the AGM 2024 underlined that continuous efforts are made to strengthen the connections with industries engaged in developments useful for our research facilities.

### IUPAP Report 41

The Report 41 (“A Worldwide Perspective of Research and Research Facilities in Nuclear Physics”) provides information on the ongoing activities and the perspectives of many research facilities focusing on Nuclear Science located around the world. The Report 41 gives a brief description of the nuclear facilities that have an acknowledged User Organization.

The Introduction to the Report outlines the key physics issues that have led to the nuclear science facilities existing or being planned:

- The nuclear physics as studied from its beginning; nuclear structure and nuclear reactions, the formation of the elements throughout the universe including the super-heavy elements.
- The structure of the nucleon consisting of quarks and gluons within the Standard Model.
- Fundamental symmetries leading to physics beyond the Standard Model and with the study of neutrino properties through neutrino-less double beta-decay and neutrino oscillations.
- Nuclear energy in the era of climate change and global warming.
- Applications of nuclear physics to the benefit of society, e.g. as in nuclear medicine.

The scientific secretary, with the help of the present and past chairs, was strongly involved in reshaping Report 41. The work to homogenize the style and type of content was recently completed together with the writing of an introduction. The updated version of the report was printed to be sent to the WG9 members and it is available in the WG9 webpage under <https://wg9.triumf.ca/report41.html>.

The plan for next year is to add a few pages with summaries of the Long Range Plans of NuPECC involving several European countries and of the Long Range Plan of USA, after their publication.

We have also decided to add a chapter dealing with topics related to the societal impact of our facilities. The preparation of this new chapter will be based on the compilation of the answers to the following questions:

- What are the activities carried out which contribute to society such as isotope production, cooperation with industry for electronics single event interrupt testing, materials testing, food preservation, environmental impacts, etc.?
- Are there specific activities that focus on climate change and/or environmental monitoring?
- What are your efforts in diversity, equity and inclusion to expand the nuclear science workforce?
- What activities are being done for public outreach and to promote and/or implement Open Science?
- Which research efforts are being performed on the topic of quantum science and technology and/or in high power computing driving innovation in the fields of AI (Artificial Intelligence) and ML (Machine Learning)? Which initiatives are there planned that support the designation of 2025 and 2026 as the International Year of Quantum Science and Technology?

## **The 2024 Annual General Meeting (Vancouver, June 21, 2024)**

The agenda of the 2024 annual meeting focused on the long range planning for nuclear science in the different areas in the world and on selected reports on major facilities under construction or starting operation.

### ***Long Range Planning : Organization Reports***

Long range plan reports were presented for the Asian Nuclear Physics Association ANPhA (by Byungsik Hong, <https://dnpkps.wixsite.com/home/anpha-asian-nuclear-physics-association>), for the NSAC (by Gail Dodge Old Dominion University, <https://nuclearsciencefuture.org>), and for NuPECC (by Marek Lewitowicz, GANIL, <https://www.nupecc.org>). The main mission of these committees and organizations is to strengthen collaboration, coordination and planning of research in Nuclear Physics in Asia, USA and in Europe, respectively. They are also responsible of preparing the strategic plans in nuclear science.

In USA the 2023 Long Range Plan for Nuclear Science was released in October 2023. It provides a road map for advancing the nation's nuclear science research over the next decade. It highlights scientific opportunities for maintaining leadership in research and for training the workforce. The NuPECC Long Range Plan concerning the scientific strategy in Nuclear Physics in Europe will be released at the end of 2024.

### ***Reports on major facilities under construction or starting operation.***

The status of the following facilities were presented and discussed in the AGM 2024 (\*Facility under construction or recently started operation):

- \*HIAF (China) (MAO, Lijun and YANG, Jiancheng)
- NICA (Dubna) (TRUBNIKOV, Grigory)
- \*Update from EIC (DESHPANDE, Abhay)
- JLab/CEBAF (HENDERSON, Stuart)
- KEK (Japan) (SAITO, Naohito)
- RIKEN (Japan) (SAKURAI, Hiro)
- \*RAON (Korea) (HONG, Seung-Woo)
- \*FAIR (Germany) (GIUBELLINO, Paolo)

- SNOLAB (Canada) (HALL, Jeter)
- \*FRIB in USA (by Thomas Glasmacher)

The presenters in their reports pointed out the importance of the international collaborations to increase the attractiveness from users of these open access facilities. WG9 is playing a role in this connection, providing the unique opportunity to discuss scientific plans of facilities at worldwide level. This is indeed the main mission of this working group of IUPAP.

A visit to the accelerator facilities at TRIUMF was also organized. This visit allowed the WG9 members to see several installations and to realize their size, technological complexity and their scientific potential for making break-throughs in basic science and applied research. It also showed the large potential for international collaborations on accelerator technologies as well as their necessity for larger laboratories.

The agenda of this meeting and the links to the presentation files are available at:  
<https://indico.triumf.ca/event/519/overview>