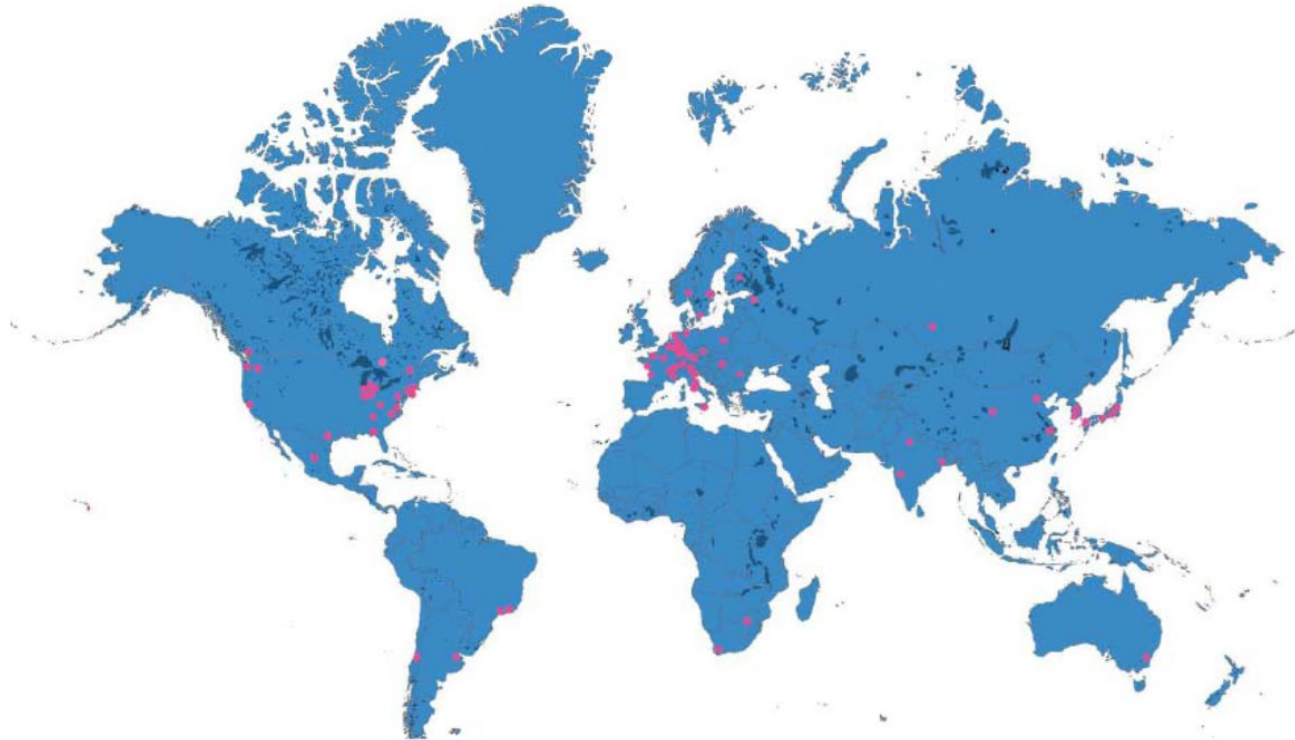


WG.9: IUPAP Working Group on International Cooperation in Nuclear Physics



Anthony W. Thomas

**AIP Congress: Adelaide
December 15th 2022**

History

- **Need for WG.9 recognised a decade before its formation – E. Vogt**
- **Began as a sub-committee of Commission on Nuclear Physics (C12)**
 - **S. Nagamiya, Chair of C12**
- **Formally established as an IUPAP Working group at the General Assembly in Cape Town (October 2005)**

Original Membership

- **Anthony W. Thomas (Jefferson Laboratory, USA) Chair**
- **Willem T.H. van Oers (University of Manitoba, Canada) Secretary**
- **Samuel H. Aronson (BNL, USA)**
- **Richard F. Casten (Yale University, USA) NSAC Past-Chair**
- **Brian R. Fulton (York University, Great Britain) NuPECC Chair**
- **Sydney Gales (GANIL, France)**
- **Muhsin N. Harakeh (KVI, the Netherlands) NuPECC Past-Chair**
- **Walter F. Henning (ANL, USA) Chair of IUPAP-C12**
- **Alinka Lepine-Szily (Universidade de Sao Paulo, Brazil)**
- **Victor A. Matveev (INR, Russia)**
- **Dong-Pil Min (Seoul National University, S. Korea)**
- **Tohru Motobayashi (RIKEN, Japan)**
- **Shoji Nagamiya (J-PARC, Japan) Past-Chair of IUPAP-C12**
- **Jean-Michel Poutissou (TRIUMF, Canada)**
- **Horst Stöcker (GSI, Germany)**
- **Robert E. Tribble (Texas A&M, USA) NSAC Chair**
- **Wenlong Zhan (IMP-Lanzhou, China)**

Mandate

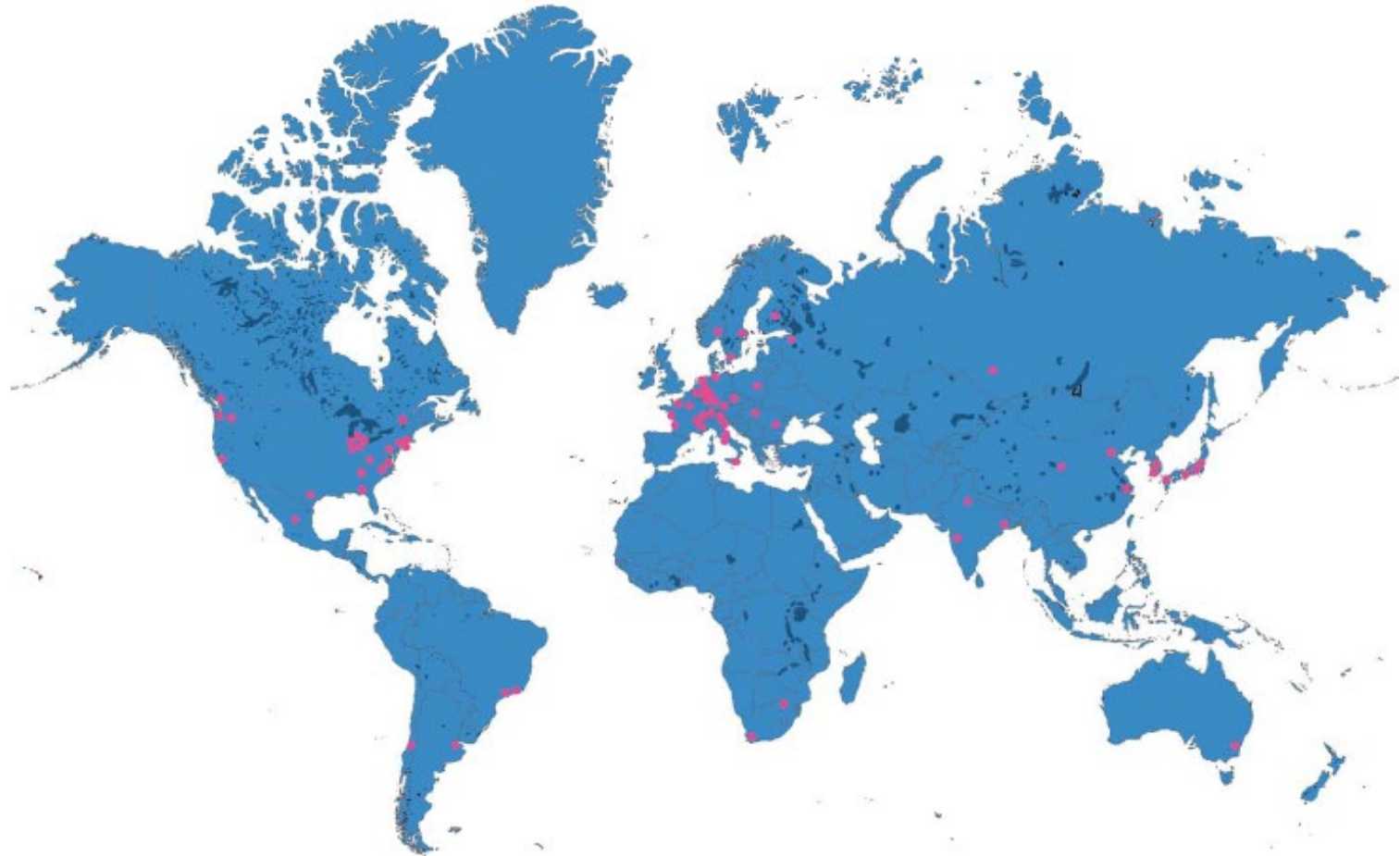
- To provide a description of the landscape of key issues in Nuclear Physics research for the next 10 to 20 years
- To produce (maintain) a compendium of facilities existing or under development worldwide
- To establish a mapping of these facilities onto the scientific questions identified above
- To identify missing components that would have to be developed to provide an optimized, comprehensive network of international facilities
- To explore mechanisms and opportunities for enhancing international collaboration in nuclear science

Mandate (cont.)

- **To identify R&D projects that could benefit from international joint effort**
- **To serve as a source of expert advice for governmental or inter-governmental organizations in connection with efforts to coordinate and promote nuclear science at the international level**
- **To serve as a forum for the discussion of future directions of nuclear science in the broadest sense**
- **To document the cross-disciplinary impact of nuclear physics and of nuclear facilities and to identify mechanisms for expanding (fostering) cross-disciplinary research.**

Produced IUPAP Report 41

A handbook of User Facilities World-wide, with short accessible overview of major research questions and how facilities address them regularly updated



The Global Nuclear Physics Enterprise

Organisation for Economic Co-operation and Development (OECD)

Global Science Forum

Report of the Working Group on Nuclear Physics

Table 1. Data on Estimated size of Nuclear Physics Workforce

Region	Theory Ph.D.	Experiment Ph.D.	Ph.D. students	Support	Totals
Europe	650	2260	1400	2210	6520
North America	350	1360	900	1150+	3760+
South America	70	100	120	100+	390+
Asia Pacific	~ 610	~ 1190	~ 520	300+	~2620
Total	~ 1680	~ 4910	~ 2940	3760+	13290+

~ indicates that some data has been estimate

+ indicates that only partial data existed for some countries (so a lower limit)

Recommendation: A forum should be established to discuss, on a regular and ongoing basis, national and regional science-based roadmaps and to articulate a global scientific roadmap for nuclear physics. It should be organised by the International Union of Pure and Applied Physics /Working Group 9 (IUPAP-WG9) and composed of representatives of WG9 itself, the major national and regional scientific planning bodies (Nuclear Science Advisory Committee [NSAC], Nuclear Physics European Collaboration Committee [NuPECC], the Nuclear Physics Executive Committee of Japan [NPEC]) with proportionate participation from all other countries that are not members of one of the latter.

Looking beyond the timescale of the current roadmap, there is a possible need for major facilities that would be planned, designed, implemented, and utilized via a global-scale collaboration of interested countries.

Recommendation: The Working Group supports the OECD Global Science Forum's activities aimed at facilitating international consultations regarding the potential establishment of large-scale international facilities.

The Working Group finds that planning for the future of nuclear physics should be a globally-coherent response to recognized scientific challenges, using an optimal set of national, regional, and, if needed, global-scale projects. To achieve this goal, funding agency officials should consider establishing a venue where they can discuss the future of the field, with special emphasis on the role of large programmes and projects.

Recommendation: National, regional, and global planning should be done at the agency level among interested parties to optimize the science and international collaboration, taking into account the global scientific roadmap of the community. The establishment of a forum for nuclear physics funding agencies should be considered for discussing plans for new large scale facilities and for optimizing communication and cooperation at a global level.

Major Questions Being Addressed

- Can we understand hadron structure in terms of QCD?
- What is the structure of nuclear matter?
- What physics is there beyond the Standard Model?
- What are the phases of nuclear matter?
- What is the role of nuclei in shaping the evolution of the Universe?



Initiatives in Cooperation

- **Members of WG.9 from Asian countries, *initially* China, Japan and Korea, decided at a WG.9 annual meeting to begin a series of meetings aimed at fostering cooperation**
- **The Asian Nuclear Physics Association was formed on July 18 2009
- Australia joined at the second Board meeting (2010)**
- **ANPhA Board also serves as Executive of the Division of Nuclear Physics of the Association of Asia Pacific Physical Societies**
- **Similar role to NuPECC in Europe**
- **Aims to promote cooperation on research, education and planning**
- **See the report on Ten Years of ANPhA:**

Initiatives in Cooperation (cont.)

- **At the initiative of the Brazilian representative on WG.9**
- **ALAFNA was formed: the Latin American Nuclear Physics Association**
- **Aims similar to ANPhA**

Summary

- **WG.9 has met all expectations**
- **Wonderful forum for exchange of ideas, fostering collaboration and discussion of future plans**
- **Produces a roadmap for the field at regular intervals**
- **Representatives of funding agencies meet at the AGM of WG.9**
- **This provides a forum for planning and cooperation in building major facilities, informed by the latest scientific developments, that would otherwise never have existed**