



## **IUPAP WG19: Working Group on Quantum Science and Technology**

Report of the Chair

June 1, 2023

### **Background**

The 30th IUPAP General Assembly of October 2021 approved, as per recommendation of the U. S. Liaison Committee, the creation of the Working Group on Quantum Science and Technology (WG19) with the following mandate:

- To analyze the creation of a new IUPAP Commission on Quantum Information Science and Technology.

Subsequently, the 31st IUPAP General of July 2022 approved the appointment of Shohini Ghose, Wilfrid Laurier University, Waterloo, Canada, as Chair of the Working Group on Quantum Science and Technology (WG19).

### **Activities**

The Chair, in consultation with IUPAP President Designate Silvina Ponce Dawson, as well as a US advisory team, developed a list of potential members of WG19. The advisory team included Laura Greene, Joe Niemela, Maria Spiropulu, Peter Mohr, Bill Phillips, and Tracy Sheffer.

A long list of potential members was created using the following guiding process:

- Include representation from all regions
- Aim for gender parity
- Include leading senior researchers as well as rising stars
- Include researchers from a broad range of research fields related to quantum science
- Seek nominations from other relevant IUPAP commissions, keeping in mind demographics, discipline, rank and geographical diversity

Invitations were sent out by the Chair and the initial membership of WG19 was finalized:

Zhang Qiang, University of Science and Technology of China  
Anna Sanpera, Universitat Autònoma Barcelona, Spain  
Michelle Simmons, University of New South Wales, Australia  
Urbasi Sinha, Raman Research Institute, India  
Andrew Forbes, University of the Witwatersrand, South Africa  
Gui-Lu Long, Tsinghua University, China  
Shohini Ghose (Chair), Wilfrid Laurier University, Canada

The working group has demographic, geographic, and disciplinary diversity, and includes members with a wealth of research and leadership experience. However gaps still exist, including a lack of representation from the US and early career researchers. The Chair will focus on expanding the WG19 membership based on the working group's discussions and identified needs. Suggestions from the US Liaison Committee for IUPAP will be sought.

The working group met virtually to discuss the question of creating a new commission on quantum information science and technology. There was broad consensus that a new commission is needed for several reasons:

- The field has matured to a point where it is poised to have a major impact on science, technology and society. There is a lot of interest in this area from all stakeholders, including researchers, students, government, industry and the general public.
- Quantum information science and technology cuts across multiple subfields of physics as well as other scientific and social disciplines. The field needs a unified platform and representation both within IUPAP and externally.
- A young scientist award is needed and could help draw top talent to the field.
- A new commission could help increase equity, diversity and inclusion in this area through its activities.
- The APS and other associations have created divisions focused on quantum information. Having an IUPAP commission would help engage with these divisions and grow the field.
- The commission could play an important role in the development of new regulations and standards for quantum science and technology.
- In the current polarized political climate, it is critical to protect the freedom of scientists and data.
- Since 2025 is being proposed as the International Year of Quantum Science and Technology, it is the right time to create the new commission.

Based on the above considerations, the working group identified what the mandate and scope of the new commission would be, such that it would create a dedicated home for quantum science and technology while not overlapping too much with existing commissions. With this in mind, the Chair created and circulated an initial document laying out the proposed mission and mandate of the new commission (included below). The working group will review and discuss the document before approving it at its next meeting.

## **Proposed Mission/Mandate**

### **Article 1**

To promote the exchange of information and views among the members of the international scientific community in the general field of quantum science and technology including:

- Quantum computing, including theory and experiments pertaining to the development of software and hardware
- Quantum communication, including quantum cryptography and development of a quantum internet.
- Quantum sensing and metrology

### **Article 2**

To recommend for Union sponsorship international conferences which qualify for support under Union regulations.

To initiate such conferences as their need arises from the evolution of the Commission field.

To assist in the organization of such conferences when practical. To ensure the compatibility of international conferences in its field and to discourage clashes and incompatibility of dates.

### **Article 3**

To promote the free circulation of scientists; to assist conference organizers in ensuring such free circulation and in resolving potential infringements.

### **Article 4**

To organize where feasible the award of medals or other testimonials of excellence in its field.

### **Article 5**

To publish where feasible newsletters, circulars, occasional books, journals or handbooks in its area.

### **Article 6**

To maintain liaison with other IUPAP Commissions, with the Commissions or Committees of other Unions or of the International Council of Scientific Unions (ICSU) or other scientific organizations, with a view to collaborating and cooperating in sponsoring joint conferences and to participating in joint projects when need arises.

In particular to maintain close liaison with the General Commissions of IUPAP (SUNAMCO, Physics Education and Development), so as to ensure suitable input from its field into these physics-wide activities.

### **Article 7**

To make available to each General Assembly of the Union a summary of activities and progress in its field since the previous Assembly.