

Recommendation for an IUPAP resolution to establish a working group in the emerging field of Quantum

U. S. Liaison Committee for IUPAP

Quantum Information Science and Technology (QIST) has become a forefront research area in modern physics and intersections with other domain sciences. A number of countries and unions, like the European Union, are investing the equivalent of billions of dollars in fundamental and applied research in QIST with the ultimate goal of tapping the potential for transformational advancements impacting economic growth spawned by the field in areas of quantum computing, metrology, networking and sensing to mention a few.

The research activity of QIST spans a number of subfields of physics, most notably AMO physics and condensed matter physics. In addition, the research effort cuts across computer science, mathematical, applied physics and engineering disciplines. In recognition of this, organizations like the APS have created new sub-units to provide a dedicated home for the QIST rapidly expanding research.

Universities target the hiring of faculty, and advertise the strength of their activity, in a field designated simply as “Quantum.” The public is excited about the Second Quantum Revolution, about Quantum 2.0, and quantum advancements at every sector from biomedical imaging to cybersecurity and finance. These advancements are related to the non-classical aspects of quantum mechanics—features like superposition and entanglement and the achievement of quantum advantage through the use of squeezed states, spin-statistical correlations, and the like. While these features have been part of QM essentially from its birth, today’s technologies make their study and exploitation possible in novel and profound ways; the promise of technological opportunities and outcomes is real and present.

In light of all of this, we propose that IUPAP establish a working group to study whether a new commission should be created, devoted to QIST, or possibly more broadly to the emerging field of Quantum, in the sense mentioned above.