

Futures Dialogues

Quantum Science and the Future of Quantum Technologies

Date and time: Wednesday 16 September 2026 (14:00-15:30 Paris time)

Languages: English and French

Format: Zoom meeting - Please [click here](#) to register

Historical Context

Brussels, October 1927. Twenty-nine of the world's leading physicists gathered for the Fifth Solvay Conference, among them Einstein, Bohr, Curie, Heisenberg, and Schrödinger, several of whom were or would become Nobel Laureates¹. At its centre, Einstein and Bohr engaged in a debate that would captivate the scientific community for generations: does the universe at its smallest scale follow deterministic cause and effect, or is it fundamentally probabilistic? Einstein's famous assertion that "*God does not play dice with the universe*" and Bohr's sharp response "*Einstein, stop telling God what to do*" marked a defining moment in the evolution of modern physics.

What is Quantum Science?

Quantum science is the study of matter and energy at atomic and subatomic scales. At this level, physical systems defy the laws of classical mechanics. A subatomic particle can exist in multiple states simultaneously, a property known as superposition, until a measurement is made. Furthermore, particles can become entangled: measuring the state of one instantly reveals information about another, regardless of the physical distance separating them. For most of the twentieth century, the "first quantum revolution" allowed scientists to understand and passively observe these phenomena, laying the foundation for modern electronics, lasers, and semiconductors. Today, we are well into the "second quantum revolution," moving from passive observation to the active manipulation and control of individual quantum systems².

The Future of Quantum Technologies

A century after the Solvay Conference, this leap from passive observation to active control is driving a profound technological shift, replacing classical limits with quantum-native principles. This transition is unlocking transformative capabilities across four key domains:

- **Quantum Computing and Simulation:** Harnessing quantum bits (qubits) to deliver unprecedented processing capability, enabling the simulation of complex molecular structures for drug discovery, advanced material design, and climate modeling far beyond the reach of classical supercomputers.
- **Quantum Algorithms:** Redefining computational problem-solving by leveraging quantum mechanics to execute complex calculations, such as large-number factorization and multi-variable optimization, at significantly faster rates than classical counterparts.
- **Quantum Communications and Cryptography:** Applying quantum principles, including Quantum Key Distribution (QKD), to create intercept-proof communication channels and safeguard digital infrastructure against emerging threats.
- **Quantum Sensing and Metrology:** Achieving unprecedented precision in measurement to transform medical diagnostics, deep-subsurface geophysical exploration, navigation, and environmental monitoring.

¹ Nobel Prize official archive, *Physics 1927: Photo Gallery*, [nobelprize.org](https://www.nobelprize.org): 17 of the 29 participants at the Fifth Solvay Conference were or became Nobel Laureates.

² J. P. Dowling & G. J. Milburn, "Quantum technology: the second quantum revolution", *Phil. Trans. R. Soc. A* 361, 1655–1674 (2003).

The “Quantum Divide” and UNESCO’s Response

While quantum technologies hold transformative potential for achieving the Sustainable Development Goals (SDGs), they also carry the acute risk of accelerating global disparities. A pronounced lack of foundational science and quantum literacy among young populations, coupled with the capital-intensive nature of research infrastructure, specialized laboratories, and intellectual property, has concentrated progress within elite academic and industrial hubs predominantly in the Global North. Without deliberate intervention, this concentration already threatens to create a stark “Quantum Divide”³.

In response, UNESCO leverages its global mandate across scientific research, STEM education, and technology ethics to ensure that quantum advancements serve as a global public good. A key milestone in this effort is the **Global Quantum Initiative (GQI, 2026 – 2028)**, an open, multilateral platform designed to foster international dialogue, capacity building, and collaborative research⁴. Through the GQI, UNESCO works alongside Member States, scientific unions, research institutions and private sector to build an inclusive Global Quantum Agenda. By expanding access to open-source quantum tools, strengthening science education, and supporting regional centers of excellence, the initiative aims to ensure that all nations actively participate in, shape, and benefit from the quantum future.

Objectives and Key Themes

As part of UNESCO's Futures Dialogues series, these online seminars serve a forward-looking, horizon-scanning, and observatory function to support long-term futures thinking across education, the sciences, culture, and communication.

This Futures Dialogue will convene scientists, ethics experts, educators, and policymakers to evaluate possible future trajectories of quantum technologies, assess their implications, and consider collaborative research agendas and strategies.

Key thematic priorities include:

- **Bridging the Quantum Knowledge Gap:** Enhancing STEM education, expanding quantum literacy curricula, and strengthening research infrastructure in the Global South.
- **Ethical Governance, Security, and Anticipatory Policy:** Operationalizing the recommendations of the COMEST Report on the Ethics of Quantum Computing⁵ to build proactive guardrails against security threats and knowledge asymmetries.
- **Open Science and Global Scientific Cooperation:** Promoting international research networks, open-access quantum simulators, and public-private partnerships aligned with the UNESCO Recommendation on Open Science⁶.

³ UNESCO, [The Quantum Moment: A Global Report — Outcomes of the International Year of Quantum Science and Technology](#), Paris, 2026. Drawn from a Global Survey on Quantum Research and Infrastructure of 590 researchers, engineers and policymakers across 81 countries.

⁴ UNESCO, [Global Quantum Initiative \(2026–2028\)](#); see also [Towards a Global Quantum Agenda: UNESCO Global Quantum Initiative for Sustainable Development \(2026–2028\)](#), Proposal, January 2026.

⁵ UNESCO, [The Ethics of Quantum Computing, COMEST Report](#), Paris, 2026.

⁶ UNESCO, [Recommendation on Open Science](#), adopted by the General Conference at its 41st session, Paris, 2021.

Provisional Agenda

Quantum Science and the Future of Quantum Technologies Wednesday 16 September 2026, 14:00 to 15:30 (Paris time)	
14:00-14:02	Welcome remarks Amal Kasry , Chief of Basic Sciences, Engineering, Technology and Innovation (BETI), Sciences Sector, UNESCO
14:02-14:05	Opening remarks Shaofeng Hu , Director, Division of Science Policy and Basic Sciences, UNESCO
14:05-14:50	Panel discussion Moderator: Amal Kasry , Chief of Basic Sciences, Engineering, Technology and Innovation (BETI), Sciences Sector, UNESCO • Malik Maaza, Professor and Staff, iThemba LABS, National Research Foundation of South Africa and UNESCO Chair on Nanoscience and Nanotechnology, University of South Africa (UNISA). • Matthias Kettemann, Professor of Innovation, Theory, and Philosophy of Law, University of Innsbruck, Austria and Vice-Chair of UNESCO's World Commission on the Ethics of Scientific Knowledge and Technology (COMEST). • Reena Dayal, Founder and CEO of Quantum Ecosystems and Technology Council of India (QETCI), IEEE Quantum Initiative Chair in India, Member of Global Futures Council for Quantum at World Economic Forum, and Member of Quantum Task Force for the Government of India. • Alexander Sokolov, Deputy Director of Institute for Statistical Studies and Economics of Knowledge, Director of Higher School of Economics (HSE) Foresight Centre and UNESCO Chair on Future Studies, National Research University Higher School of Economics, Russian Federation.
14:50-15:20	Open discussion - Moderator: Amal Kasry
15:20-15:25	Key takeaways - Section for Bioethics and Ethics of Science and Technology, Sciences Sector, UNESCO (Speaker tbc)
15:25-15:30	Closing remarks and next steps Keith Holmes , Research Coordinator/UNITWIN, Future of Learning and Innovation Division, UNESCO

*** [Register here](#) ***