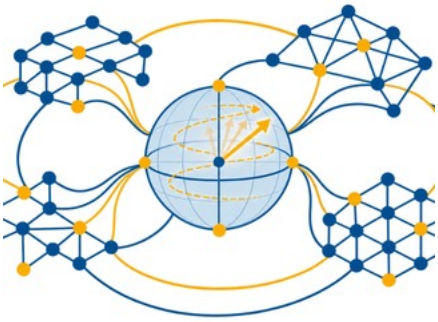
institute for pure & applied mathematics

Quantum Winter School 2027: Quantum Research in the Age of AI



JANUARY 20 - 22, 2027

Scientific Overview

The Challenge Institute for Quantum Computation (CIQC) and the Institute for Pure and Applied Mathematics (IPAM) and the Quantum Computing Science Association (QCSA), are pleased to present the 2027 Winter School in Quantum Information Science. This year's school focuses on LLM-Based Agentic Networks in Quantum Information Science, exploring how large language models and cooperating AI agents can support theoretical, computational, and experimental quantum research.

Recent AI-driven breakthroughs in mathematics, including an announced resolution of the Navier–Stokes Millennium Prize Problem, signal a profound shift in the practice of research. Scientists are gaining a powerful new instrument whose impact may rival that of the computer itself. These advances also bring the role of the human researcher to a crossroads, raising fundamental questions about how we choose problems, verify results, and turn discoveries into understanding.

The school will provide an introduction to the foundations of agentic AI, including planning, tool use, and multi-agent coordination, followed by tutorials and hands-on sessions on applications in quantum science. Topics will include complexity theory, quantum circuit discovery and optimization, quantum simulation, and experimental automation. Particular attention will be given to verifying AI-generated results, establishing meaningful benchmarks, and understanding the role of human judgment. Participants will learn practical approaches to incorporating these tools into existing research workflows while assessing their capabilities and limitations.

The school is intended for graduate students and early-career researchers in quantum information science, physics, computer science, and applied mathematics. By bringing together experimentalists, theorists, and AI researchers, we aim to develop shared methods for reliable AI-assisted quantum research and inspire new scientific applications and collaborations.

Organizers

Alexander Jurgens
University of California, Los Angeles (UCLA)

Jens Palsberg
University of California, Los Angeles (UCLA)

Christian Ratsch
Institute for Pure and Applied Mathematics

Richard Ross
University of California, Los Angeles (UCLA)

Alp Sipahigil
University of California, Berkeley (UC Berkeley)

Invited Speakers

Shuxiang Cao (NVIDIA), **Gabriel Gomes** (Carnegie Mellon University), **Adam Holmes** (NVIDIA), **Adrien Moulart** (Arcas Agentic), **Qian Xu** (University of California, Berkeley (UC Berkeley))

NSF UCLA

For program details and registration:

Scan the QR code or visit ipam.ucla.edu/QWS2027