



South African
Quantum
Technology
Initiative

NITheCS

National Institute for
Theoretical and Computational Sciences



INTERNATIONAL YEAR OF
Quantum Science
and Technology

COLLOQUIUM

A Century of Quantum: From Foundations to the Future

Prof Francesco Petruccione (NITheCS)

DATE: Monday, 10 February 2025 | 16h00–17h00 SAST

VENUES:

- Neelsie Cinema, Stellenbosch University
- Online

--- A recording of the talk will be published on the NITheCS YouTube channel afterwards ---

ABSTRACT

The year 2025 marks the UNESCO International Year of Quantum Science and Technology, celebrating a century of quantum mechanics and its profound impact on science and society. In this talk, I will briefly revisit the historical milestones that led to the birth of quantum mechanics and its first technological revolution—ushering in innovations such as the laser, transistor, and atomic clock. We now stand in the midst of the second quantum revolution, where quantum computing, quantum communication, and quantum sensing promise to redefine computation, security, and precision measurement. I will also touch on the emerging role of quantum effects in biology, hinting at the broader implications of quantum science beyond physics. As we look ahead, the possibilities of quantum science and technology continue to expand—and this is just the beginning.

BIOGRAPHY

Francesco Petruccione is a physicist and professor with a career spanning quantum science, computational thinking, and artificial intelligence. After earning his PhD and habilitation from the University of Freiburg, he joined the University of KwaZulu-Natal in South Africa, where he held the South African Research Chair in Quantum Information Processing and served as Pro-Vice-Chancellor for Big Data and Informatics. Now Director of the National Institute for Theoretical and Computational Sciences and a Professor of Quantum Computing at Stellenbosch University, he co-leads the Africa Europe Cluster of Research Excellence in AI and Data Science for global challenges. Prof Petruccione has authored over 250 scientific papers and landmark texts, including *The Theory of Open Quantum Systems* and *Machine Learning with Quantum Computers*. His contributions have earned him accolades such as the Stella d'Italia honour and fellowship in leading academies, reflecting his impact on science and education worldwide.



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