

NOBEL SYMPOSIA

Nobel in Africa Nobel Symposium in Physics

QUANTUM COMPUTING

STIAS, Stellenbosch, 25-30 October 2026

INTRODUCTORY NOTE

Quantum computing harnesses the principles of quantum mechanics—superposition, entanglement, and interference—to process information in fundamentally new ways. While classical computing has transformed science and society, quantum technologies may enable an even deeper shift, including the simulation of complex quantum systems, efficient factorization of large numbers, and new approaches to hard optimization problems.

Progress in this field relies not only on engineering advances, but also on breakthroughs in physics, materials science, control theory, algorithms, and quantum error correction.

This raises fundamental questions: how far can quantum computing take us, and where will it have the greatest impact? Early experiments have demonstrated quantum advantage in specialized tasks, yet scalable, fault-tolerant systems remain a major challenge. At the same time, rapid theoretical and technological developments are reshaping our understanding of the limits of classical simulation, the role of noise, and the potential of hybrid quantum–classical approaches. These advances also challenge long-standing assumptions about computational complexity and the boundary between physical and computational possibility.

The Nobel Symposium on Quantum Computing will bring together leading researchers in quantum information science, condensed matter physics, computer science, and engineering to address these questions. The symposium will assess the current state and future potential of quantum technologies, with a focus on key challenges and opportunities.

Central questions include:

Which problems can quantum computers realistically solve?

How can scalable quantum architectures be achieved?

How should we rethink modelling, simulation, and the concept of computation in light of quantum principles?

Convenors: Per Delsing, Chalmers University of Technology and Wallenberg Center for Quantum Technology (WACQT); Göran Johansson, Chalmers University of Technology and WACQT; Artur Ekert, University of Oxford & CQT Singapore; Francesco Petruccione, Stellenbosch University and National Institute for Theoretical and Computational Sciences.

The Nobel in Africa – NOBEL SYMPOSIA series is a STIAS Initiative in partnership with Stellenbosch University, under the auspices of the Nobel Foundation and the Royal Swedish Academy of Sciences with funding from the Knut & Alice Wallenberg Foundation. The NOBEL SYMPOSIA mark is owned by the Nobel Foundation.

PROGRAMME: 25 – 30 October 2026

Day 0 Sunday, 25 Oct: PARTICIPANTS' WELCOME RECEPTION Venue: STIAS Wallenberg Research Centre	
18:00 – 19:00	Registration and welcome drinks
19:00 – 21:00	Welcome reception with remarks by Edward K Kirumira, STIAS Director and Francesco Petruccione, Symposium Co-convenor

Day 1 Monday, 26 Oct: ALGORITHMS		
OPENING SESSION (Open to the Public & Media)		MC: tbc
08:00 – 09:00	Arrival coffee & tea	
09:00 – 09:40	Welcome & Opening remarks • STIAS Director, Edward K. Kirumira • Stellenbosch University Rector & Vice-Chancellor, Deresh Ramjugernath • Nobel Foundation, Astrid Söderbergh Widding • Symposium Convenors, Per Delsing	
09:40 – 10:40	PUBLIC LECTURE: <i>From prehistoric qubits to a quantum computer</i>	SPEAKER: John Martinis
10:40 – 11:20	COFFEE & TEA BREAK	
SYMPOSIUM SESSION 1: ALGORITHMS (symposium participants only)		CHAIRS: Göran Johansson & Francesco Petruccione
11:20 – 12:20	RAPPORTEUR: Algorithms - Ignacio Cirac	
12:20 – 13:20	LUNCH	
13:20 – 14:20	RAPPORTEUR: Algorithms - Elham Kashefi	
14:20 – 15:00	SPEAKER: Maria Schuld	
15:00 – 15:40	SPEAKER: Seth Lloyd	
15:40 – 16:10	COFFEE & TEA BREAK	
16:10 – 16:50	SPEAKER: Matthias Troyer	
16:50 – 17:30	PANEL DISCUSSION: Algorithms – Speakers & Rapporteurs	MODERATORS: Ignacio Cirac & Elham Kashefi
17:30 – 19:00	Free interaction	
19:00	DINNER IN STELLENBOSCH (own arrangements)	

Day 2 Tuesday, 27 Oct: ION TRAPS & SUPERCONDUCTING CIRCUITS		
08:00 – 09:00	Arrival coffee & tea	
SYMPOSIUM SESSION 2: ION TRAPS		CHAIR: Artur Ekert
09:00 – 10:00	RAPPORTEUR: Ion traps - Chris Monroe	
10:00 – 10:40	SPEAKER: Rainer Blatt	
10:40 – 11:20	COFFEE & TEA BREAK – Group Photo	
11:20 – 12:00	SPEAKER: Winfried Hensinger	
12:00 – 12:40	SPEAKER: Jonathan Home	
12:40 – 13:40	GROUP PHOTO & LUNCH	
SYMPOSIUM SESSION 3: SUPERCONDUCTING CIRCUITS		CHAIR: Per Delsing
13:40 – 14:40	RAPPORTEUR: Superconducting circuits - Yasunobu Nakamura	
14:40 – 15:20	SPEAKER: Rob Schoelkopf	
15:20 – 15:50	COFFEE & TEA BREAK	
15:50 – 16:30	SPEAKER: John Martinis	
16:30 – 17:10	SPEAKER: Xiabo Zhu	
17:10 – 18:00	PANEL DISCUSSION: Ion traps and Superconducting circuits – Speakers & Rapporteurs	MODERATOR: Chris Monroe
18:00	TRANSPORT TO STELLENBOSCH UNIVERSITY	
STELLENBOSCH UNIVERSITY CHANCELLOR’S PUBLIC LECTURE Venue: TBC (Stellenbosch University)		PROGRAMME DIRECTOR: tbc
18:30 – 20:00	PUBLIC LECTURE: <i>The two quantum revolutions: from concepts to applications</i>	SPEAKER: Alain Aspect
20:00	Cocktail reception	

Day 3 Wednesday 28 Oct: OUTREACH		
Outreach 1		University of the Western Cape
08:00	Transport from STIAS	
10:00	Programme tbc	
12:00	Light lunch	
13:00	Return transport to STIAS	
Outreach 2		University of Cape Town
08:00	Transport from STIAS	
10:00	Programme tbc	
12:00	Light lunch	
13:00	Return transport to STIAS	
Outreach 3		African Institute for Mathematical Sciences
08:00	Transport from STIAS	
10:00	Programme tbc	
12:00	Light lunch	
13:00	Return transport to STIAS	
Outreach 4		NITheCS, Stellenbosch University
10:00	Programme tbc	
12:00	Light lunch	

Day 3 continues Wednesday 28 Oct: NEUTRAL ATOMS		
14:00 – 14:20	COFFEE & TEA BREAK	
SYMPOSIUM SESSION 4: NEUTRAL ATOMS		CHAIR: Göran Johansson
14:20 – 15:00	RAPPORTEUR: Neutral Atoms - Michail Lukin	
15:00– 15:40	SPEAKER: Johannes Zeiher	
15:40 – 16:10	COFFEE & TEA BREAK	
16:10 – 16:50	SPEAKER: Antoine Browaeys	
16:50 – 17:30	SPEAKER: Cho-Yang Lu	
17:30 – 18:30	PANEL DISCUSSION: Neutral Atoms – Speakers	MODERATOR: Michail Lukin
18:30	Transport to Longridge Wine Estate	
19:00 – 21:00	Conference dinner at Rijkaarts, Longridge Wine Estate	

Day 4 Thursday, 29 Oct: SEMICONDUCTORS & PHOTONS		
08:00 – 09:00	Arrival coffee & tea	
SYMPOSIUM SESSION 5: SEMICONDUCTORS		CHAIR: Francesco Petruccione
09:00 – 10:00	RAPPORTEUR: Semiconductors – Michelle Simmons	
10:00 – 10:40	SPEAKER: Lieven Vandersypen	
10:40 – 11:20	COFFEE & TEA BREAK	
11:20 – 12:00	SPEAKER: John Morton	
12:00 – 12:30	PANEL DISCUSSION: Semiconductors	MODERATOR: Michelle Simmons
12:30 – 13:30	LUNCH	
SYMPOSIUM SESSION 6: PHOTONS		CHAIR: Artur Ekert
13:30 – 14:30	RAPPORTEUR: Photons – Gerard Milburn	
14:30 – 15:10	SPEAKER: Jianwei Pan	
15:10 – 15:40	COFFEE & TEA BREAK	
15:40 – 16:20	SPEAKER: Alexia Auffèves	
16:20 – 17:00	PANEL DISCUSSION: Photons	MODERATOR: Gerard Milburn
17:00 – 18:00	Free interaction	
STIAS DIRECTOR’S RECEPTION		
19:00 – 21:00	Venue: STIAS Wallenberg Research Centre Dress: Smart casual	

Day 5 Friday, 30 Oct: THEORY & ERROR CORRECTION		
08:00 – 09:00	Arrival coffee & tea	
SYMPOSIUM SESSION 6: THEORY & ERROR CORRECTION		CHAIRS: Göran Johansson & Per Delsing
09:00 – 10:00	RAPPORTEUR: Error Correction – John Preskill	
10:00 – 10:40	SPEAKER: Madelyn Cain	
10:40 – 11:00	COFFEE & TEA BREAK	
11:00 – 12:00	RAPPORTEUR: Error correction – Shruti Puri	
12:00 – 12:40	SPEAKER: David DiVincenzo	
12:40 – 13:40	LUNCH	
13:40 – 14:20	SPEAKER: Ryan Sweke	
14:20 – 15:00	SPEAKER: Peter Zoller	
15:00 – 15:30	COFFEE & TEA BREAK	
15:30 – 16:20	PANEL DISCUSSION: Error correction – Speakers & Rapporteurs	MODERATORS: John Preskill & Shruti Puri
16:20 – 16:30	Conclusion	
	DEPARTURE	