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COLLOQUIUM

Quantum Computing: Challenges and Opportunities

Dr Ryan Sweke (AIMS South Africa & Stellenbosch University)

DATE: Monday, 24 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

Over the last decade, quantum computing has progressed rapidly from theoretical idea to practical reality. Indeed, in recent years quantum computing has attracted incredible investment from all sectors of society, and it is now possible for anyone to run quantum computations via a wide variety of cloud providers. In this talk, I will give a survey of the quantum computing landscape as it stands now, from my personal perspective. I'll start with a brief introduction to what quantum computing actually is, and what it is not, and how we got to where we are today. After this, I will give an overview of what I view as the most promising scientific and industrial applications of quantum computing, as well as the scientific (and social) challenges that need to be overcome for the potential of these applications to be realised.

BIOGRAPHY

Ryan Sweke is the Alexander von Humboldt German Research Chair of Mathematics and its Applications at AIMS, as well as a senior lecturer at Stellenbosch University. He leads the Quantum at AIMS group, whose research is focused on a wide variety of topics under the broad umbrella of quantum computing and quantum information.

Ryan completed his PhD at the University of KwaZulu-Natal in 2017, with a focus on quantum algorithms for the simulation of open quantum systems. After this he spent almost five years (2018-2022) as a post-doctoral researcher at the Freie Universität Berlin, first as an Alexander von Humboldt postdoctoral fellow (2018-2019) and then as a senior postdoc of the PlanQK project, the flagship quantum machine learning initiative of the German government.

After his time in Berlin, Ryan spent just over two years as a research scientist at IBM Quantum, in San Jose, California (2022-2024) before joining AIMS as the German Research Chair in January 2025.



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