Two PhD Positions in Quantum Computing

Location: Muizenberg, Cape Town, South Africa
Start date: 1st of January 2026

The Quantum@AIMS research group, led by Dr Ryan Sweke, is offering two three-year PhD positions in quantum computing and quantum information, with the possibility of an additional one year extension. The scope for both positions is broad, but it is envisaged that successful applicants will work on foundational mathematical questions at the intersection of quantum computing, theory of machine learning and cryptography. Example questions of interest include:

Can quantum computers provably offer meaningful advantages for machine learning? If not, can one prove their limitations?

Can one develop provably efficient algorithms for learning about the quantum world – i.e. for learning unknown quantum states and processes?

To what extent can one implement quantum learning algorithms in distributed settings with untrusted parties?

How can quantum cryptography be utilised to provide cryptographic advantages in security and robustness to state-of-the-art ML algorithms and models?

What foundational assumptions are necessary for cryptography — to what extent can one develop quantum cryptography in a world without one-way functions?

Successful applicants will be formally registered as PhD students in the Department of Mathematical Sciences at Stellenbosch University. The positions are funded by the DAAD, as part of the "AIMS\FU Berlin Quantum Computing Partnership". As such, while being based primarily at AIMS, students will have the opportunity for collaboration with, and annual research visits to, the group of Prof. Dr. Jens Eisert at the Freie Universität Berlin.

Requirements

- An MSc in physics, mathematics or computer science, completed within the last two years, or a letter certifying enrolment in such an MSc with the intent to graduate by the 31st of December 2025.
- A strong mathematical background, with a desire to perform mathematical research in quantum computing on topics related to those listed above.

Compensation and Benefits

- All tuition and registration fees.
- Annual research visits to the Freie Universität Berlin (up to three months per year).
- Monthly stipend of €1800 per month while in South Africa (paid in South African Rands based on monthly exchange rate).
- Monthly stipend of €1300 per month while in Germany.
- Health Insurance.
- Flights to and from AIMS at the beginning and end of position.

Applying

To apply please email the below documents, in four separate pdf files, to rsweke@aims.ac.za, with the subject line "PhD Application":

1. **Comprehensive Curriculum Vitae** (including contact details of at least two references).
2. **Statement of Motivation** (at least one page,max 3 pages) detailing your motivation to undertake a PhD in quantum computing, focusing on questions at the interface of quantum computing, learning theory and cryptography. Why do these specific topics excite you? Why do you want to do a PhD?
3. **Proof of MSc completion**, or proof of enrolment with intent to graduate by 31st December 2025. If you have already completed your MSc please also include a copy of your thesis here.
4. **All available academic transcript**s (compiled into one pdf).

There is no deadline for applications, and the positions will be filled when suitable candidates are found.

AIMS is a vibrant inter-disciplinary pan-African research environment, and applicants should be enthusiastic to be present and contribute actively to the research environment at AIMS. Applications will be accepted from anywhere in the world, with applications from students in Africa and groups under-represented in the mathematical sciences strongly encouraged.

With funding from the:

Federal Ministry of Research, Technology and Space

DAAD Deutscher Akademischer Austauschdienst German Academic Exchange Service

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