



POSITION DESCRIPTION

School of Electrical, Mechanical and Infrastructure Engineering
Faculty of Engineering and Information Technology

Research Fellow in Quantum Information Theory

POSITION NO	0063609
CLASSIFICATION	Research Fellow Grade 1 (Level A)
SALARY	\$80,258 - \$108,906 p.a. (pro rata for part-time)
SUPERANNUATION	Employer contribution of 17%
WORKING HOURS	Full-time (1.0 FTE)
BASIS OF EMPLOYMENT	Fixed-term for 18 months Applications for part-time or other flexible working arrangements will be welcomed and will be fully considered subject to meeting the inherent requirements of the position
OTHER BENEFITS	https://about.unimelb.edu.au/careers/staff-benefits
HOW TO APPLY	Online applications are preferred. Go to http://about.unimelb.edu.au/careers , select the relevant option ('Current Opportunities' or 'Jobs available to current staff'), then find the position by title or number.
CONTACT FOR ENQUIRIES ONLY	Dr. Farhad Farokhi Email: farhad.farokhi@unimelb.edu.au <i>Please do not send your application to this contact</i>

For information about working for the University of Melbourne, visit our website:
about.unimelb.edu.au/careers

Acknowledgement of Country

The University of Melbourne acknowledges the Traditional Owners of country throughout Australia. The University recognises the unique place held by Aboriginal and Torres Strait Islander peoples as the original custodians of country and their continued connection to the land, waterways, songlines and culture. The University respects all Aboriginal and Torres Strait Islander People and warmly embrace those students, staff, Elders and collaborators who identify as First Nations.

Commitment to Diversity and Inclusion

The Faculty of Engineering and Information Technology (FEIT) is committed to creating a diverse and inclusive environment that welcomes and values all people. We recognise that diversity is essential in contributing to the success of FEIT. Women, Aboriginal and Torres Strait Islanders, the LGBTIQ+ community, people living with disability and those from a culturally and linguistically diverse background, are strongly encouraged to apply.

Position Summary

You will work on Quantum Information Theory to investigate fundamental limitations of quantum communication and computing. You will use information-theoretic concepts to formalize notions, such as complexity, performance, and information leakage, and develop optimization-based frameworks to understand fundamental trade-offs involving these notions. One application domain is to develop optimal encoding strategies for quantum computing subject to constraints on complexity of realizing the encoded states. Another application domain is to understand the interplay between privacy, security, and utility in quantum computing.

You must have a doctorate in theoretical physics, information theory, signal processing, applied mathematics, computer science, or a closely related subject and a record of outstanding research in quantum physics or quantum information theory.

You will conduct independent research, leading to the preparation and publication of research outcomes in conferences and journals. You will be located in the Department of Electrical and Electronic Engineering (EEE) at the Faculty of Engineering and Information Technology (FEIT) and will be expected to be an active member of the Department, collaborating with other researchers. You may undertake small amounts of teaching and research supervision, as required.

This position is a full-time fixed-term 18 months contract. There is funding available for attending international conferences and visiting internationally recognized research groups for collaboration on the topic of this position.

1. Key Responsibilities

1.1 EDUCATION

- ▶ Contribute to teaching, training, scientific mentoring, and supervision of students;
- ▶ Supervise junior research staff in the appointee's area of expertise;
- ▶ Conduct lectures, tutorials, mark and undertake laboratory duties as required by the Department (if required).

1.2 RESEARCH AND RESEARCH TRAINING

- ▶ Independently plan and carry out research on the nominated research project and work towards completion of the aims of the project;
- ▶ Develop effective timelines and milestones based on goals of the research programme;
- ▶ Perform problem formulation and analysis, and communicate this information to the Chief Investigators and collaborators;
- ▶ Regularly write technical reports on the developed results, and maintain accurate and detailed records of all derivations, experiments, and simulations;
- ▶ Participate in preparation of manuscripts for publication in peer-reviewed conferences and journals;
- ▶ Liaise effectively with collaborators with a variety of internal and external stakeholders;
- ▶ Assist other researchers in carrying out analysis or experiments in order to work as a team and further the department's research output;

- ▶ Contribute to the development of the Department's and the School's strong research program in topic of this project;
- ▶ Work towards building an independent research project;
- ▶ Active participation in some outreach activities relating to research and scholarship;
- ▶ Present results at local, national, and international forums;
- ▶ Participation in writing research funding proposals and applications, and in delivering expected outcomes;

1.3 LEADERSHIP AND SERVICE

- ▶ Active participation in the communication and dissemination of research;
- ▶ Identify sources of funding to support individual or collaborative projects, relating to teaching, research and engagement practice in the discipline;
- ▶ Effective supervision of research support staff;
- ▶ Effective liaison with external networks to foster collaborative partnerships;
- ▶ Involvement in professional activities, including consultations and referrals;
- ▶ Attend and actively participate in departmental seminars, meetings and/or committee memberships.

2. Selection Criteria

2.1 ESSENTIAL

- ▶ A PhD in Electrical Engineering, Theoretical Physics, Computer Science, Applied Mathematics, or closely related disciplines with a specific focus on quantum systems or quantum information theory;
- ▶ A record of quality research as evidenced by publications on quantum systems or quantum information theory in leading journals and at peer-reviewed conferences commensurate with opportunity;
- ▶ Ability to perform independent research and a commitment to interdisciplinary research;
- ▶ Demonstrated capacity to communicate research concepts to technical and non-technical audiences;
- ▶ Excellent ability in theoretical analysis, problem solving, and maintaining accurate research records;
- ▶ Capability for innovative research, as evidenced by scholarly publication;
- ▶ Experience in using initiative, working with minimal supervision and ability to prioritise tasks to achieve project objectives within timelines;
- ▶ Excellent written and verbal communication skills, demonstrated by presentation of research results at conferences, internal forums and through manuscript submissions;
- ▶ Excellent interpersonal skills, including an ability to interact with internal and external stakeholders (academic, administrative and support staff) in a courteous and effective manner.

2.2 DESIRABLE

- ▶ Experience in supervision of students and/or research assistants;
- ▶ Experience in submission of grant applications;

2.3 OTHER JOB-RELATED INFORMATION

- ▶ This position requires the incumbent to hold a current and valid Working with Children Check.
- ▶ Occasional work out of ordinary hours, travel, etc.
- ▶ Perform other tasks as requested by the supervisor or the Head of the Department;

3. *Equal Opportunity, Diversity and Inclusion*

The University is an equal opportunity employer and is committed to providing a workplace free from all forms of unlawful discrimination, harassment, bullying, vilification and victimisation. The University makes decisions on employment, promotion, and reward on the basis of merit.

The University is committed to all aspects of equal opportunity, diversity and inclusion in the workplace and to providing all staff, students, contractors, honorary appointees, volunteers and visitors with a safe, respectful and rewarding environment free from all forms of unlawful discrimination, harassment, vilification and victimisation. This commitment is set out in the Advancing Melbourne strategy that addresses diversity and inclusion, equal employment opportunity, discrimination, sexual harassment, bullying and appropriate workplace behaviour. All staff are required to comply with all University policies.

The University values diversity because we recognise that the differences in our people's age, race, ethnicity, culture, gender, nationality, sexual orientation, physical ability and background bring richness to our work environment. Consequently, the People Strategy sets out the strategic aim to drive diversity and inclusion across the University to create an environment where the compounding benefits of a diverse workforce are recognised as vital in our continuous desire to strive for excellence and reach the targets of Advancing Melbourne.

4. *Occupational Health and Safety (OHS)*

All staff are required to take reasonable care for their own health and safety and that of other personnel who may be affected by their conduct.

OHS responsibilities applicable to positions are published at:

<https://safety.unimelb.edu.au/people/community/responsibilities-of-personnel>

These include general staff responsibilities and those additional responsibilities that apply for Managers and Supervisors and other Personnel.

5. *Other Information*

5.1 SCHOOL OF ELECTRICAL, MECHANICAL AND INFRASTRUCTURE ENGINEERING

The School of Electrical, Mechanical and Infrastructure Engineering undertakes teaching and research across a range of disciplines that are internationally recognised for their contribution to fundamental research. It has a number of well-established industry linkages and international partnerships. It is building a vibrant profile of interdisciplinary research, working with industry with an aim to contribute to society. It offers a comprehensive range of accredited Masters of Engineering and Master of Information Technology programs taught through the Electrical, Mechanical and Infrastructure departments as well as professional Masters programs. It has a substantial cohort of research higher degree students. A major focus of the school is to attract and retain outstanding and internationally recognised academic staff. The School is committed through strategy, culture and mentorship to increasing the number of female engineers and scientists on its staff.

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

The Department of Electrical and Electronic Engineering is a vibrant community of internationally recognised researchers focused on addressing major challenges in Power Systems; Computation and Communication Networks; Electronic & Photonic Devices and Materials; and Systems Engineering. We have long-standing, strong partnerships with industry and government that support our researchers in conducting high impact research. The Department offers both PhD and Masters level research degrees and the postgraduate coursework [Masters of Electrical Engineering](#). The Department also contributes to the [Electrical Engineering Systems](#) major in the [Bachelor of Science](#). Further information about the Department is available at <https://electrical.eng.unimelb.edu.au/>

5.2 FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

The Faculty of Engineering and Information Technology (FEIT) has been the leading Australian provider of engineering and IT education and research for over 150 years. We are a multidisciplinary School organised into three key areas; Computing and Information Systems (CIS), Chemical and Biomedical Engineering (CBE) and Electrical, Mechanical and Infrastructure Engineering (EMI). FEIT continues to attract top staff and students with a global reputation and has a commitment to knowledge for the betterment of society.

FEIT has never been better positioned as a global leader, anchored in the dynamic Asia Pacific region, creating and curating knowledge to address some of the world's biggest challenges. Through our students and our relationships with communities, we can not only respond to society's needs but anticipate and create engineering and IT solutions for the future.

<https://eng.unimelb.edu.au/>

<https://eng.unimelb.edu.au/about/join-feit>

Our ten-year strategy, FEIT 2025, is our School's commitment to bring to life the University-wide strategy Advancing Melbourne and reinforce the University of Melbourne's position as one of the best in the world.

To achieve our ambitions, we will continue to build new infrastructure to enable our teaching, research and engagement; we continue to recruit outstanding people from around the world; and we continue to attract high-quality students from across the globe who are at the heart of our enterprise.

<https://eng.unimelb.edu.au/about/feit-2025>

5.3 THE UNIVERSITY OF MELBOURNE

Established in 1853, the University of Melbourne is a leading international university with a tradition of excellence in teaching and research. The main campus in Parkville is recognised as the hub of Australia's premier knowledge precinct comprising eight hospitals, many leading research institutes and a wide-range of knowledge-based industries. With outstanding performance in international rankings, the University is at the forefront of higher education in the Asia-Pacific region and the world.

The University employs people of outstanding calibre and offers a unique environment where staff are valued and rewarded.

Further information about working at The University of Melbourne is available at <http://about.unimelb.edu.au/careers>

5.4 ADVANCING MELBOURNE

The University's strategic direction is grounded in its purpose. While its expression may change, our purpose is enduring: to benefit society through the transformative impact of education and research. Together, the vision and purpose inform the focus and scale of our aspirations for the coming decade.

Advancing Melbourne reflects the University's commitment to its people, its place, and its partners. Our aspiration for 2030 is to be known as a world-leading and globally connected Australian university, with our students at the heart of everything we do.

- ▶ We will offer students a distinctive and outstanding education and experience, preparing them for success as leaders, change agents and global citizens.
- ▶ We will be recognised locally and globally for our leadership on matters of national and global importance, through outstanding research and scholarship and a commitment to collaboration.
- ▶ We will be empowered by our sense of place and connections with communities. We will take opportunities to advance both the University and the City of Melbourne in close collaboration and synergy.
- ▶ We will deliver this through building a brilliant, diverse and vibrant University community, with strong connections to those we serve.

The means for achieving these goals include the development of the University of Melbourne's academic and professional staff and the capabilities needed to support a modern, world-class university. Those means require a commitment to ongoing financial sustainability and an ambitious infrastructure program which will reshape the campus and our contribution to the communities we engage with. This strategy, and the priorities proposed, is centred around five intersecting themes; place, community, education, discovery and global.

5.5 GOVERNANCE

The Vice Chancellor is the Chief Executive Officer of the University and responsible to Council for the good management of the University.

Comprehensive information about the University of Melbourne and its governance structure is available at <https://about.unimelb.edu.au/strategy/governance>