## Position Summary

The purpose of this role is to conduct research in the field of silicon-based quantum computing, within the group of Prof Andrea Morello. The group specializes in the development of quantum computing hardware based on the spin of implanted donors, integrated with silicon nanoelectronic devices.

The Research Associate/Senior Research Associate will conduct research of experimental nature. The research project is aimed at the demonstration of quantum information processing with high-spin nuclei in silicon, and their integration with electron spins in engineered nanostructures. The high-spin nuclei will belong to ion-implanted donors (e.g. Antimony-123) and will be addressed by coupling them to electron spins bound to the donor or confined in a quantum dot. The focus of the project is on the demonstration of fault-tolerant quanutm operations, quantum error correction, and scalablity beyond one atom.

The role will suit candidates with a strong background in experimental quantum information processing, including on platforms other than spins in semiconductors, e.g. superconducting qubits, trapped ions, cold atoms.

The role reports to Scientia Professor Andrea Morello, and has nil direct reports.

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## Level AAccountabilities

It is expected that the appointee will progress on a continual satisfactory and upward trajectory in their performance and specific performance expectations will be set individually with the Head of School/Supervisor.

Specific responsibilities for the role include:

* Conduct research in the area of **silicon-based quantum computing**, independently and as part of the team.
* Conduct electronic measurements at low temperatures, high frequencies, and high magnetic fields.
* Develop models to analyze experimental data, or to predict the behavior of more complex quantum computer devices.
* Develop and apply custom-built software to control measurement instruments and to analyze experimental data.
* Contribute to the writing of scientific papers and reports for international journals and progress reporting to other researchers and industry partners.
* Assist with the coordination of research activities and actively contribute to research outputs to meet project milestones.
* Contribute to the preparation of research proposal submissions to funding bodies and actively seek collaboration with industry partners as appropriate.
* Participate in and/or present at conferences and/or workshops relevant to the project as required.
* Assist with the supervision of research students in the research area where required.
* Align with and actively demonstrate the [UNSW Values in Action: Our Behaviours](https://unsw.sharepoint.com/sites/values-in-action) and the [UNSW Code of Conduct](https://www.gs.unsw.edu.au/policy/documents/codeofconduct.pdf).
* Cooperate with all health and safety policies and procedures of the university and take all reasonable care to ensure that your actions or omissions do not impact on the health and safety of yourself or others.

## Level A

Skills and Experience

* PhD (or soon to be awarded) in quantum physics, quantum engineering, or related area.
* Demonstrated track record of performing quantum measurements using high-frequency (including optical), and/or low-noise, and/or cryogenic methods, and programming of the instruments involved in the measurements.
* Demonstrated track record of developing methods for the analysis and design of quantum computing hardware;
* Demonstrated ability to conduct independent research with limited supervision.
* Demonstrated track record of publications and conference presentations relative to opportunity.
* Demonstrated ability to work in a team, collaborate across disciplines and build effective relationships.
* Strong interpersonal skills with demonstrated ability to communicate and interact with a diverse range of stakeholders and students.
* An understanding of and commitment to UNSW’s aims, objectives and values in action, together with relevant policies and guidelines.
* Ability and capacity to implement required UNSW health and safety policies and procedures.

## Level B

## Accountabilities

Specific responsibilities for the role include:

* Conduct research in the area of **silicon-based quantum computing**, independently and as part of a team, including leading some areas of the project where the opportunity arises and where appropriate.
* Conduct electronic measurements at extremely low temperatures, high frequencies, and high magnetic fields.
* Design thereotical and experimental protocols for the encoding and manipulation of quantum information in high-dimensional quantum systems.
* Develop and implement qubit control and readout techniques that integrate electron and nuclear spin systems, and optimise the performance of the operations.
* Develop and apply custom-built software to control measurement instruments and to analyze experimental data.
* Coordinate the maintenance of laboratory equipment and its compliance to safety regulations.
* Coordinate activities with external (including international) collaborators on the project.
* Liaise with the funding agency and contribute to the preparation of funding reports.
* Disseminate research results through writing of scientific papers and reports for international journals and progress reporting to other researchers and industry partners.
* Participate in the definition of research directions and actively contributes to the coordination of research activities and research outputs to meet project milestones.
* Independently seek and apply for external funding opportunities to grow and enhance the research project.
* Participate in and/or present at conferences and/or workshops relevant to the project as required.
* Joint supervision of honours and HDR students.
* Align with and actively demonstrate the [UNSW Values in Action: Our Behaviours](https://unsw.sharepoint.com/sites/values-in-action) and the [UNSW Code of Conduct](https://www.gs.unsw.edu.au/policy/documents/codeofconduct.pdf).
* Cooperate with all health and safety policies and procedures of the university and take all reasonable care to ensure that your actions or omissions do not impact on the health and safety of yourself or others.

Level B

Skills and Experience

* PhD in **Physics, Quantum Engineering**, or related area. Previous postdoctoral experience in relevant areas of research is preferred.
* Demonstrated track record in the operation of solid-state quantum computing hardware, especially coherent quantum control at microwave frequencies.
* Demonstrated track record of performing electrical measurements on quantum electronic devices and characterisation of their performance.
* Demonstrated track record in benchmarking the performance of quantum computing hardware.
* Demonstrated ability to conduct independent research with limited supervision.
* Experience in day-to-day supervision of PhD and undergraduate students.
* Strong track record of publications and conference presentations relative to opportunity, and evidence of leadership in the writing of peer-reviewed publications.
* Proven ability to work in a team, collaborate across disciplines and build effective relationships.
* Strong interpersonal skills with demonstrated ability to communicate and interact with a diverse range of stakeholders and students.
* Demonstrated ability to supervise honours and postgraduate research students.
* An understanding of and commitment to UNSW’s aims, objectives and values in action, together with relevant policies and guidelines.
* Ability and capacity to implement required UNSW health and safety policies and procedures.

PRE EMPLOYMENT CHECKS REQUIRED FOR THIS POSITION

**Verification of qualifications**

About this document

This Position Description outlines the objectives, desired outcomes, key responsibilities, accountabilities, required skills, experience and desired behaviours required to successfully perform the role.

This template is not intended to limit the scope or accountabilities of the position. Characteristics of the position may be altered in accordance with the changing requirements of the role.