

# UNSW@ADFA

## CANBERRA • AUSTRALIA

*UNSW@ADFA is a campus of the University of New South Wales located at the Australian Defence Force Academy in Canberra. UNSW@ADFA endeavours to offer staff a rewarding experience and offers many opportunities and attractive benefits, including:*

- *Strong commitment to staff development and learning*
- *Strong commitment to work life and family balance*
- *Australian bushland setting with free parking*
- *Generous superannuation and salary packaging opportunities*
- *Sports and social facilities*

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### SCHOOL OF INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

#### PhD Scholarship in Coherent State Quantum Computing

**Three years funding at \$21,207 (2008 figure), indexed annually, Tax Free; plus a Thesis allowance, Relocation and Travel allowances and 20 days annual recreation leave.**

In 1965 Gordon Moore made the very famous, and accurate, prediction that computing power would double every 18 months. We are currently achieving these increases in computational power by making computer components smaller and smaller. However there is a fundamental lower limit, the size of an atom, to these components. Consequently, at some point Moore's Law will no longer apply. In anticipation of this, there is a vast international research effort focussed on the development of a Quantum Computer. The Quantum Electronics group, through the Centre for Quantum Computer Technologies, is a part of this global research effort. We conduct research into photonic quantum computation architectures.

Existing experiments in the field of photonic quantum computation make use of single photons as quantum bits, or qubits, in what is known as a dual-rail encoding scheme. Such an architecture has advantages in that it is relatively straightforward to construct the basic resources required for these experiments. However, interactions between multiple qubits are hard to achieve. A quite different and potentially more efficient approach to optical quantum computing is Coherent State Quantum Computing (CSQC). In CSQC the basis states are coherent states (multi-photon states that exhibit classical optical coherence) that can be created deterministically from well-stabilised lasers. These states are non-orthogonal, but can serve as qubits under appropriate conditions. Processing of these qubits requires superpositions of coherent states as a resource.

Our laboratories host state-of-the-art experiments in the generation, manipulation and detection of quantum optical states. These states include high frequency squeezed light, single photons and Schroedinger Cat (coherent superposition) states. The aim of our research is to continuously build upon the work performed to date and demonstrate single and 2-qubit operations, teleportation and other techniques in CSQC. This will allow further exploration into the viability of this approach to quantum computation.

The scholarship is located at the UNSW at ADFA campus in Canberra. For further inquiries regarding the project, please contact: Dr Elanor Huntington ((02) 6268 8592 or [e.huntington@adfa.edu.au](mailto:e.huntington@adfa.edu.au)). Closing Date: 21 October 2008

A written application including a resume and the names and addresses (preferably email) of at least three referees should be submitted to: Elanor Huntington, School of Information Technology and Electrical Engineering UNSW@ADFA, Australian Defence Force Academy, Northcott Drive, Canberra, ACT 2600. You may email your application to: [e.huntington@adfa.edu.au](mailto:e.huntington@adfa.edu.au). For confirmation of receipt of applications telephone (02) 6268 8592. People from EEO groups are encouraged to apply.