

PhD Scholarship - \$50,000 per year in Quantum Communications (3-year project)

UNSW Sydney, Australia In Collaboration with the Australian Government's Defence Science Technology Group (Adelaide).

Project Title: Quantum Communication Capabilities for Low-Earth Orbit Satellites.

Quantum communication via low-orbit satellites offers up a paradigm shift in telecommunications. Providing for unparalleled communication security, this emerging technology will also underpin the development of the global quantum internet. This research area was given a large boost recently with the launch of the world's first quantum communications enabled satellite. This new satellite creates entangled photon pairs, beaming them down to Earth for subsequent processing and use in a range of communication scenarios. In this PhD project you will investigate the use of Free-Space Optical (FSO) links to and from Low-Earth Orbit (LEO) satellites to enable quantum communications over very large distances. Distinct from the Discrete Variable (DV) single-photon technology used by the satellite currently in orbit, you will be focused on Continuous Variable (CV) multi-photon laser technology. This latter technology has the potential for better quantum communication performance. Your main goal will be to fully investigate the performance gains that can be achieved in practice using current CV detector technology in the context of LEO satellites.

The project combines two key areas: theoretical studies on CV quantum-information transfer through the free space channel, and experimental and/or modelling studies of laser propagation through atmospheric turbulence. This project offers the PhD candidate the opportunity to enter an exciting and emerging technology frontier that is positioned at the interface of advanced quantum physics and satellite-based communications.

This three-year PhD Scholarship is sponsored by the Department of Defence's DSTG (Defence Science Technology Group) based in Adelaide (see www.dst.defence.gov.au). Although the PhD candidate will be based at UNSW, Sydney he/she should be prepared to spend several weeks per year visiting and collaborating with DSTG researchers. The candidate must be an Australian Citizen prior to the commencement of the PhD and is expected to hold the equivalent of a First-Class Honours degree in Engineering or Physics. The salary given with this scholarship will be approximately **AUD \$45,000 per annum** and based on the successful award by UNSW of a Domestic Research Scholarship and a \$16,000 per annum top-up scholarship supplied by DSTG and UNSW. In addition to a stipend, approximately **\$5,000 per annum** will be made available to the successful candidate for travel to international conferences. UNSW will cover all tuition fees.

Further Information:

Contact: UNSW PhD Supervisor: Professor Robert Malaney, Email r.malaney@unsw.edu.au, Tel +61 2 9385 6580.