

PhD Scholarship

University of New South Wales (UNSW) Sydney, Australia

QKD from Space-Based Quantum Communications

Quantum communication via low-orbit satellites offers up a paradigm shift in telecommunications. Providing for unparalleled communication security, this emerging technology will also lead us into 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 satellite by China. 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 we will leverage optical quantum communications, quantum error correction, and channel modelling, to deliver novel and optimized quantum communication protocols specifically designed for the turbulent atmospheric paths traversed by entangled photons emanating from a satellite. We will be particularly focussed on quantum key distribution (QKD) protocols, and the resulting ultra-secret key rates that can be produced from the different variants of such protocols. We will consider multiple quantum information carriers, such as those involving discrete variables (DV) coded into single photons, and continuous variables (CV) coded into weak laser pulses. Manipulation of these quantum states will involve feedback mechanisms based partially on assessments of the satellite-to-ground channels. This work will lead to state-of-the-art quantum communication protocols that optimize secure communication throughput over very large distances. It 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 PhD Scholarship is sponsored by **Northrop Grumman**. The scholarship stipend is anticipated to be approximately \$37,000 (AUD) per year for the duration of the 3 year PhD. An extra 6 months of stipend will be provided if needed. One trip per year to the US to visit Northrop Grumman is anticipated, and travel funds to attend international conferences will also be provided. This scholarship is open to both domestic and international candidates. A Tuition Fee Scholarship (TFS) will be provided by UNSW to successful international candidates. The deadline for applications is 15th January 2018. The student is expected to commence studies at UNSW, Sydney by March 31, 2018.*

Further Information:

School of Electrical Engineering & Telecommunications, UNSW, Sydney, Australia

<https://www.engineering.unsw.edu.au/electrical-engineering/>

UNSW Graduate Research: <https://research.unsw.edu.au/graduate-research>

Contact UNSW PhD Supervisor:

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