



# PhD Projects at ACQAO

## EXPERIMENTAL

### About ACQAO

The Australian Centre for Quantum-Atom Optics (ACQAO) was formed in 2003 as one of the recently established Australian Research Council Centres of Excellence. It involves collaboration between the Australian National University in Canberra, the University of Queensland in Brisbane, and the Swinburne University of Technology in Melbourne.

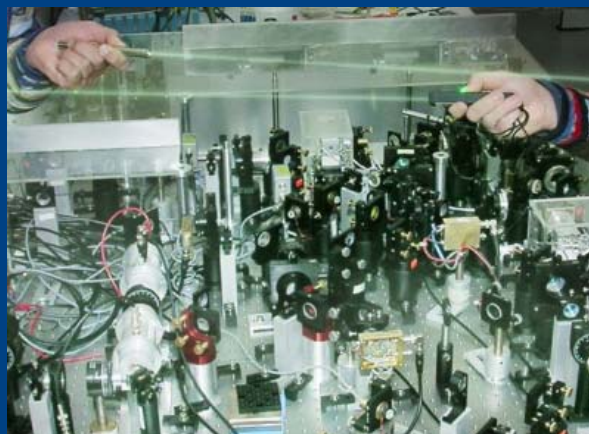
The aim of ACQAO is to carry out strategic fundamental research, which combines the ideas of quantum optics, such as squeezing and entanglement, and the techniques of atom optics, such as Bose-Einstein condensation and atom lasers.

## QUANTUM IMAGING

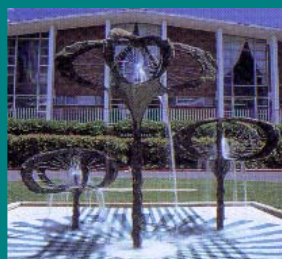
Tremendous progress has been made to use quantum concepts in optical communication. What used to be purely theoretical concepts, such as entanglement and duality of waves and particles, is now the guiding concept behind new technologies. Within ACQAO we combine the best lasers, nonlinear optics and high quality components with new original ideas of quantum correlations and multimode optics. This project is concerned with exploring the limits of communicating spatial information, such as the direction and position of laser beam and eventually simple images. The possibilities of quantum imaging are just now emerging.

You will join a lively international team based at the ANU with collaborators across Europe and in the US. We have built unique experiments and will demonstrate the capability of this unique Australian approach [1]. The project is well funded and equipped and located in the new ACQAO laboratories at ANU. It offers the opportunity to produce exciting experimental results such as *spatial entanglement and super resolution data storage*.

You will work alongside students and researchers from France, Denmark and Germany and with supervisors (H.-A. Bachor, P. K. Lam, C. C. Harb) who are pioneers in this field [2]. The project is timed and planned 2006-2008 and successful candidates will have the chance to work later in leading laboratories in Europe. APA scholarships with financial top up for the best students are available via the ANU and ACQAO.



- [1] N. Treps, N. Grosse, W. P. Bowen, C. Fabre, H.-A. Bachor, P. K. Lam, *A quantum laser pointer*. Science 301, 940 (2003).  
[2] H.-A. Bachor and T. C. Ralph, *A guide to experiments in quantum optics* (Wiley, 2003).



### Supervisors

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### Scholarships and further information

For further details about the research project please contact one of the prospective supervisors. Information about PhD scholarships at ANU can be found at:

<http://www.anu.edu.au/sas/scholarships/>