



# PhD Projects at ACQAO

## EXPERIMENTAL

### About the 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.

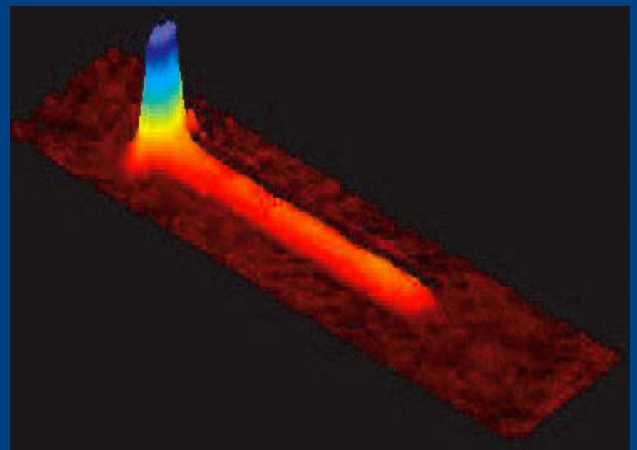
## ATOM LASER

Ultra-cold atoms form matter waves that can be diffracted, interfered, squeezed and polarised. Because atoms have mass and a high self-nonlinearity, many measurements, and the technology based on them, can be improved by using atoms.

The key to future applications is the development of the atom laser, a fully coherent atomic beam derived from a Bose-Einstein condensate. An atom laser is as different from a normal atomic beam as an optical laser is different from a light bulb. The development of the atom laser is one of the major goals of the Australian Centre for Quantum Atom Optics. Our group is well funded and has excellent contact and exchange with international groups in Europe and the US. We are looking for highly motivated students who can take full advantage of the nationally and internationally collaborative research environment that we offer.

Our experimental program is aimed at, but is not limited to, answering the following questions:

- Can we maximise pumping and minimise the line-width of an atom laser by manipulating the scattering length of Bose condensed atoms?
- How can we measure the quantum field of an atom laser and a BEC?
- Can we build a measurement device based on an atom laser and how well will it perform compared to existing technology?



### Supervisors

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### Scholarships and further information

For further details about the research project and information about PhD scholarships please contact one of the prospective supervisors or visit the webpage of the ANU Node of ACQAO:

<http://www.anu.edu.au/Physics/ANUBEC/projects.html>