Macquarie’s physics and astronomy research is world leading. In the Excellence in Research for Australia (ERA) 2012 evaluation our physical sciences research received a rating of 5 out of 5 – ‘outstanding performance well above world standard’, as did our research in the sub-disciplines of astronomical and space sciences, and quantum physics.

Our scientists enjoy outstanding international collaborative links, and publish their research in high impact journals.

As an HDR candidate you will work alongside outstanding researchers on fundamental and applied physics in optics, photonics and lasers; astronomy and astrophysics; or quantum information science.

Projects include:
• building new powerful lasers with pure diamond crystals
• constructing 3D quantum logic circuits using high-intensity femtosecond lasers
• designing new sensors based on levitated quantum mechanical systems
• discovering forming exoplanetary systems
• finding cell populations with enhanced therapeutic value using advanced imaging
• harnessing the angular momentum of light at the quantum level
• studying collisions between planets and dying stars
• ultrahigh resolution studies of experimental nonlinear laser systems
• using nanoparticles to identify diseases

Macquarie physicists have partnered in successful commercial ventures leading to spinoff companies such as semiconductor producer BluGlass Ltd, and Laser Micromachining Solutions which provides micro-fabrication services to companies and universities across Australia.

Graduates from Macquarie have obtained academic, post-doctoral research, industry and government positions, making successful careers in Australia and internationally.

AREAS OF SPECIALISATION
• Astronomy, astrophysics and astrophotonics
• Biophotonics
• Lasers and light sources, photonic structures and devices
• Molecular physics
• Quantum information science and technology
• Semiconductors and materials

FACILITIES
• Access to on-shore and off-shore 2 – 8 metre telescopes
• Laser micromachining and fabrication facility
• Optical and photonic micro-characterisation and microscopy facilities
• Thin film deposition and crystal growth systems

RESEARCH HUBS
• MQ Biofocus Research Centre
• MQ Photonics Research Centre
• Research Centre for Astronomy, Astrophysics and Astrophotonics
• Research Centre in Quantum Science and Technology
Highlights

- Macquarie is home to major nodes in the ARC Centre of Excellence for Ultrahigh-bandwidth Devices for Optical Systems, the ARC Centre of Excellence for Engineered Quantum Systems, and the OptoFab node of the Australian National Fabrication Facility

- We have strong collaborations with Australian Astronomy Observatory (AAO) and CSIRO Astronomy and Space Science

- Macquarie is home to Future Fellows, Super Science Fellows, and a Gutenberg Chair

Support

We give HDR candidates strong academic and administrative support. This includes:

- Commencement and completion programs
- Discipline-specific research training units, including workshops in research communication, presentation skills, academic writing skills, thesis planning and poster preparation
- Experienced supervisors and department-based higher degree research directors
- Financial support for eligible candidates for a range of research-related activity
- Regular progress reports and interviews, and/or work-in-progress presentations in which research candidates receive feedback on their work from a panel of academics in their field

Research leaders

Macquarie is home to many internationally renowned researchers, including:

**Professor Ewa Goldys, Professor Brian Orr and Professor Jim Piper** are Fellows of the Optical Society of America.

**Professor Quentin Parker** leads the Research Centre for Astronomy, Astrophysics and Astrophotonics, and chairs the International Astronomical Union working group on sky-surveys.

**Associate Professor Gabriel Molina-Terriza, Dr Peter Rohde, Anthony Conn and Jana Say** have recently published in prestigious journals *Nature, Nature Nanotechnology, Nature Physics* and *Science*.

Recent graduate **Dr Yiqing Lu** was named ISAC Scholar (2013–2017) by the International Society for Advancement of Cytometry.

PhD candidates **Tui Britton, Ashkbiz Danekhar, Tobias Feger** and **Tim Zhao** have recently won competitive prizes and awards.