From research into granny galaxies and supermassive black holes to nano-optical tweezers and SuperDots, Macquarie’s physics and astronomy researchers are uniquely positioned to help shape the complex issues that define the future of humanity.

Our scientists enjoy outstanding international collaborative links and publish their research in high-impact journals. As a higher degree research candidate, you will work alongside outstanding researchers on fundamental and applied physics in optics, photonics and lasers; astronomy and astrophysics; or quantum information science. A range of cutting-edge projects are available, involving:

- building powerful new lasers with pure diamond crystals
- constructing 3D quantum logic circuits using high-intensity femtosecond lasers
- designing new sensors based on levitated quantum mechanical 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
- using nanoparticles to identify diseases.

Our physics and astronomy researchers enjoy an international reputation as leaders in their fields. In the most recent Excellence in Research for Australia (ERA) 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.

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

Graduates from Macquarie have forged successful careers in Australia and overseas, obtaining academic, post-doctoral research, industry and government positions. Additionally, our higher degree research candidates have been successful in obtaining national and international awards including the Jak Kelly Award, Royal Society of New South Wales Scholarships, travel grants from The Optical Society and International Society for Advancement of Cytometry, and awards at major conferences.
Large federally funded centres

- Macquarie is home to major nodes in the ARC Centres of Excellence for Engineered Quantum Systems, Nanoscale BioPhotonics and Ultrahigh-bandwidth Devices for Optical Systems, as well as the OptoFab Node of the Australian National Fabrication Facility.

Support

You will be provided with individualised support, as well as a range of opportunities, at all stages of your research degree, including:

- higher degree research learning skills advisers who provide valuable training options such as workshops in research communication, presentation skills, academic writing skills, thesis planning and more
- inspirational supervision and mentoring
- a candidature management plan that closely supports progress, commencement programs, work-in-progress reviews, and presentations providing opportunities for feedback from a panel of academics
- real-world engagement with opportunities for cotutelle and joint degrees
- financial support for a range of research-related activities
- world-class facilities
- a transformative research experience that fosters cross-disciplinary collaboration.

RESEARCH LEADERS

Meet some of our internationally renowned researchers.

- Macquarie hosts three Fellows of The Optical Society and six ARC Future Fellows. We have strong collaborations and joint staff appointments with the Australian Astronomical Observatory and CSIRO Astronomy and Space Science.
- Our research leadership is recognised internationally, with high-profile research published in prestigious journals including Nature Physics, Nature Photonics, Nature Nanotechnology and Science.
- Our national and international network of collaborators allows you to participate in industrial projects and in international research programs, supporting you to develop successful careers beyond your degree.