



RESEARCH FELLOW IN X-RAY OPTICS

DEPARTMENT/UNIT	School of Physics and Astronomy
FACULTY/DIVISION	Faculty of Science
CLASSIFICATION	Level A
WORK LOCATION	Clayton campus

ORGANISATIONAL CONTEXT

Everyone needs a platform to launch a satisfying career. At Monash, we give you the space and support to take your career in all kinds of exciting new directions. You'll have access to quality research, infrastructure and learning facilities, opportunities to collaborate internationally, as well as the grants you'll need to publish your work. We're a university full of energetic and enthusiastic minds, driven to challenge what's expected, expand what we know, and learn from other inspiring, empowering thinkers. Discover more at www.monash.edu

The Faculty of Science works at the frontiers of research and scholarship, and is committed to high quality teaching and learning; we have numerous partnerships with research institutions, industry, government and individual supporters. Our five Schools offer a large and diverse range of disciplines in undergraduate and postgraduate courses, including physical, biological, biomedical, behavioural, environmental, mathematical and computer sciences. Our researchers are at the forefront of their fields - conducting research that spans the theoretical to the applied, contributing to new knowledge and technologies, and challenging how we understand and interact with the world. To learn more about the Faculty of Science, please visit our website: www.monash.edu/science/

The School of Physics and Astronomy is committed to research and teaching of the highest quality in experimental physics, theoretical physics, astronomy and astrophysics. We are recognised internationally for research in several fields of physics and astrophysics. In the most recent national audit of research excellence (ERA 2018), the School achieved the maximum overall rating of 5 for Physical Sciences, including the maximum rating of 5 in each of our assessed fields of research (spanning astronomy & astrophysics, atomic & molecular physics, nuclear physics, particle physics, condensed matter physics and optics).

The School has research strengths in X-ray optics and synchrotron science, ultracold atomic gases, gravitational-wave astrophysics, electron microscopy and diffraction, condensed matter physics, high-energy particle physics, astronomy and astrophysics. Currently the School has 30 academic staff, 32 research-only staff and 12 adjunct staff, supported by 12 professional staff. In 2018, the School's total recurrent income was approximately \$20M, with research income in the past four years totaling >\$40M. It is actively involved in six research centres:

- The ARC Centre of Excellence for Future Low Energy Electronics Technologies (FLEET) <https://www.fleet.org.au/>
- The ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav) - <http://www.ozgrav.org/>

- The ARC Centre of Excellence for Particle Physics at the Terascale (CoEPP) - <http://www.coepp.org.au/>
- The Monash Centre for Astrophysics (MoCA) - <http://moca.monash.edu>
- The Monash Centre for Electron Microscopy (MCEM) - <http://mcem.monash.edu.au>
- The Monash Centre for Atomically Thin Materials (MCATM) - <https://www.monash.edu/atomically-thin-materials>

In addition, the School has over a dozen Australian Research Council funded programmes and is an active user of the Australian Synchrotron and the Melbourne Centre for Nanofabrication, which are located adjacent to the Clayton Campus of Monash University. Modern laboratory facilities are a high priority in the School's Strategic Plan. In 2013 the School's research laboratories relocated to a new building - the \$175M New Horizons Research Centre (NHRC). This research centre houses state-of-the art x-ray imaging facilities (e.g., an Excillum liquid metal jet x-ray source), atom optics, BEC, biophotonics, condensed matter physics and nanotechnology laboratories, and specialised infrastructure that supports active research programmes in a wide range of areas.

X-ray Optics

The School has cultivated a focused research program in x-ray optics for over 15 years. This program spans theoretical, experimental and applied topics, specialising in new methods of x-ray imaging that can reveal weakly-attenuating and sub-pixel structures that are not seen using conventional methods. In recent years, a number of collaborations within the program have applied these new methods of x-ray imaging to equip biomedical studies, aiming to better understand health and to accelerate the development of new medical treatments.

In the area of X-ray Optics, the School currently employs Dr Kaye Morgan and Dr Marcus Kitchen. Both Dr Morgan and Dr Kitchen are currently research-focused, each holding a Future Fellowship from the Australian Research Council (ARC) and a number of research grants from the ARC and the National Health and Medical Research Council (NHRC). Other key members of the School include Adjunct Professor David Paganin (theorist and author of 'Coherent X-ray Optics') and Dr Imant Svalbe (specialising in discrete projections, with applications in Computed Tomography). Research is often in collaboration with physicists specialising in x-ray optics from the neighbouring CSIRO (Commonwealth Scientific and Industrial Research Organisation, an Australian government agency), Australian Universities (e.g. Australian National University) and International groups (e.g. The Technical University of Munich), as well as with medical scientists from Australian Hospitals (e.g. Women's and Children's, Adelaide), Institutes (e.g. The Ritchie Centre) and Universities (e.g. University of Tasmania, University of Sydney). Experimental work utilises a range of local and international x-ray sources, including the Australian Synchrotron, situated across the road from Monash University. This facility provides the largest synchrotron beam in the world at the Imaging and Medical Beamline (IMBL), and a new micro-Computed Tomography beamline is currently in construction.

Further information about the position and the School of Physics and Astronomy is available at:

<https://research.monash.edu/en/organisations/sch-of-physics-astronomy/persons/>

<https://www.monash.edu/science/schools/physics>

POSITION PURPOSE

The Postdoctoral Research Fellow will join the newly established research group led by Kaye Morgan, carrying out research in x-ray physics. The group's research focuses in the following key areas:

- The development of new experimental techniques and reconstruction algorithms for x-ray phase contrast and dark field imaging, in particular using structured illumination (speckle, grids or gratings), propagation-based phase contrast and approaches compatible with high-speed or low-dose imaging. The focus is particularly on extracting quantitative measurement of a sample via innovative methods that are based in theoretical coherent x-ray optics.
- The translation of x-ray phase contrast imaging from the synchrotron to compact x-ray sources to enable widespread use of these techniques in medicine, industry and beyond.

- The application of x-ray phase contrast imaging and innovative image analysis to biomedical research. In particular, work in this area has previously focused on applications in respiratory research, looking at new non-invasive methods of measuring lung and airway health via x-ray imaging. Collaborations have looked at developing new treatments for Cystic Fibrosis, better understanding respiratory treatment delivery mechanisms, new diagnostic methods for earlier detection of lung disease, and understanding the effects of mechanical ventilation on lung health.

The successful candidate is expected to have a high degree of synergy with the existing x-ray optics program, and can take on a leadership role in one or more of the recently-funded projects that fall into the categories listed above and/or develop their own research ideas in this area. The Research Fellow will publish papers in high-impact journals, present results at major conferences and collaboration meetings, and assist in the supervision of students.

Reporting Line: The position reports to an ARC Future Fellow

Supervisory Responsibilities: Not applicable

Financial Delegation: Not applicable

Budgetary Responsibilities: Not applicable

KEY RESPONSIBILITIES

A Level A research-only academic shall work with support, guidance and/or direction from staff classified at Level B and above, and with an increasing degree of autonomy as the research academic gains in skill and experience.

1. The conduct of research under limited supervision either as a member of a team or, where appropriate, independently and the production or contribution to the production of conference and seminar papers and publications from that research
2. Involvement in professional activities including, subject to availability of funds, attendance at conferences and seminars in the field of expertise
3. Limited administrative functions primarily connected with the area of research of the academic
4. Development of a limited amount of research-related material for teaching or other purposes with appropriate guidance from other staff
5. Occasional contributions to teaching in relation to her/his research project(s)
6. Attendance at meetings associated with research or the work of the organisational unit to which the research is connected and/or at departmental, school and/or faculty meetings and/or membership of a limited number of committees
7. Provide advice within the field of the staff member's research to postgraduate students

KEY SELECTION CRITERIA

Education/Qualifications

1. The appointee will have:
 - A PhD in optical physics or a related research area (applicants who are nearing completion of a PhD may be considered)

Knowledge and Skills

2. A demonstrated aptitude for research with a sound record of publication, commensurate with experience and opportunities
3. Ability to solve problems by using discretion, innovation and the exercise of diagnostic skills within areas of functional responsibility or professional expertise

4. Well-developed written communication and verbal communication skills with proven ability to effectively analyse information and produce clear, succinct reports and documents which requires interaction with others
5. Planning and organisational skills, with the ability to prioritise multiple tasks and set and meet deadlines
6. Demonstrated computer literacy and proficiency in coding for imaging simulations or image analysis (e.g. Python, IDL, Matlab), with the capability and willingness to learn new packages as appropriate
7. The ability to work cohesively in a team, across multiple disciplines where appropriate
8. Experience in optics and/or x-ray imaging would be a key advantage

OTHER JOB RELATED INFORMATION

- Travel to other campuses of the University may be required
- There may be a requirement to work additional hours from time to time
- There may be peak periods of work during which taking of leave may be restricted

GOVERNANCE

Monash University expects staff to appropriately balance risk and reward in a manner that is sustainable to its long-term future, contribute to a culture of honesty and integrity, and provide an environment that is safe, secure and inclusive. Ensure you are aware of and adhere to University policies relevant to the duties undertaken and the values of the University. This is a standard which the University sees as the benchmark for all of its activities in Australia and internationally.