

# RESEARCH FELLOW IN S/TEM

DEPARTMENT/UNIT	School of Physics and Astronomy
FACULTY/DIVISION	Faculty of Science
CLASSIFICATION	Level B
DESIGNATED CAMPUS OR LOCATION	Clayton campus

## ORGANISATIONAL CONTEXT

---

At [Monash](#), work feels different. There's a sense of belonging, from contributing to something groundbreaking – a place where great things happen. You know you're part of something special and purposeful because, like Monash, your ambitions drive you to make change.

We have a clear purpose to deliver ground-breaking intensive research; a world-class education; a global ecosystem of enterprise – and we activate these to address some of the [challenges](#) of the age, Climate Change, Thriving Communities and Geopolitical Security.

We welcome and value difference and [diversity](#). When you come to work, you can be yourself, be a change-maker and develop your career in exciting ways with curious, energetic, inspiring and committed people and teams driven to make an impact – just like you.

Together with our [commitment to academic freedom](#), you will have access to quality research facilities, infrastructure, world class teaching spaces, and international collaboration opportunities.

We champion an [inclusive workplace culture](#) for our staff regardless of ethnicity or cultural background. We have also worked to improve [gender equality](#) for more than 30 years. Join the pursuit of our purpose to build a better future for ourselves and our communities – [#Changelt](#) with us.

The five Schools of the **Faculty of Science** offer a large and diverse range of disciplines in undergraduate and postgraduate courses. Ten Schools from other university faculties contribute to science teaching at all levels, allowing students to choose their studies from physical, biological, biomedical, behavioural, environmental, mathematical and computer sciences. The Faculty of Science has a strong research reputation. The faculty's research spans the theoretical to the applied, contributes to new knowledge and technologies, and challenges how we interact with the world. To learn more about the Faculty of Science, please visit our website:

[www.monash.edu/science](http://www.monash.edu/science).

The **School of Physics and Astronomy (SPA)** is a School located within the Faculty of Science. The School is committed to teaching and research of the highest quality in astronomy, astrophysics, experimental physics, and theoretical physics. It has major research activities under the themes of Quantum Light, Information and Matter; the Physics of Imaging; Particle Physics; Astronomy and Astrophysics and Physics Education Research. The School has a significant on-going commitment to the development and delivery of innovative, active learning across the undergraduate curriculum.

The School is strongly committed to improving the diversity of our staff and students, and promoting a culture of equality, fairness, respect and openness. Please visit <https://www.monash.edu/science/schools/physics>

The **Physics of Imaging group** within the School of Physics and Astronomy has vibrant programmes of research in imaging and diffraction physics using electrons, light, x-rays and sound with applications across condensed matter physics, materials science, medical imaging and astronomy.

The **Monash Centre for Electron Microscopy (MCEM)** is a central university research platform. Its mission is to enable and advance research excellence at Monash University and beyond through the provision of a world-class research capability in electron microscopy for the determination of the structure of matter down to the atomic scale.

The MCEM comprises expert staff and a suite of advanced instruments, including the Thermo Scientific Spectra- $\phi$ , a next generation monochromated, double-aberration corrected S/TEM with outstanding spatial and energy resolution, multiple fast, pixelated, single-electron detectors and unique electron-optical elements to optimise performance in S/TEM; a double-aberration-corrected Titan<sup>3</sup> 80-300kV with pixelated detectors; plus 1 other FEGTEM, a TEM, 2 FEGSEMs and 2 FIB/SEMs This includes a just installed Thermo Scientific Helios 5 UX FIB-SEM Triple beam microscope including high speed EDX & EBSD, ToF-SIMS and cryo-transfer and a Thermo Scientific Verios 5 UC FEGSEM. MCEM is also in the process of procuring an in-situ mechanical/heating FEG-SEM and high performance analytical FEG-SEM. This instrumentation is supported by an extensive range of specimen preparation equipment, computing and analysis software plus access to high performance computing at the Monash eResearch Centre.

The MCEM is located in an award-winning ultra-stable building, purpose-designed to optimise instrument performance.

The MCEM provides a key complementary facility to the adjacent Ramaciotti Centre for Cryo-Electron Microscopy (which includes a FEI Titan Krios Cryo-TEM with Volta phase plate, energy filter and 2 direct electron detectors and a 2<sup>nd</sup> Titan Krios with pixelated detectors), the Australian Synchrotron and Melbourne Centre for Nanofabrication (MCN), which are all within walking distance. To learn more about MCEM please visit our website:

<https://www.monash.edu/researchinfrastructure/mcem>.

Monash and the Faculty of Science values staff diversity and champions inclusive practices. We are committed to equitable decision making and apply the principles of [achievement relative to opportunity](#) in our selection processes.

## POSITION PURPOSE

---

A Level B research-only academic is expected to carry out independent and team research within the field in which they are appointed and to carry out activities to develop their research expertise relevant to the particular field of research.

This senior postdoctoral research fellowship is an exceptional opportunity to conduct high quality research in the development of new transmission electron microscopy methods (STEM and/or TEM) and to apply them to solve important problems in condensed matter physics and materials science. The position will be able to exploit aberration-corrected FEG-TEMs with tailored electron-

optics and pixelated and single electron detector systems operating in customised modes to deliver new information about key material systems.

The position will be part of the Laureate Fellowship team of Professor Joanne Etheridge located in the School of Physics and Astronomy. This team is working on both theoretical and experimental aspects of TEM technique development and their application to materials problems. This includes design of electron wavefields, electron scattering theory, algorithm development and their coordinated implementation into new experimental methods and electron-optical configurations for measuring structure and electronic structure down to the atomic scale. Just some examples of specific topics under investigation include (but are not limited to): CBED (including for measurements of structure, electronic structure and solutions to the phase problem); 4D-STEM (including Symmetry-STEM, Energy-filtered 4D-STEM, "Pseudo-confocal" 4D-STEM); and, more generally, quantitative STEM and TEM, including low dose methods. These methods are then being applied to materials systems including (but not limited to) functional perovskites and nanoparticle systems.

The research fellow will be part of a diverse, international research team and will enjoy a friendly, creative and collaborative research environment. The team meets regularly for group meetings, broader discussion groups and seminars, as well as social outings and events. More broadly, the position will benefit from a critical mass of expertise in the physics of imaging and in material science at Monash University, as well as world-class research facilities and expertise at the Monash Centre for Electron Microscopy. There will be opportunities to build linkages, present your results at national and international conference and to work with leading international collaborators

**Reporting Line:** The position reports to an ARC Georgina Sweet Laureate Fellow, School of Physics and Astronomy

**Supervisory Responsibilities:** Not applicable

**Financial Delegation:** Not applicable

**Budgetary Responsibilities:** Not applicable

## KEY RESPONSIBILITIES

---

Specific duties required of a Level B research-only academic may include:

1. Conduct research, both as a member of a team and independently, in the development of STEM and/or TEM methods. This research may be experimental or theoretical or both, depending on the expertise of the candidate.
2. Apply these methods to the solution of challenging problems in condensed matter physics and materials science and engineering.
3. Produce high quality research publications describing the outcomes of (1) and (2) above.
4. Contribute to professional activities including presenting results at conferences and seminars relevant to the research area;
5. Guide or co-supervise honours or postgraduate research students within the research group.
6. Contribute to the preparation or, where appropriate, individual preparation of research proposal submissions to external funding bodies
7. Undertake limited administrative functions primarily connected with this research project and the research group;
8. Participate in meetings associated with the research group or the work of the organisational unit to which the research is connected and/or membership of a limited number of committees.

## KEY SELECTION CRITERIA

---

### Education/Qualifications

1. The appointee will have:
  - a doctoral qualification in science, engineering or other relevant discipline with a minimum of 3 years research experience post-PhD or;
  - an equivalent combination of relevant experience and/or education/training.

### Knowledge and Skills

2. Advanced understanding and experience in at least **four** of the following fields:
  - Aberration-corrected STEM or TEM
  - Electron scattering theory and simulation
  - Physics of optics and/or imaging
  - Theory and/or application of new electron wavefields (probes)
  - Convergent Beam Electron Diffraction
  - Scanning diffraction/4D-STEM
  - Energy-filtered diffraction
  - Electron Energy Loss Spectroscopy
  - Algorithm development related to STEM or TEM data analysis
  - Practical computing and programming skills
3. Demonstrated track record of high quality research work and refereed research publications (journal impact factor will not be used to assess publication quality).
4. Excellent communication skills to effectively relate scientific material, both orally and in writing.
5. High level organisational skills, with demonstrated capacity to establish and achieve goals
6. Ability to work both independently and as part of a team
7. Strong interpersonal skills to interact effectively with students, academic and professional staff

## 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
- Occasional travel may be required to attend national and/or international conferences and/or to visit international collaborators, if required.

## 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.