**FACULTY OF SCIENCE AND ENGINEERING**

**Dame Kathleen Ollerenshaw Research Fellowships Scheme Guidance and Information for Applicants**

The flagship Dame Kathleen Ollerenshaw Research Fellowships are aimed at outstanding scientists and engineers at an early stage in their academic careers. Fellows should show a high level of creativity and ambition in their ideas and want to develop potentially transformative research. We anticipate up to 10 of these prestigious Fellowships to be offered annually. Each Fellowship is for an initial 5 year period. The Fellowship is an excellent stepping stone to establishing an independent research career and gaining a full time permanent academic position

**Area descriptors**

**Future Engineering (SoE)**

Our research community is pioneering solutions that can help us achieve net zero emissions and embed sustainability in engineering processes, construction, power systems and transport systems. We welcome applications related to the following areas: green and sustainable aviation; low carbon energy and storage; sustainable construction materials; power system protection; power electronics for power systems; safer infrastructures and digitalisation in construction; engineering materials; health and biomedical engineering; digital engineering and intelligent design; advanced manufacturing; space systems engineering.

**Future computing, electronics and AI (SoE)**

The School of Engineering hosts numerous research groups dedicated to the development of future intelligent systems, including the Centre of AI Fundamental and the Centre for Robotics and AI. We welcome applications that will contribute directly to and support the aims of these research areas, including: novel AI methods; future and neuromorphic computing; software security; AI hardware; image processing; electronic systems; radio frequency communications

**British Heart Foundation (SoE)**

The Manchester BHF Centre of Research Excellence (CRE) has been established in 2024 to deliver scientific outputs of the highest quality that will benefit global populations with, or at risk of, cardiovascular diseases. Since the mid 2010s, and with substantial BHF support, cardiovascular research in Manchester has been transformed in scope and capability. The CRE blends long-standing BHF supported Manchester excellence (for example in genomics; basic discovery science in cardiac pathophysiology) with emerging interdisciplinary strengths in data science and computational modelling & simulation, building on existing core capacities and partnerships to undertake research spanning from molecules to populations. Alongside clinicians and life scientists, the CRE includes world-leading computer scientists and engineers as PIs, building on our international strength in the physical and data sciences, and positioning us ideally to incorporate transformational developments in computational modelling and AI into cardiovascular science. We are welcoming applications in 6 challenge areas:

1. *Cerebrovascular Medical Devices safety and efficacy via in silico assessment.* Different coil designs and packing densities affect the long-term stability and recurrence rates of treated cerebral aneurysms. How do different stent designs and deployment strategies affect cerebral blood flow patterns and cognitive outcomes? Can in silico modelling predict the most effective combination of mechanical thrombectomy devices and techniques for specific clot compositions and locations?
2. *Transcatheter Aortic Valve Implantation (TAVI):* in silico trials of tricuspid and bicuspid valves in aortic stenosis as well as mitral valve treatment. How does the interaction between TAVI devices and patient-specific anatomies affect post-procedural complications? What is the optimal frame design (shape and cross-sectional size) for TAVI devices to minimize the risk of migration while ensuring proper valve function? How do calcifications in the aortic root impact the performance and safety of TAVI devices?
3. *Endovascular Aneurysm Repair (EVAR) of Abdominal Aortic Aneurysms.* A multitude of design, deployment techniques and strategies affect the outcomes of EVAR procedures. What is the optimal stent graft configuration for patient-specific aortic anatomies to minimize the risk of endoleaks and migration? How does the design of endovascular stent grafts affect their long-term durability and performance in treating aortic aneurysms?
4. *Development of Computational Methods for systematic and Accelerated Assessment of Medical Device Performance.* Novel developments in multiscale Multiphysics modelling are needed to ensure efficient and practical assessment of conditions. The use of data fusion and virtual populations can broaden the applicability of findings. Can generative anatomical models and deep learning of flow fields play a role? Application areas include Structural Heart Disease, Aortic Disease and Carotid Artery Disease.
5. *Development of a Foundation Clinical LLM for the Cardiovascular Domain*. This development will include continual pre-training and instruction tuning of LLaMA-like models using large medical datasets (including longitudinal datasets). It will involve extensive evaluation against existing open-source medical LLMs in zero-shot, few-shot and supervised learning setups across several Natural Language Processing tasks including summarisation, information extraction and classification.
6. *Trustworthy, explainable multimodal LLMs for Medicine*. Development of robust, explainable, and trustworthy multimodal LLMs. The verifiability of generated outputs will be assessed with clinical teams, using modelling and simulation techniques. The alignment of modalities will be crucial for creating an end-to-end multimodal system, and the development of hybrid fine-tuning techniques that blend prompt tuning, adapter modules, and meta-learning across modalities.

**Digital Twins, In Silico Trials and Computational Modelling for Regulatory Science (FSE)**

The University of Manchester has recently been awarded the coordination of the UK Centre of Excellence on in-silico Regulatory Science and Innovation (UK CEiRSI), which brings together expertise across academia, industry and regulatory affairs to transform medical product testing and approval processes. We welcome applications from researchers with expertise in computational modelling, simulation, and artificial intelligence applied to regulatory science. We are particularly interested in candidates who can contribute to the following areas:

1. **Advanced Computational Methods for Medical Product Development:** Development of novel in silico approaches that complement and potentially reduce the need for animal and human trials. This includes multi-scale and multi-physics modelling techniques that can simulate physiological responses to drugs or medical devices across diverse virtual populations, enhancing reliability in testing whilst substantially reducing development time and costs.
2. **Digital Evidence Generation and Validation**: Research focused on creating robust methodologies for generating, validating, and interpreting digital evidence for regulatory decision-making. This includes development of credibility assessment frameworks for computational models, verification and validation protocols, and uncertainty quantification methods that meet regulatory standards.
3. **AI-Driven Regulatory Science:** Application of machine learning and artificial intelligence techniques to predict safety and efficacy outcomes, analyse real-world evidence, streamline digital twinning, accelerate multiphysics modelling, and develop digital biomarkers. We welcome expertise in explainable AI, federated learning approaches, and methods for ensuring algorithmic fairness in healthcare applications.
4. **Virtual Patient and Population Modelling**: Creation of representative virtual patient cohorts that reflect real-world diversity in physiological parameters, genetic variations, and disease manifestations. This includes developing generative models for synthetic patient data that preserve privacy whilst enabling more equitable testing conditions and provable certification guarantees.
5. **In Silico Trials for Medical Devices and Pharmaceuticals**: Design and implementation of virtual clinical trials that can accelerate product development cycles, reduce costs, and improve safety profiles. This encompasses, amongst others, physiologically-based pharmacokinetic (PBPK) modelling, quantitative systems pharmacology (QSP), and computational multiphysics modelling for medical device design, discovery and testing.
6. **Regulatory Science Innovation**: Research addressing the regulatory deadlock for in silico technologies through development of novel frameworks, standards, and methodologies that enable regulators to assess digital evidence effectively. This includes work on standardisation of model reporting, integration of real-world evidence with computational predictions, and development of regulatory science toolkits.

Successful candidates will have the opportunity to collaborate with UK CEiRSI's extensive network of partners, including leading universities across the UK's four nations, world-class companies, health systems and regulatory bodies such as MHRA, NICE, HRA, FDA (US), and EMA (Europe). The fellowship offers a unique platform to contribute to breaking the regulatory deadlock and positioning in silico technology and virtual trials as mainstream approaches to eliminate risk from future medical and pharmaceutical innovations. We are particularly interested in candidates who can demonstrate interdisciplinary expertise spanning computational sciences, engineering, mathematics, and biomedical domains, with a strong commitment to translational research that bridges the gap between academic innovation and regulatory implementation.

**Fashion business technology (SNS)**

The desired area of research sits at the intersection of digital and material aspects within fashion technology, aiming to merge advanced technological solutions with traditional textile craftsmanship and business approaches. The objective is to develop innovative solutions that redefine traditional fashion practices, prioritising sustainability, functionality and consumer engagement.  The key areas of research could include 3D modelling and robotics in fashion, data as a material for fashion, haptic and responsive materials, iterative design processes, computational craftsmanship and smart textiles and deep tech in fashion retail.

**Nuclear environment and waste (SNS)**

Nuclear environment and waste research underpins delivery and innovation in nuclear decommissioning and radioactive waste disposal and this fellowship is intended to align with and enhance our current internationally leading research capability in radioactive waste disposal, effluent treatment, decontamination, contaminated land and clean-up. We are interested in innovative, solutions-based fellowship applications that can exploit the University of Manchester’s experimental facilities and which include cutting edge approaches applied to radionuclide behaviour in engineered and natural environments. Areas of interest include, but are not restricted to, radionuclide biogeochemistry, nuclear environmental analytical techniques and transport modelling at the relevant scale (mineral surface-, pore-, column- and/or field scale).

**Imaging aligned with AI and TEM (SNS)**

We are looking to appoint a DKO fellow in the area of advanced Transmission Electron Microscopy (TEM), aiming to apply the unique new automated electron imaging, diffraction and spectroscopy capabilities of our state-of-the-art Thermofisher Iliad scanning TEM with high efficiency energy dispersive X-ray spectroscopy and electron energy loss spectroscopy (arriving in Manchester in August 2025). We are particularly interested in the development or application of artificial intelligence/ deep learning (AI/DL) powered approaches to acquisition and analysis of large scanning TEM imaging, diffraction and/or electron spectroscopy data sets to drive advances in materials discovery/characterisation.

**Unilever (SNS or SoE)**

We are seeking innovative proposals that align with the strategic goals in process engineering and product science. We are particularly keen on harnessing digital technologies to advance these objectives. This encompasses the application of simulation tools (e.g., Computational Fluid Dynamics (CFD), Discrete Element Method (DEM), molecular modelling etc.) and advanced AI methodologies (inevitably including Large Language Models). Proposals should articulate a clear vision statement, detailing how they will tackle Unilever’s specific challenges and indicate on how they would seek to foster collaborations between academia and industry to develop and implement solid strategies.

1. *Scale up of formulated products.*

The efficacy of formulated products, both liquids and soft solids, is influenced by their composition and physical attributes like rheology. These characteristics are determined by the product’s microstructure, which is shaped by its processing history, including deformation rates, sequence of ingredient addition, and temperature changes. Scaling up from lab to production is a multifaceted challenge that demands a comprehensive understanding of the underlying process mechanisms. As scale increases, unique issues may arise due to complex interactions. The end point is a specification (e.g. setpoints) for how the process should be run which recognises the capability of the equipment. Practical engineering experience is vital in navigating these challenges, and the integration of Large Language Models (LLMs) can provide valuable support in this intricate endeavour.

2. *Enhancing our comprehension of critical processes.*

Scale-up of operations is hard-wired into chemical engineering which is a combination of process development (i.e. systems engineering approach) and equipment-based view (i.e. unit operations approach). The challenges of scale-up are theoretical, practical and conceptual, and often unexpected issues arise as scale increases. Usually, data is not available across scales, so instead we rely on simulation techniques such as CFD and systems modelling in combination with AI/ML to generate validated process models for both pilot plant and factory. We are particularly interested in the following areas:

* Agitated tanks and static mixers for blending.
* High shear mixing and structure optimisation of complex rheologies.
* Extrusion of soft solids.
* Spray drying of complex slurries with insoluble particulates.

**Nuclear: HALEU (High Assay Low Enriched Uranium) processing (SNS or SoE)**

The UK government is investing in a £300M HALEU Production programme that will manufacture enriched uranium product (up to 19.75% Uranium-235) needed for next generation nuclear reactor. This includes technology development, design and construction of new HALEU processing facilities, as well as new transport and regulatory arrangements. .We are interested in the development, design and operation of these advanced processing facilities, where the fellow will develop expertise in chemical process design, nuclear material safety and safeguards, and isotopic separations. This DKO fellowship is co-funded by the BNFL Endowment from the Dalton Nuclear Institute and will provide opportunities to collaborate with UK National Nuclear Laboratory and the nuclear industry.

**Nuclear: cogeneration utilising advanced nuclear energy generation technologies (SNS or SoE)**

UK Government commitments to the delivery of Net Zero by 2050 requires changes on how electrical power is sourced to the grid and decarbonisation of industry and transport. The substantial potential of nuclear cogeneration across new nuclear reactors (GW, SMRs, AMRs) has been explored in a limited capacity thus far. This fellowship in nuclear cogeneration will be supported by established UoM research strengths in energy networks, sustainability, hydrogen and nuclear energy. This DKO fellowship is co-funded by the BNFL Endowment from the Dalton Nuclear Institute and will provide opportunities to collaborate with UK National Nuclear Laboratory, government bodies and the nuclear industry.

**University of Manchester at Harwell Institute (SNS or SoE)**

We encourage applications in areas which are aligned with our strategic partnership with the National Science Facilities based on the Harwell Campus in Oxfordshire (including, but not  limited to, the Diamond Light Source, the ISIS Neutron and Muon Facility, the Central Laser Facility, Scientific Computing Division and National Quantum computing Centre), the Daresbury Laboratory (Accelerator Science and Technology Centre and cryogenic facilities, Hartree supercomputing Centre) and STFC’s Boulby Underground Laboratory (Ultra low-background science).  There is particular interest in developing the areas of the use of these facilities in understanding:

* Catalytic processes
* Quantum materials
* Magnetic materials
* Formulation science and engineering.
* Novel Detector Technologies
* Fusion technologies

As well as the specific areas of science and engineering detailed above, the National Science Facilities and the University of Manchester has a strong desire to develop further capability in:

* Characterisation including imaging and scattering and photoelectron emission
* In -situ/operando environments
* Scientific computing.
* Novel acceleration technology
* Low temperature science
* Ultra low-background science
* Applied quantum technologies.

**ELIGIBILITY TO APPLY**

The Fellowship is for Early Career Researchers (ECR). Applicants are expected to hold a PhD by the start date of the Fellowship or have equivalent research experience. There are no eligibility rules based on years of post-doctoral experience or whether the applicant holds a permanent academic position. The ethos of the Early Career Researcher scheme is to support candidates who have a track record of outstanding research and in delivering impact. Consideration will be given to applicants who have taken a non-standard career path after their primary degree and circumstances such as maternity, paternity, long term illness, caring responsibilities or career breaks. Applications are also welcome from candidates who wish to re-establish themselves after a career break or other period of absence from active research. There are no nationality restrictions.

The University reserves the right to reject, at any stage, applications that do not fit the remit, and ethos of this scheme.

**APPOINTMENT DETAILS AND CONDITIONS**

The scheme provides funding for 5 years covering the applicant’s salary costs, estate costs and indirect costs over this period. Successful candidates will undertake a limited amount of teaching-related work (up to 6 hours per week) as we aim to support the development of leading research programmes. DKO Fellows who are about to start their first year are eligible to apply for a research grant of up to £20k, subject to a business case. They will also be allocated a PhD studentship upon appointment, with a second studentship available subject to performance. Candidates will be enrolled on the New Academics' Programme (NAP), which is part of a University wide approach to support new academics and to provide academic staff with the skills they need to carry out their research, teaching and learning and social responsibility duties at the highest level. All candidates will be provided with a senior colleague mentor with additional mentoring available for cross-School appointees.

**APPLICATION PROCESS**

Key contacts and information about the Faculty, Schools, Departments and Institutes can be found on our website (https://www.se.manchester.ac.uk/) and queries may be emailed to DKOFellows@manchester.ac.uk.

Applications should be submitted via the application form on Jobtrain together with the following supporting documents **noting the maximum page numbers for each document**:

1. ***Curriculum Vitae*** (2 pages)
2. Please also upload your **Research Proposal** (2 pages), **Academic Impact Statement** (1 page) and **Statement of Strategic Fit** (1 page). These three documents must be combined into a single pdf (4 pages in total)

**Deadline for applications: 23.59 (BST) Monday 07 April 2025**

**SELECTION CRITERIA**

The criteria for appointment will be based upon:

* Overall potential of the fellowship to establish and maintain a distinctive and outstanding research and/or innovation activity
* Quality of the proposal, particularly in relation to potential impact and deliverables
* The relevance of the proposal to funders, industrial and/or policy stakeholders
* Contribution to a priority area of research for the Faculty/School (see above)
* Potential to act as an ambassador and advocate in their field
* Ability to teach and communicate effectively to undergraduate and postgraduate students

**SELECTION PROCESS**

Applications will be reviewed and shortlisted by a panel, independently chaired by a Head of School. A shortlist of candidates will be drawn and presented to an interview panel at Faculty chaired by the Vice President and Dean of the Faculty. The ‘home’ Department(s) of successful applicants will be discussed with the candidate and agreed with the Heads of School following interview

Applications are particularly welcomed from women and Black, Asian and Minority Ethnic applicants who are currently under-represented at this level. Appointments will be made on merit. The Faculty will support requests to hold the award part-time over a proportionately longer period for childcare commitments.

Research excellence is the main criterion on which Dame Kathleen Ollerenshaw Research Fellowships are awarded. However, career breaks as well as unconventional research career paths will be considered. Evaluations will be monitored to identify potential biases e.g. in terms of gender and race to guarantee transparency, fairness and impartiality in the treatment of proposals.

## KEY RESPONSIBILITIES, ACCOUNTABILITIES OR DUTIES:

## Fellows will be expected to:

## Plan, develop and conduct world-leading research

## Develop new concepts and ideas to extend intellectual understanding

## Win external funding for research

## Supervise postgraduate and postdoctoral researchers

## Extend, transform and apply knowledge acquired from scholarship to research and appropriate external activities

## Disseminate research findings widely via publications, conferences and other appropriate media and fora

## Participate and collaborate in external networks

## Develop positive and productive working relationships with other members of academic and professional services staff

## Plan and manage the effective use of research resources

## Conduct risk assessment and take responsibility for the health and safety of others

## Develop and realise pathways to impact for research

## Contribute to the teaching programmes in the School, as appropriate, typically up to six hours per week

## Embed the University’s social responsibility objectives, which include equality, diversity and inclusion, within all activities.

## PERSON SPECIFICATION

#### Essential Knowledge, Skills and Experience*:*

* A relevant PhD (or equivalent qualification) awarded prior to commencing the appointment
* Ability to develop a coherent world-leading research programme
* A sustained record of publication output
* Ability to plan and build a team and deliver outstanding results
* Ability to inspire and engage students
* Excellent communication and interpersonal skills
* Excellent time management and organisational skills
* Ability to work independently and as part of a team
* Ability to meet deadlines
* Ability to assess and organise resources
* Commitment to the value and goals of The University of Manchester, including Goal 3 – Social Responsibility
* An understanding and application of the principles of equal opportunity in relation to research, teaching and the wider University context.

**Desirable Skills and Experience:**

* An understanding of the potential for interdisciplinary collaborations to advance knowledge and discovery and a willingness to engage in developing such projects where appropriate

**KEY DATES**

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| **Date Call issued:** | Friday 28 February 2025 |
| **Deadline for applications:** | 23.59 (BST) Monday 07 April 2025 |
| **Shortlisting completed:** | Thursday 01 May 2025 |
| **Invitations to first interview issued:** | Friday 02 May 2025 |
| **First interviews:** | Friday 09 May and Monday 12 May 2025 |
| **Invitations for final interview issued** | Tuesday 13 May 2025 |
| **Final interviews:** | Wednesday 28 and Thursday 29 May 2025 |
| **Outcomes notified to interviewees:** | Monday 03 June 2025 |
| **Fellowship Start date:** | as soon as possible after announcement of success |