

THE UNIVERSITY OF MANCHESTER
PARTICULARS OF APPOINTMENT
FACULTY OF SCIENCE & ENGINEERING
SCHOOL OF NATURAL SCIENCES
RESEARCH ASSOCIATE IN AUTONOMOUS LAB FOR MATERIALS DISCOVERY
VACANCY REF: PSX-029822

Salary: £37,694 to £46,049 per annum, depending on relevant experience

Hours: 1 FTE

Duration: Fixed term from 1 December 2025 to 30 November 2026

Location: Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:

Name: Dr Qian Yang

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Overall Purpose of the Job:

We are seeking an outstanding Postdoctoral Research Associate to help pioneer an **autonomous laboratory platform** for accelerated discovery of novel materials for quantum technologies, energy, and related applications. The project combines **robotic synthesis, high-throughput characterisation, and AI-driven decision-making** into a closed-loop discovery engine.

The successful candidate will work at the interface of **physics, chemistry, materials science, and AI**, developing workflows for autonomous discovery. Depending on background, the PDRA may focus on experimental platforms (growth, characterisation, electrochemistry), computational modelling, or AI/automation - but the strongest candidates are expected to bring expertise across multiple areas.

The project is expected to lead to high-impact scientific publications and technological developments.

Key Responsibilities, Accountabilities or Duties:

You will have obtained, or be about to obtain, a PhD (or equivalent) by the starting date of the project in Physics, Materials Science, Chemistry, Engineering, or related fields. The successful candidate will join Autonomous Lab for Materials Discovery.

- Build an **autonomous laboratory platform** for accelerated discovery of novel materials.
- Adhere to all relevant health and safety procedures.
- Work independently or collaboratively on as required.
- Use initiative and creativity to identify areas for research, develop new research methods and extend the research portfolio.
- Maintain accurate, comprehensive and secure records of research data.
- Analyse and interpret research data and draw conclusions on the outcomes.
- Communicate complex information, orally, in writing and electronically.
- Communicate material of a specialist or highly technical nature.
- Prepare research reports and papers for publication.
- Present results from research project at national and international meetings.
- Contribution to project management and day-to-day laboratory management.
- Train students and others in skills appropriate to the project.
- Meet required deadlines throughout the project.
- Contribute to collaborative decision making with colleagues in areas of research.
- Contribute to the social responsibility agenda of the University and demonstrate a commitment to Equality, Diversity and Inclusion policies and activities and support the development and delivery of related initiatives.

PERSON SPECIFICATION

Essential Knowledge, Skills and Experience:

- Holds or about to obtain a PhD (or equivalent) in Physics, Materials Science, Chemistry, Engineering, or related field.
- Strong skills in **Python programming** for control, automation, and data analysis.
- **Demonstrated ability** to carry out independent, high-quality research with a strong publication record (please provide GitHub pages or other relevant information).
- Excellent analytical and **problem-solving** skills.
- Ability to work **collaboratively** within a group and, also, to work independently.
- Ability to **communicate** complex ideas and arguments and research findings at national and international meetings and conferences.
- Good written and oral communication skills, including communicating technical information effectively to wide range of people.
- Contribution to laboratory support of PhD students and a desire to pass on skills and knowledge to PhD, MSc and project students.
- Passion in learning new techniques and a desire to undertake interdisciplinary research.
- A strong personal commitment to equality, diversity, inclusion and accessibility.

Desirable Knowledge, Skills, Experience and Qualifications:

- **Experimental solid-state physics** and quantum materials.

- **Crystal growth / thin-film synthesis** (e.g., 2D materials, quantum dots).
- **Optical and spectroscopic techniques** (Raman, photoluminescence, etc.).
- **Electrochemistry**
- **Theoretical & computational methods:** Density Functional Theory (DFT), tight-binding, many-body physics.
- **AI/ML:** deep neural networks, graph neural networks, transformers, active learning, reinforcement learning.
- **Lab automation & robotics:** high-throughput workflows, instrument integration, autonomous experimentation.
- Experience with **large-scale datasets** and linking experimental results to AI pipelines.

This is a unique opportunity to work at the frontier of **autonomous discovery**, shaping the next generation of materials for quantum and energy applications.

Further information

The University of Manchester

The University of Manchester (www.manchester.ac.uk) enjoys a global reputation for its research and its innovative approach to learning, with an on-going £1 billion investment in facilities, staff and buildings. This builds on our tradition of success that stretches back over 180 years. The birth of the modern computer, the splitting of the atom, the founding principles of modern economics, the discovery of graphene, and the birthplace of chemical engineering – these and many more world changing innovations have their roots at our university. We are at the forefront of the search for solutions to some of the world's most pressing problems, boasting strong collaborative links with industry and public services.

Manchester has the largest student community in the UK, with more than 28000 undergraduates and 11000 postgraduates attracted by the high international standing of the academic staff, by the superb research and teaching facilities, and by the cultural assets both of the university and the city of Manchester itself. For further information, please consult www.manchester.ac.uk.

Faculty of Science and Engineering

The Faculty of Science and Engineering is one of the largest in the UK with over 10,000 students, 2,000 staff and strategic links with over 300 industrial companies. We are leading research efforts in energy, nuclear science and technology, computer science, atmospheric science, bioscience and biotechnology, photon science and photonic materials, imaging and visualisation, security, and advanced materials, attracting an annual income of over £200 million.

Founded in 1824, we have a history of breaking new ground in science and engineering. Rutherford began his work here on splitting the atom and later received the Nobel prize in 1908 for his work on radioactivity. The 'Baby', the world's first stored-program computer, and Manchester Mark 1 came into being here. It is the birthplace of Chemical Engineering. The world's first steerable radio telescope at Jodrell Bank was built here by Bernard Lovell. Since 1906, when former student Joseph Thomson won the Nobel prize for physics, the University has produced more than 20 Nobel Laureates, the most recent of which were Professor Andre Geim and Professor Konstantin Novoselov in 2010 - for their pioneering work with the world's thinnest material, graphene.

Department of Physics and Astronomy

The Department of Physics and Astronomy is one of five Departments in the School of Natural Sciences which is in the Faculty of Science and Engineering. There are 95 academic staff in the Department with expertise in areas such as condensed matter physics (which includes Prof. Andre Geim and Prof. Konstantin Novoselov who won the 2010 Nobel Prize in Physics for their work on graphene), atomic physics, liquid crystal physics, biological physics, accelerator physics, nuclear physics, particle physics, astrophysics, astronomy, cosmology, complexity and theoretical physics. Jodrell Bank Observatory (part of Jodrell Bank Centre for Astrophysics) also forms part of our Department. We have approximately 150 research staff, 250 PGR students and 1200 UG/PG students.

The Department has ranked in the top fifteen in the Academic Ranking of World Universities for Physics since 2011. In Research Excellence Frameworks (REF) 2014 and 2021 the Department was in the top three institutions for its proportion of “world-leading” components and was first for non-academic impact.

The Department values teaching highly and scored 90% in the 2019 National Student Survey. The Department has the largest undergraduate intake of any Physics department in the UK. Student cohorts are around 1120 and 100 for undergraduate and postgraduate taught programmes respectively. Taught postgraduate courses include Masters programmes in Photon Science, Nuclear Science and Technology, and Radio Imaging and Sensing.

P&A research is based in four topical divisions: Accelerator, Nuclear and Particle Physics; Condensed Matter (which includes Prof. Andre Geim and Prof. Konstantin Novoselov who won the 2010 Nobel Prize in Physics for their work on graphene); and Jodrell Bank Centre for Astrophysics. The Department operates the world-renowned Jodrell Bank Observatory (JBO). The Jodrell Bank site also provides the permanent home for the international headquarters of the Square Kilometre Array (SKA) Organisation. The Department is deeply involved in the £61 million National Graphene Institute (NGI), opened in 2015. The NGI building has 7350 m² research space over five floors and includes 1500m² of cleanrooms, lab facilities, office space and seminar rooms.

The Department of Physics and Astronomy is committed to promoting Equality, Diversity, Inclusion and Access through contributing to the University’s social responsibility agenda, demonstrating a commitment to its policies, activities and delivery of initiatives including the Athena SWAN charter for promoting women’s careers in STEMM subjects (science, technology, engineering, mathematics and medicine) in higher education. The Department has held JUNO Champion status since 2016 for its commitment to achieving gender equality which positively promotes inclusivity for all.

Further information on the Department of Physics and Astronomy can be found at www.physics.manchester.ac.uk.

Condensed Matter Physics Group

The group comprises 12 academics and dozens of researchers and post-graduate students. It is highly collaborative and internationally leading across the major thematic areas: graphene and 2D materials, superconductivity, plasmonics, spintronics, nanofluidics and superfluidity. The flagship activities focus on freestanding 2D crystalline materials, including graphene, hexagonal boron nitride, and MoS₂, and their applications. The experimental research benefits from world-class cryogenic and nanofabrication facilities; active theoretical support is provided by theorists in the Department. Building on the Nobel prize-winning discoveries made at Manchester, many of these activities are based in the National Graphene Institute and the Henry Royce Institute - the international hubs for graphene and 2D materials research.

THE NATIONAL GRAPHENE INSTITUTE

Website: <http://www.graphene.manchester.ac.uk>

The National Graphene Institute (NGI) has been established at the University of Manchester through a bespoke, fit-for-purpose, £61m building funded by the Engineering and Physical Sciences Research Council (EPSRC, £38m) and European Regional Development Fund (ERDF, £23m).

The NGI brings together a large, focused, interdisciplinary research community, acting as a sustainable incubator of new applications in all areas of graphene and 2D materials science, ensuring that national and international industries will have a major role in this radical technology shift in future years. An effective transfer of knowledge and technology to industries will enable product development and production. The NGI houses state-of-the-art facilities, laboratories and business services, shared with commercial and academic partners to support and nurture application and commercialization of on-going developments. This is an ambitious, large-scale, visionary research initiative, aiming at a breakthrough for technological innovation and economic exploitation based on graphene and related two dimensional materials and building on the discovery of graphene at the University of Manchester in 2004.