Department of Physics/School of Science

Loughborough University

Research Associate in *Physics*
Novel spintronic devices with two-dimensional quantum materials
Job Ref: REQ250688

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project Description

We invite applications for a Postdoctoral Research Associate (PDRA) to join a research project on spintronics, two-dimensional (2D) materials, and quantum transport. The successful candidate will work on the design, fabrication, and characterisation of novel spintronic devices using 2D van der Waals under the direction of Dr Fasil Dejene on an EPSRC-funded project "Symmetry Demanded Spin Current Generation in Quantum Materials". This project aims to exploit reduced crystal symmetry to generate spin currents with unconventional spin polarisation suitable for electrically manipulating magnetic states under zero applied magnetic fields. This possibility offers exciting prospects for next-generation low-power magnetic memory and computing technologies.

The PDRA will be responsible for conducting advanced research on spintronics with two-dimensional materials and will work with other members of the group to develop methodologies for device fabrication, material characterisation, and the measurement of quantum properties at room and cryogenic temperatures. As such, the successful candidate should have completed or be about to obtain a PhD in physics or material science within the field of experimental condensed matter physics, magnetism, spintronics, or physics of two-dimensional van der Waals heterostructures.

Further desirable experience and skills include knowledge of various device fabrication, electrical characterisation and instrumentation (such as nanolithography, magneto-transport, AFM, SEM) and solid competency in programming skills (e.g. LabVIEW, Python, Matlab, C++, etc). Further experience in micromagnetic or multiphysics simulations would be beneficial. The successful candidate should have good interpersonal skills and clear oral and written communication skills.

For further information, please contact Dr Fasil Dejene at f.dejene@lboro.ac.uk.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose
To fabricate and assemble van der Waals heterostructures using state-of-the-art techniques,
To develop and characterise spintronic devices using nanofabrication and electrical transport methods
To perform quantum and spin transport measurements at both room and cryogenic temperatures
To consolidate the outcomes of this work for academic publications and presentations.

Job Duties

- *Fabricate and assemble van der Waals heterostructures using state-of-the-art techniques*
- *Develop and characterise spintronic devices using nanofabrication and electrical transport methods*
- *Perform quantum and spin transport measurements at both room and cryogenic temperatures*
- *Collaborate closely with other researchers within the group and across disciplines*
- *state-of-the-art cleanroom facilities for nano/microfabrication and device processing.*
- *undertake material preparation via exfoliation assembly of van der Waals heterostructures and optimise thin film deposition processes.*
- *Plans and manages research activities in collaboration with colleagues, ensuring the efficient use of laboratory resources.*
- *Responsible for conducting the day-to-day running of the project.*
- *To formulate detailed plans for the project based on broad guidance from the project team.*
- *To provide feedback to the project team on progress and make recommendations for the next steps.*
- *Write regular progress reports and present outcomes to all Investigators and Collaborators.*
- *Travel to attend meetings and make presentations both within the project partners working group and to external stakeholders.*
- *To write research papers suitable for publication in high-quality academic journals.*
- *To attend and contribute to conferences.*
- *To assist the academic staff in the project team with the supervision of undergraduate MSc and PhD project work and day-to-day supervision and support of other researchers.*
- *Where appropriate, teaching, tutorials, and laboratory sessions were delivered to students.*
- *Engage in training programs at the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Department.*
- *Undertake other duties as may be reasonably requested and are commensurate with the nature and grade of the post.*
- *be fully aware of and manage risks in the work environment, and adhere to all safety protocols.*

Points To Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

Special Conditions

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

Organisational Responsibility

Reports to Dr Fasil Dejene, Senior Lecturer in Physics.

Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

1 – Application
2 – Test/Assessment Centre/Presentation
3 – Interview

Essential Criteria

Area	Criteria	Stage
Experience	*Experience in 2D material handling, including mechanical exfoliation and deterministic transfer techniques (e.g. dry/wet transfer methods, PPC/PDMS stamps)*	1, 3
	Assembly of van der Waals heterostructures under inert conditions (e.g. using glovebox-based systems)	1, 3
	Cleanroom nanofabrication techniques (e.g. electron-beam lithography, photolithography, metal deposition, lift-off)	1, 3
	Characterisation tools such as AFM, Raman spectroscopy, SEM and low-noise electrical transport measurements (Magneto-transport) at room and cryogenic temperatures.	1, 3
	Demonstrated use of thin film deposition methods such as e-beam and thermal deposition, sputtering and argon ion milling techniques	1, 3
	Authoring original work for academic journal papers, conference papers or technical reports	1, 3
	Demonstrated ability to design, execute, and troubleshoot complex experiments	1, 3
	Programming for data acquisition and instrument control (e.g. LabVIEW, Python, Matlab, C++)	1, 3
Skills and abilities	*Programming for data acquisition and instrument control (e.g. LabVIEW, Python, Matlab, C++)*	1, 3
	Extensive experience designing devcies from exfoliated 2D flakes using Klayout, Cygwin or other CAD tools	1, 3
	Excellent written and oral communication skills	1, 3
	Self-motivated with ability to meet deadlines	1, 3
	Excellent interpersonal, and organisational skills	1, 3
	Working knowledge of software packages such as MATLAB, Python, LabVIEW	1, 3
	Working knowledge of multistep nanolithography process design, fabrication and thin-film deposition techniques	1, 3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1, 3
	Knowledge of relevant Health & Safety issues	1, 3
Training	Demonstrate evidence of having undertaken further training	1, 3
Qualifications	PhD (or near completion) in Physics or a closely related discipline.	1, 3
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1

Desirable Criteria

Area	Criteria	Stage
Experience	*Experience specifically in spintronics, spin transport measurements in metallic spin valves, 2D spintronics and quantum transport*	1, 3
	Experience with device simulation tools (e.g., micromagnetic simulations, COMSOL Multiphysics or other related packages).	1, 3
	Developing proposals for funding from external agencies	1, 3
	Working in a high-quality academic research environment	
	Experience of teaching and / or supervision of students in relevant areas	1, 3
Skills and abilities	Authoring original work, in the highest quality refereed academic journals	1, 3
	A strong publication track record	1, 3
	Previous postdoctoral experience in related area	1, 3
Qualifications	PhD (or near completion) in Physics, Materials Science or Engineering	1, 3
Other	Travel / Able to travel Independently / Working patterns	1, 3

Conditions of Service

The position is full-time for 24 months. Salary will be on Specialist and Supporting Academic Research, Grade 6 (£35,116- £45,413 per annum), at a starting salary to be confirmed on offer of appointment.
The appointment will be subject to the University's Terms and Conditions of Employment for STAFF GRADES 6 AND ABOVE, details of which can be found here.

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found here.

The University offers a wide range of employee benefits which can be found here.

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html

In addition, the University is supportive, wherever possible, of flexible working arrangements.
We also strive to create a culture that supports equality and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see http://www.lboro.ac.uk/services/hr/athena-swan/

Applications

The closing date for receipt of applications is 30th September 2025.

For further information, please contact Dr Fasil Dejene at f.dejene@lboro.ac.uk.