

Research Associate in Physics

Optically Controlled Thermoplasmonic-Spintronic Devices

Job Ref: REQ270742

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.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

You will be part of the project team working on "Light-Controlled Magneto-Thermoplasmonic Devices" led by Dr Naëmi Leo, a UKRI Future Leader Fellow (MR/X033910/1, LIONESS). The project will primarily be undertaken in the physics department at Loughborough University and will include collaborations with internal colleagues and facilities (such as the Loughborough Materials Characterisation Centre) as well as with national and international project partners (e.g., EXTREMAG, UK; Durham University, UK; University of Konstanz, Germany). In addition to the Researcher and the PI, the team will later be joined by another postdoctoral researcher as well as a PhD student.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

Your aim will be to demonstrate novel optical control of spin-caloritronic devices by harnessing light-controlled thermoplasmonic excitations. This will require: (a) developing and testing nanofabrication recipes for the fabrication of hybrid plasmonic-spintronic devices; (b) developing magneto-transport characterisation with variable optical illumination conditions; (c) implementation of rigorous measurement protocols; and (d) consolidating the outcomes of this work for academic publication and presentations.

Job Duties

- (a) **Nanofabrication:** Fabrication of hybrid plasmonic-spintronic devices via multi-step nanolithography (using maskless optical lithography, scanning thermal nanolithography, thin-film deposition and etching/ion milling steps), including the development and testing of recipes and pre-characterisation of sample properties (e.g., using AFM, SEM, XRD, and potentially MOKE).
- (b,c) **Magneto-transport experiments:** Development and implementation of experimental setup and measurement protocols (including ensuring adherence to safety regulations) for magneto-transport measurements under different optical illumination conditions, using continuous wave and modulated illumination, as well as nano- (in the lab) and femto- to picosecond pulses (at the external research facility Extremag). The job holder is furthermore responsible for well-documented data collection following the FAIR standards and data analysis (using open-access tools based on python).
- (d) **Dissemination and Collaboration:** Data analysis, generation of new understanding and dissemination of the obtained methods and results in the form of project reports (to be regularly discussed within the team and

LU-internal, national, and international project partners), technical and scientific publications, and via conference presentations.

- Be 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 feed back to the project team on progress, to make recommendations for next steps.
- Write up 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.
- Engage in training programmes in 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 that are commensurate with the nature and grade of the post.

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 Naëmi Leo

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	Background in magnetism and spintronics	1,3
	<i>Experience in nanolithography and thin-film deposition methods to fabricate nanostructured metamaterials or spintronic devices.</i>	1,3
	<i>Experience of magnetic sample characterisation techniques based on magneto-transport experiments.</i>	1,3
	Experience of related structural device characterisation techniques (e.g., SEM, AFM, XRD).	1,3
	Experience and ability to undertake literature reviews and writing of scientific manuscripts, as evidenced by a strong publication track record of high-quality papers.	1,3
	Practical experience of working in a hands-on experimental physics research environment.	1,3
Skills and abilities	<i>Excellent hands-on practical skills, with competency on using a variety of lab equipment and instrumentation and a methodological approach to problem solving.</i>	1,3
	<i>At least a basic knowledge in programming (e.g., Python, Matlab, C++, etc) applied to data analysis (and, ideally, advanced knowledge e.g., for instrumentation)</i>	1,3
	Excellent communication skills, ability to work in a team, and to interact effectively with people of different cultural and disciplinary background (including staff, students, and national and international collaborators)	1,3
	Excellent organisational skills and ability to work flexibly and independently, while meeting deadlines	1,3
	Ability to write project reports and make technical presentations to industrial and academic research groups	3
	Awareness of health and safety issues related to laboratory work and nanofabrication.	3
Training	Demonstrate evidence of continuing professional development relevant to the role, and of having undertaken further training, e.g., for health and safety, nanofabrication, writing and communication, and further skills.	3
Qualifications	Completed (or nearly completed) PhD degree in Physics, Material Sciences, or a closely related discipline.	1,3
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1,3
	Flexible approach to working hours, and willingness and ability to travel for national and international collaborations and attending conferences.	1,3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in instrumentation for multi-step nanolithography and thin-film deposition to create nanoscale devices, e.g., <ul style="list-style-type: none"> • sputter deposition, • e-beam deposition, • atomic and magnetic force microscopy (AFM, MFM) or thermal scanning nanolithography, • scanning electron microscopy (SEM), • x-ray diffraction (XRD), etc 	1,3
	Experience in instrumentation for and implementation of magneto-transport setups, e.g., <ul style="list-style-type: none"> • sourcemeters, • nanovoltmeters, • lock-in detection, • wire bonders, • electromagnets, • cryostats, etc 	1,3
	Experience working with lasers [cw and modulated, ns, ps to fs] and high-power optical illumination (e.g., used for MOKE detection, MOKE imaging, or pumping of magnetic states or plasmonic excitations)	1,3
	Experience with micromagnetic or multi-physics simulations based on either finite-differences (e.g., mumax3) or finite-element codes (e.g., COMSOL, Ansys)	1,3
	Experience with adhering to data management plans according to FAIR principles, as evidenced by creation of data repositories for publications as requested by funding agencies	3
Skills and abilities	Hands-on experience using custom-built experimental setups, and skills relate to developing new experimental schemes, as evidenced e.g., by manual/mechanical construction of elements of experiments (such as creation of accurate technical drawings, design of PCBs, winding of electromagnets or creating magnet arrays for specific applications).	3
	Skilled use of CAD software, e.g., for creation of nanofabrication fabrication patterns, or design of components for setups which can be 3D printed or created by an engineer in a mechanical workshop based on a technical drawing	3
Training	<i>Willingness and ability to undertake further training, both in lab skills and health & safety, as outlined in the above job duties and special conditions</i>	3
Qualifications	Completed (or nearly completed) PhD degree in Physics, Material Sciences, or a closely related discipline, within the field of magnetism, spintronics, or spin-caloritronics	1,3
Other	Awareness of health and safety regulations with respect to nanomaterials, use of lasers, electrical and magnetic circuits, and proper handling and waste deposition of chemicals (COSHH), and willingness to develop new safety protocols related to the experimental setups to be developed within the research project.	3

Conditions of Service

The position is FULL TIME and FIXED TERM for 30 months (with a possible extension to four years dependent upon performance and available funding). Salary will be on Specialist and Supporting Academic Grade 6 (£33,966 - £44,263), 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 2024**.