School of Science

Loughborough University

Research Associate in Photonic and Quantum Technology

Job Ref: REQ250333

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

The Emergent Photonics Research Centre is a 500m^2 university research facility completely dedicated to complexity in Photonics within the domains of Ultrafast Photonics, Optical Frequency Combs in Microresonators, Artificial Intelligence for Photonics and Terahertz technology. The Centre hosts a multi-million portfolio of facilities and running research grants from several funders including the European ERC, EPSRC, DSTL, Innovate-UK, The Leverhulme Trust. These include several early career Fellowships and PhD studentships.

The Physics Department at Loughborough University has a vibrant community of scholars who are committed in supporting each other to deliver outstanding research. It hosts a very significant theoretical expertise in covering the foundation of complexity and nonlinear dynamics in several disciplines, with a high international profile and staff members collaborate with the top physicists in the world.

Loughborough University holds the Athena SWAN Bronze award, recognizing its commitment to improving the representation and career progression of women in STEM (science, technology, engineering and mathematics) subjects. The Department of Physics is committed to creating a diverse and inclusive culture in which staff and students are able to thrive, regardless of gender, religious and philosophical beliefs

Postdoctoral Research Associate in Photonic and Quantum Technology is a two-year award to work at the Emergent Photonics Research Centre, with the possibility of extension under a standard postdoctoral contract. The Associate will work across different international projects and is expected to provide distinct research leadership in advancing the technology of microcombs—compact optical frequency combs in microresonators—across various areas of quantum technology, from metrology and positioning, navigation, and timing to quantum cryptography.

The research is aligned with the UK Quantum Missions, envisioning a system capable of transmitting ultraprecise clock signals, directly targeting UK QT Mission 4 on positioning, navigation, and timing, as well as network synchronisation under UK QT Mission 5. Additionally, the development of practical quantum sources compatible with classical networks is a key technology in these areas, a priority within the National Quantum Technology Programme in the UK, under QT Mission 2, quantum communications.

This position will involve research that enhances collaboration within three prestigious research initiatives:

1. **UK Hub for Quantum-Enabled Position, Navigation and Timing (QEPNT):**
   One of five UK hubs funded by UKRI EPSRC as part of their Quantum Technology Programme, QEPNT is led by the University of Glasgow. Loughborough University joins this network alongside Imperial College London and the Universities of Bristol, Cambridge, Edinburgh, Strathclyde, Heriot-Watt, Queen's University Belfast, and Warwick. The overarching vision is to develop atomic clocks, quantum inertial sensors, single-photon LiDAR sensors, and quantum-classical hybrid sensors, enabling practical systems for resilient positioning, navigation, and timing (PNT) applications in national security, critical infrastructure, aerospace, connected and autonomous vehicles (CAVs), finance, maritime, and agriculture.
2. **EPSRC Programme Grant: Chip-Scale Atomic Systems for a Quantum Navigator:**
   Led by the University of Glasgow, this collaboration includes Loughborough University and the Universities of Birmingham and Strathclyde. The overarching vision of this project is to pioneer chip-scale atomic clocks, accelerometers, and Sagnac rotation sensors that can be manufactured on silicon chips. These

devices will enable PNT capabilities without reliance on satellites, creating a quantum navigator the size of a mobile phone.

3. **STFC-NSERC UK-Canada Joint Action for Quantum Technology (MICROQ):** Microcombs for Quantum Networking and Synchronisation is a joint initiative between Loughborough University (UK) and INRS-EMT (Quebec, Canada). It focuses on microresonators for future networks, integrating classical and quantum channels within a single, compact microcomb source. This technology will enable the distribution of both ultraprecise clock signals for ultradense optical communication and quantum-secure information.

The successful applicant should have a PhD in a field related to our research areas, nonlinear photonics, ultrafast photonics, nonlinear wave propagation, and background preferably intersecting soliton theory and optical complexity with a good publication record. Previous experimental experience with photonic benches implementation would be desirable, along with basic knowledge of ultrafast laser operation and a history of international involvement and aggressive publication strategy. Evidence of potential leadership, independence and a strong motivation are also essential. Some of the typical tasks for this position include the operation of ultrafast fibre-lasers and optical frequency combs, the design of optical benches, the acquisition of data using fast electronics and their analysis.

The successful candidate is expected to actively engage in our research plans, to provide guidance to undergraduate and postgraduate students, to participate in the strategic planning of the group and to contribute to drafting successful research bids. They are expected to travel among our network of collaborators. The salary offered will be appropriate to the qualifications, standing and experience of the successful candidate.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

To conduct research in the area of microcombs and nonlinear photonics and to be responsible for the theoretical and experimental development of compact, microresonator-based frequency combs. To investigate theoretically and experimentally the physical framework of broadband optical states, like solitons in microcombs. To lead independently a small research team that may include PhD, graduate and undergraduate students. To undertake primary data collection and analyse data, develop theoretical modelling and design integrated photonics chip. To lead the dissemination of the specific research activity in major research journals and dissemination outlets.

Job Duties

- *To investigate theoretical models related to microcomb research*
- *To design and develop experimental demonstrators based on nonlinear photonics and related methodologies for microcomb research.*
- *To advise and co-supervise PhD students on the specific subject field.*
- *To manage, collate and evaluate data obtained from simulations and experiments in the form of specialist reports suitable for publication in peer-reviewed scientific journals*
- *To organise and advise on applications relevant to securing partnerships and research funds*
- *To lead cross-pollination and networking activities with other research running at the Emergent Photonics Research Centre.*
- *To 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 feedback 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.*

- *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, to deliver teaching, tutorial and laboratory sessions to students.*
- *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 Equity & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equity & 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 Prof Alessia Pasquazi

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 Ultrafast Photonics*	1,2
	Background in Nonlinear Optics	1,2
	Project specific experience	1,3
	Authoring original work for academic journal papers, conference papers or technical reports	1
	Understanding of project specific physical challenges	3
Skills and abilities		
	Project specific skills	1
	Good written and oral communication skills, including writing peer-reviewed research publications	1,2
	Self-motivated with ability to meet deadlines	3
	Good interpersonal, and organisational skills	3
	Working knowledge of Matlab	1,3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1,2
	Knowledge of relevant Health & Safety issues	2,3
Training	*Demonstrate evidence of having undertaken further training*	3
Qualifications	*PhD (or near completion)*	1
Other	*Commitment to observing the University's Equal Opportunities policy at all times.*	3

Desirable Criteria

Area	Criteria	Stage
Experience	*Track record in photonics*	1,3
	Track record in nonlinear optics	1,3
	Developing proposals for funding from external agencies	1,3
	Working in a high quality academic research environment	1
	Experience of teaching and / or supervision of students in relevant areas	1,3
	A strong publication track record	1
Other	*Able to travel Independently.*	3

	Ability to manage independently working patterns following project needs	3

Conditions of Service

The position is Full Time and Fixed Term for 24 months with possible extension beyond this point subject to funding availability. Salary will be on 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 grades 6 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 31st May 2025.