Department of Mathematics
School of Science

Loughborough University

Research Associate in Algebra and Geometry
Exotic Representation Theory
Job Ref: REQ260222

School/Department summary:

Loughborough University is seeking to appoint a Postdoctoral Research Associate in the areas of Algebra and Geometry to conduct research under the direction of Dr Jason Semeraro on an EPSRC funded project “Exotic Representation Theory”. The aim of the project is understand how recent state-of-the-art advances in homotopy theory (related to fixed points of classifying spaces) can be applied to study the local-global conjectures of modular representation theory.

The project will last for up to 5 months and will be carried out jointly by the RA and Dr Jason Semeraro as the Supervisor / Principal Investigator (PI).

Job Description

Job Family and Grade: Specialist and Supporting Academic Grade 6

Job Purpose

To conduct research in algebra and geometry; in particular generalisation of Deligne—Lusztig theory to the setting of spetses by applying methods from homotopy theory. To develop new techniques to tackle local-global conjectures in modular representation theory using fusion systems. To investigate the relationship between Hecke algebras and blocks of unipotent groups.

Job Duties

- To become familiar with relevant literature on Deligne—Lusztig theory and spetses.
- To learn and apply relevant homotopy-theoretic techniques such as constructing classifying spaces, decomposing spaces as homotopy colimits and taking fixed points under unstable Adams operators.
- To develop new techniques to prove local-global counting conjectures (relating local and global information concentrated at a prime).
- To apply methods from fusion systems to extract local information about compact Lie and p-compact groups.
- To write research papers suitable for publication in high quality academic journals.
- To disseminate results of the project at both national and international conferences.
- To support the PI by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To undertake tasks assigned by the PI.
- To participate in activities within the Loughborough Geometry and Mathematical Physics group, including regular research seminars.
- There will be an opportunity to do a small amount of teaching in the Department of Mathematical Sciences, if desired.
- To 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 outlined in the document.

Organisational Responsibility

Reports to the: Principal Investigator, Dr Jason Semeraro
Direct Reports: 1
Budget Responsibilities: N/A
Structure Chart: N/A

Person Specification

Your application will be assessed based on the essential and desirable criteria listed below.

Applicants are strongly encouraged to explicitly demonstrate how they meet each essential (and desirable) criteria at the application stage. The criteria that you need to demonstrate in your application will be listed as Stage 1 in the table below.

Stages of assessment are as follows:

1 – Criteria measured within the Application
2 – Criteria measured at Test/Assessment Centre/Presentation
3 - Criteria measured at Interview

Essential Criteria:

Area	Criteria	Stage
Experience	Background in algebra and/or algebraic topology	1,2,3
	Experience of preparing and/or publishing original work as academic journal papers and/or conference papers	1
Skills and abilities	Research in representation theory and/or homotopy theory and/or group theory and/or fusion systems	1,2
	Excellent written and oral communication skills	1,2,3
	Self-motivated with ability to meet deadlines	3
	Excellent interpersonal, and organisational skills	1,3
	Ability to work as part of a team and collaborate with others	1,3
Training	Willingness to undertake further training as required	3
Qualifications	PhD (or near completion) in mathematics	1
Other	Uphold and actively contribute to the University's commitment to Equity, Diversity and Inclusion.	1,3

Desirable Criteria: These are skills, experience and competencies that are additional extras that may be used to narrow the pool down if we receive a high volume of applications that meet the essential criteria.

Area	Criteria	Stage
Experience	Familiarity with the local-global conjectures in modular representation theory and the application of Deligne—Lusztig theory to these problems	1,2,3
	Acquaintance with homotopy theory, p-local analysis, Hecke algebras and/or the theory of fusion systems	1,2,3
	Knowledge of methods to reduce problems of representation theory to the case of simple groups	1,2,3
	Working in a high-quality academic research environment	1,3
Skills and abilities	Authoring original work, in the highest quality refereed academic journals	1,2,3
	A strong publication track record	1
	Ability and willingness to teach at an undergraduate level	1,3
Qualifications	Prior postdoctoral experience	1

Conditions of Service

The appointment will be subject to the University's Terms and Conditions of Employment relevant to the job grade.

Shared University Responsibilities

As a member of the Loughborough community, you are expected to:

- Take reasonable care of yourself, others and the environment, and to prevent harm by your acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Sustainability Policies & Procedures.
- Support and contribute to the University's commitment to Equity, Diversity, and Inclusion (EDI), while carrying out all duties in a way that respects these principles and upholds the right to free expression. Further information about EDI at Loughborough and our strategic aims is available on our website.

Our Purpose, Vision, and Values

Our purpose, Vision and Values underpin all that we do and shape how we work together at Loughborough.

We're proud to promote our values: **Adventurous**, **Collaborative**, **Creative**, **Authentic** and **Responsible**. Our people bring these values to life every day, and they are central to the positive and supportive culture that makes Loughborough unique.

If you join us, you'll be encouraged to bring these values to life in your own work and contribute to the positive, supportive culture that makes Loughborough unique.

Read more about our **vision and values**.

Our Benefits

At Loughborough, our benefits are designed to support your life inside and outside of work, helping you to thrive and feel valued as part of our community. Examples of our benefits include:

Time off - generous holiday allowance, including 14 university closure days and bank holidays, with the option to buy extra through our holiday purchase scheme.

Where you work - access to a range of fantastic facilities with plenty of green space across our 523-acre East Midlands campus, plus an exciting community at our London campus on the Queen Elizabeth Olympic Park

Financial Wellbeing - competitive pay, two excellent pension schemes, and everyday savings opportunities.

Support for you and those close to you - through our range of life event leave policies as well as access to an on-site nursery at our East Midlands campus, flexible and hybrid working options.

Health and Wellbeing - discounted gym memberships and access to world-class sporting facilities, including physiotherapy, plus healthcare offers such as eyesight testing and wellbeing support.

Travel and sustainability - access to our electric vehicle and cycle-to-work schemes, as well as a variety of travel offers to support sustainable commuting.

Discover more about the full range of rewards and benefits at Loughborough University.

Our Accreditations

Eligible courses in the Department of Mathematical Sciences are accredited by the Institute of Mathematics and its Applications

We strive to create a culture that supports equity 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 career.

We are proud to be a Race Equality Charter Member. The Charter aims to improve the representation, progression and success of all minority ethnic staff and students within higher education and address issues of racism within higher education institutions (HEIs).

We are proud to be a Disability Confident Employer and have adopted a proactive approach to employing disabled people and to creating a more diverse workforce. We ensure that our recruitment processes are inclusive and accessible. We guarantee to offer an interview to all applicants who have declared a disability, provided that the essential criteria for the role are met. We proactively anticipate and provide reasonable adjustments and support existing employees who acquire a disability or long-term condition to thrive in the workplace.

We are a real living wage employer, and our Living Wage Employer Mark shows our commitment to paying our staff according to the cost of living.

We are proud supporters of the City of Sanctuary movement and delighted to be recognised as a University of Sanctuary. This national network brings together, university staff, lecturers, academics, and students, who together work to make Higher Education institutions places of safety, solidarity and empowerment for people seeking sanctuary.

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.