

Candidate Information

Position: Research Fellow
School/Department: School of Mathematics and Physics
Reference: 26/113647
Closing Date: Monday 19 October 2026
Salary: £42,972 per annum
Anticipated Interview Date: Monday 2 November 2026
Duration: Fixed Term - Full Time; available until 31 December 2027

JOB PURPOSE:

The School of Mathematics and Physics at Queens University Belfast is seeking a Research Fellow to undertake research to model irradiation of biological molecules in the presence of solvents and metal nanoparticles (MNPs). Such irradiation processes occur over a wide range of time and length scales and so we are developing a range of theoretical and computational approaches that bridge these different regimes in a unified approach. Specifically, the Research Fellow will use embedding schemes developed by the team members in Belfast and Toulouse to study photon irradiation of nucleobases and radiosensitiser molecules in the presence of solvents and MNPs. The successful candidate will be based within the Centre for Light-Matter Interactions (CLMI), which has an ongoing world-class research activity in laser-matter interactions and plasma physics.

The position will assume responsibility for the delivery of specific research objectives as part of a continuing Leverhulme Trust project that aims to model irradiation of biological molecules, in conjunction with collaborators in the University of Toulouse, France. Such irradiation processes occur over a wide range of time and length scales and so a range of theoretical and computational approaches are required that bridge these different regimes. The team involved in this work have developed a range of techniques to do this and the goal of this project is to join these methods together into a unified approach.

MAJOR DUTIES:

1. Undertake research within a specific research project as a member of a research team.
2. Design, develop and refine theoretical and computational methods to implement a frequency-dependent polarisable embedding scheme based on the projected equation of motion formalism to describe molecular systems embedded within complex environments.
3. Carry out critical evaluations and interpretations using methodologies and other techniques appropriate to the area of research.
4. Present regular progress reports on research to members of the research group or to external audiences to disseminate and publicise research findings.
5. Prepare, in consultation with supervisor and research team, material for publication in international journals and presentations at international conferences.
6. Organise, attend and contribute to relevant research orientated meetings.
7. Assist the grant holders in the preparation of funding proposals and applications to external bodies.
8. Carry out routine administrative tasks associated with the research project to ensure that the project is completed on time and within budget. These might include organisation of project meetings and documentation.
9. Provide guidance and supervision, as required, for the PhD researcher in the team.
10. Read academic papers, journals and textbooks to keep abreast of developments in the subject area of the project and related disciplines.

ESSENTIAL CRITERIA:

1. Degree or equivalent in physics or other cognate area of relevance to the post.
2. Have or be about to obtain a PhD in a relevant area.

3. Significant, relevant experience and track record in the following areas:
 - (i) the theory and numerical simulation of irradiation of atoms and molecules by laser pulses,
 - (ii) first-principles electronic-structure theory using real-time time-dependent density functional theory.
4. Peer-reviewed publications in these areas commensurate with career stage.
5. Experience of FORTRAN and python programming.
6. Previous experience in developing and using parallel computer codes using the Message Passing Interface (MPI).
7. Ability to contribute to broader management and administrative processes.
8. Sufficient breadth and depth of specialist knowledge in the discipline and of research methods and techniques to work within established research programmes.
9. Ability to communicate complex information in English effectively in oral and written format.
10. Ability to build contacts and participate in internal and external networks.
11. Demonstrable intellectual ability.
12. Practical problem-solving skills, independence of thought and initiative.
13. Ability to assess and organise resources.
14. Ability and willingness to work in a team, to collaborate, to communicate on a regular basis and to be an active and approachable member of a research group.

DESIRABLE CRITERIA:

1. Relevant PhD research experience in embedding quantum systems within external environments.
2. Experience of using large-scale high-performance computing facilities in research, including resource management.
3. Demonstratable teaching experience to undergraduate maths and/or physics students.
4. Contribute to the School's outreach programme by links with industry, community groups, etc.
5. Ability to prepare and give well-timed, coherent and insightful presentations.
6. Contributed talks at international and local conferences.
7. Strongly motivated, able to work independently and take ownership of the project.
8. Experience of working in multi-institute collaborations.