

## Candidate Information

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| <b>Position:</b>                   | Research Fellow                                      |
| <b>School/Department:</b>          | School of Mathematics and Physics                    |
| <b>Reference:</b>                  | 20/108415  |
| <b>Closing Date:</b>               | Monday 23 November 2020                              |
| <b>Salary:</b>                     | £33,797 per annum                                    |
| <b>Anticipated Interview Date:</b> | Wednesday 02 December 2020                           |
| <b>Duration:</b>                   | This is a fixed term contract until 31 December 2021 |

### JOB PURPOSE:

To be an active member of the research team working on quantum technologies at Queen's University, undertaking theoretical research towards the exploration of fundamental physics through levitated nanomechanical system and, in general, mesoscopic systems, including quantum many-body and hybrid systems. Emphasis will be given, among other topics, to the thermodynamics of quantum devices.

### MAJOR DUTIES:

1. Develop and plan an area of personal research and expertise, and/or undertake research under supervision within a specific research project or as a member of a research team.
2. Design, develop and refine experimental apparatus, field research or experiments in order to obtain reliable data.
3. Carry out analyses, critical evaluations, and interpretations using methodologies and other techniques appropriate to 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, often in consultation with supervisor, material for publication in national and international journals and presentations at international conferences.
6. Assist grant holder in the preparation of funding proposals and applications to external bodies.
7. Carry out routine administrative tasks associated with the research project/s to ensure that project/s are completed on time and within budget. These might include organisation of project meetings and documentation, financial control, risk assessment of research activities.
8. Carry out occasional undergraduate supervision, demonstrating or lecturing duties within the post holder's area of expertise and under the direct guidance of a member of academic staff.
9. Read academic papers, journals and textbooks to keep abreast of developments in own specialism and related disciplines.

### Planning and Organising:

1. Plan for specific aspects of research programmes. Timescales range from 1-6 months in advance and contribute to research group planning.
2. Plan for the use of research resources, laboratories and workshops where appropriate.
3. Plan own day-to day activity within framework of the agreed research programme.
4. Plan up to a year in advance to meet deadlines for journal publications and to prepare presentations and papers for conferences.
5. Coordinate and liaise with other members of the research group over work progress.

### Resource Management Responsibilities:

1. Ensure research resources are used in an effective and efficient manner.
2. Provide guidance as required to support staff and any students who may be assisting with research.

### Internal and External Relationships:

1. Liaise on a regular basis with colleagues and students.
2. Build internal contacts and participate in internal networks for the exchange of information and to form relationships for future collaboration.
3. Join external networks to share information and ideas.
4. Contribute to the School's outreach programme by establishing links with local community groups, industries etc.

**ESSENTIAL CRITERIA:**

1. Normally have or be about to obtain a relevant PhD.
2. At least 3 years relevant research experience in theoretical physics, including at the postgraduate level
3. Ability to contribute to broader management and administrative processes.
4. Contribute to the School's outreach programme by links with industry, community groups etc
5. Sufficient breadth and depth of specialist knowledge in the discipline and of research methods and techniques to work within established research programmes.
6. Ability to communicate complex information clearly.
7. Ability to build contacts and participate in internal and external networks.
8. Demonstrable intellectual ability.
9. Ability to assess and organise resources.

**DESIRABLE CRITERIA:**

1. PhD in Theoretical Quantum Optics, Quantum Information Processing or Condensed Matter Physics
2. Provable research experience in one or more of the following areas:
  - Quantum Optics.
  - Foundations of quantum theory
  - Quantum Optomechanics
  - Quantum Information Processing.
  - Theory of quantum correlations.
  - Open system dynamics.
  - Non-equilibrium quantum processes and thermodynamics.
3. Familiarity with the theory of quantum criticality, and quantum control.
4. A substantial number of high-quality publications in international peer-reviewed journals (commensurate with the research experience)
5. Some experience in grant writing; willingness to support and complement the outreach activities of the group.
6. Numerical analysis/simulation skills (quantum optics tool-box, tensor-network methods).
7. Provide evidence of independence and the ability to manage a personal network of collaborations.
8. Proven ability to work in a group as well as ability/willingness to conduct/carry on a research activity with a relevant/some/certain degree of independence; some experience with research student supervision or willingness to co-supervise a research student. Enthusiasm and willingness to establish new connections/collaborations.