

Research Role Profile

Job Title:	Research Fellow A
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Responsible to:	Head of research group, or principal investigator
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Responsible for:	Not applicable
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Job Summary and Purpose:
To undertake research in accordance with the specified research project(s) under the supervision of the principal investigator.

Main Responsibilities/Activities
<p>To undertake a range of research activities within a specified research area, assuming responsibility for specific areas of projects and making use of new research techniques and methods, in consultation with the research award holder or supervisor. This may include fieldwork, interviews, laboratory experimentation, critical evaluation and interpretation, computer-based data analysis and evaluation or library research.</p> <p>Using initiative and creativity to identify areas for research develop new research methods and extend the research portfolio. Analysing and interpreting results of own research. Write up results and prepare papers for submission to appropriate journals and conferences, and other outputs as required and/or appropriate. Attend appropriate conferences for the purpose of disseminating research results of personal development. The post holder may also contribute to writing bids for research grants and will contribute to collaborative decision making with colleagues in areas of research.</p> <p>Continually to update knowledge and develop skills, and translate knowledge of advances in the area into research activity.</p> <p>To plan and manage own research activity in collaboration with others. To carry out administrative tasks associated with specified research funding, for example risk assessment of research activities, organisation of project meetings and documentation. Implementation of procedures required to ensure accurate and timely formal reporting and financial control.</p> <p>To contribute to teaching in the Faculty by carrying out student supervision and/or demonstrating within the post holder's area of expertise and under the direct guidance of a member of departmental academic staff, as appropriate.</p> <p>The post holder may occasionally be required to supervise more junior research staff.</p>

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Person Specification

The post holder must have:

A doctoral degree in a relevant discipline (although individuals who have almost completed a doctoral degree may be appointed). Consideration may also be given to individuals who do not hold a doctoral degree but have required skills based on a number of years experience in specified / relevant fields

The post holder will have authority over some aspects of project work and must be capable of providing academic judgement, offering original and creative thoughts and be able to interpret and analyse results.

Relationships and Contacts

Direct responsibility to the principal investigator or academic supervisor. The post holder may be asked to serve on a relevant Faculty committee. There may be additional reporting and liaison responsibilities to external funding bodies or sponsors. The post holder may work on original research tasks with colleagues in other institutions.

Special Requirements

To be available to participate in fieldwork as required by the specified research project

All staff are expected to:

- Positively support equality of opportunity and equity of treatment to colleagues and students in accordance with the University of Surrey Equal Opportunities policy.
- Help maintain a safe working environment by:
 - Attending training in Health and Safety requirements as necessary, both on appointment and as changes in duties and techniques demand
 - Following local codes of safe working practices and the University of Surrey Health and Safety Policy
- Undertake such other duties within the scope of the post as may be requested by your Manager.

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Addendum

This document provides additional information relating to both specific aspects of the post/faculty and any post specific person specification criteria. The information contained within this document should always be read in conjunction with the accompanying generic Role Profile.

Job Title:

Research Fellow in Open Quantum Systems

Background Information/Relationships

The post holder is expected to hold a doctoral degree in Theoretical Physics.

The post holder will have authority over some aspects of project work and must be capable of providing academic judgement, offering original and creative thoughts and be able to interpret and analyse results.

They will carry out work in open quantum systems and quantum thermodynamics to study decoherence processes and memory effects via non-Markovian dynamics. The approach will need to be generalized to incorporate the role of noise within the unique structure and dynamical properties of the environment. This is likely to be important in biological and biochemical systems where fluctuations can occur on long timescales. In connection with quantum biology, the aim is to determine what features of the biological cellular environment slows down the process of decoherence, thereby 'protecting' the quantum nature of the system of interest on biologically relevant time scales. The role will involve analytical techniques in developing a mathematical model, building on past work both at Surrey and elsewhere and also involve developing computational/simulations using programming languages such as Python and/or Mathematica. The work will be closely tied to the other RA post (in computational chemistry applied to quantum biology) in this theme as well as linking with the RA on theme 1 (Quantum Thermodynamics) and a willingness to interact more widely with the other themes. Results will be presented at conferences and disseminated in peer-reviewed journals.

They will report to the theme leader and liaise with other members of the same and different themes of the project.

Person Specification

This section describes the sum total of knowledge, experience & competence required by the post holder that is necessary for standard acceptable performance in carrying out this role. This is in addition to the criteria contained within the accompanying generic Role Profile.

	Essential/Desirable
PhD in theoretical physics	Essential
Strong background in one or more of the following relevant areas: path integral techniques, open quantum systems, master equations, Markovian and no-Markovian dynamics, equilibrium and nonequilibrium statistical mechanics.	Essential
Experience with one or more programming languages such as Python (preferable), Fortran, C++, Julia, and software packages such as Mathematica for computer algebra (symbolic computation);	Essential

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interfacing between different languages; plotting functions; computational algorithms and techniques for manipulation of matrices, etc.	
Publication record in a relevant area	Essential
Willingness to interact and collaborate with computational chemists and molecular biologists	Essential
Interest in foundational problems relating to the arrow of time, the measurement problem in quantum mechanics and the nature of entanglement, decoherence and links between quantum mechanics and thermodynamics	Desirable
Willingness to interact and collaborate with philosophers of science on foundational questions.	Desirable
Excellent oral and communication skills	Essential

Key Responsibilities

This document is not designed to be a list of all tasks undertaken but an outline record of any faculty/post specific responsibilities (5 to 8 maximum). This should be read in conjunction with those contained within the accompanying generic Role Profile.

- **Work closely with other investigators in the project, in particular Al-Khalili and Rocco.**
- **Work independently on extending existing mathematical models of open quantum system approach that take into account memory effects via non-Markovian dynamics. Incorporate the role of noise within the unique structure and dynamical properties of the environment and in the context of quantum biology, determine what features of the biological cellular environment slows down the process of decoherence.**
- **Take part in regular meetings (face-to-face or via Zoom) with collaborators on the grant**
- **Interact with PhD students, not in a supervisory role, but to be on hand to offer advice and guidance if required**
- **Preparation and publication of manuscripts for peer-reviewed journals**
- **Presentation of results at project organised workshops, national and international conferences**

N.B. The above list is not exhaustive.