

Job Description

Job Title:	Research Associate in Experimental Ion Trapping
Department/Division/Faculty:	Department of Physics, Quantum Optics and Laser Science Group, Faculty of Natural Sciences
Campus location:	South Kensington Campus
Job Family/Level:	Research Family, Research Associate*
Responsible to:	Prof Richard Thompson
Key Working Relationships (internal):	Research Students and Technicians
Key Working Relationships (external):	External scientific collaborators
Contract type:	Full-time and fixed-term for 12 months in the first instance with the possibility of an extension working on a related project

Purpose of the Post

We are seeking an experimental Research Associate for 12 months to work on our research project “Optimal Control for Robust Ion Trap Quantum Logic”. The goal of the project is to develop optimal control of coherent operations on trapped ions, including quantum logic gates, in non-ideal conditions. This includes situations where the ions are outside the Lamb-Dicke regime; where they are hot; or where there is significant experimental noise present. The project aims to evaluate the effectiveness of schemes such as multi-tone driving of the qubit transition to improve the fidelity of gates, and to investigate the use of machine-learning techniques for further improvement of the gates.

This project is part of a close collaboration between experiment and theory, led by Professor Richard Thompson and Professor Florian Mintert. Our initial work with RF traps was originally funded by a 4-year EPSRC grant, and the current studies are supported through the Oxford Quantum Technology Hub in Quantum Computing and Simulation, also funded by EPSRC.

It is expected that the appointee to this experimental position will have extensive experience with laser cooling of trapped ions. The appointee will be responsible for running and further developing our linear RF trap system for calcium ions, which uses diode lasers for laser cooling. A highly stable laser at 729 nm is used for addressing the optical qubit transition and a ground state Raman transition driven by lasers at 397 nm is also available. This system will be used for evaluation and improvement of the theoretically-developed optimal control procedures, moving into the regime of large Lamb-Dicke parameters.

The position is funded for a fixed term of 12 months and there is a possibility of moving to a related project at the end of this period for a suitably-qualified candidate.

The successful candidate should have a PhD or have an equivalent level of professional qualification in the area of experimental ion trapping. It is a requirement to have a strong record of research experience and publications. The ability to work independently and collaboratively is essential, as well as a proven record of

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communicating research findings. The appointee will work in a small group alongside PhD students and will be expected to help supervise the students on a day-to-day basis.

More information about the research project can be found at: www.imperial.ac.uk/ion-trapping/research/ or by email to Richard Thompson (r.thompson@imperial.ac.uk) or Florian Mintert (f.mintert@imperial.ac.uk).

Key Responsibilities

- To drive experiments in quantum science and technology
- To design and assemble apparatus for the research
- To acquire and interpret research data and results
- To undertake day-to-day supervision of PhD students and Masters students as agreed
- To take initiatives in the planning of research
- To take responsibility for organising resources and effective decision making in support of research
- To develop ideas and to communicate them within the research team and collaborators
- To write internal reports
- To prepare material for presentation in oral and poster formats
- To attend and present at relevant workshops and conferences
- To draft publications and prepare them for submission to peer-reviewed journals
- To promote the reputation of the research Group, the Department, and the College
- To prioritise tasks within an agreed work schedule
- To ensure the validity and reliability of data at all times
- To maintain accurate and complete records of all findings
- To maintain a safe working environment and contribute to risk assessments and safety documentation

Other Duties

- To undertake appropriate administration tasks
- To attend relevant meetings
- To undertake any necessary training and / or development
- Any other duties commensurate with the grade of the post as directed by line manager / supervisor

* Candidates who have not yet been officially awarded their PhD will be appointed as Research Assistant within the salary range £38,194 - £41,388 per annum.

Person Specification

Requirements	Essential (E)/ Desirable (D)
Candidates/post holders will be expected to demonstrate the following	
Education	
Research Associate: Hold a PhD (or equivalent) in a relevant field of experimental physical science or related discipline	E
Research Assistant: Near completion of a PhD (or equivalent) in a relevant field of experimental physical science or related discipline	E
Experience & Knowledge	
A strong record of experimental work in ion trapping or a related field	E
Knowledge and experience in modelling and data analysis	D
Proven ability to work in experiment-centred teams	E
Skills & Abilities	
The ability to present results as high-quality written reports, scientific papers, and conference talks	D
Creative approach to problem-solving	E
Good verbal communication skills, the ability to deal with a wide range of people and to interact successfully with others to learn and teach new skills	E
Ability to write scientifically, clearly and succinctly for publication	D
Ability to organise and prioritise own work with minimal supervision	E
A flexible attitude to learning new skills as the research demands	D
Computing skills appropriate to the programme of work	E
Ability to identify, develop and apply new concepts, techniques and methods	D
Ability to motivate and guide the work of others	E
High level analytical capability	E
Ability to communicate complex information clearly	E
Ability to encourage research culture in others	E
Other Requirements	
Willingness to work as part of a team and to be open-minded and cooperative	E
Commitment to meeting deadlines	E
Flexible and adaptable approach to work over a range of duties	E
Discipline and regard for confidentiality and security at all times	E
Willingness to undertake any necessary training and career development for the role	E
Willingness to travel both within the United Kingdom and abroad to conduct research and attend conferences/workshops and other meetings	D

Please note that job descriptions cannot be exhaustive, and the post-holder may be required to undertake other duties, which are broadly in line with the above key responsibilities.

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Imperial College is committed to equality of opportunity and to eliminating discrimination. All employees are expected to follow the [Imperial Values & Behaviours framework](#). Our values are:

- Respect
- Collaboration
- Excellence
- Integrity
- Innovation

Employees are also required to comply with all College policies and regulations paying special attention to: Confidentiality, Conflict of Interest, Data Protection, Equal Opportunities, Financial Regulations, Health and Safety, Information Technology, Smoking, Private Engagements and Register of Interests. They must also undertake specific training and assume responsibility for safety relevant to specific roles, as set out on the [College Website Health and Safety Structure and Responsibilities](#) page.

The College is a proud signatory to the San-Francisco Declaration on Research Assessment (DORA), which means that in hiring and promotion decisions, we evaluate applicants on the quality of their work, not the journal impact factor where it is published. For more information, see <https://www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-evaluation/>

The College believes that the use of animals in research is vital to improve human and animal health and welfare. Animals may only be used in research programmes which are ultimately aimed towards finding new treatments and making scientific and medical advances, and where there are no satisfactory or reasonably practical alternatives to their use. Imperial is committed to ensuring that, in cases where this research is deemed essential, all animals in the College's care are treated with full respect, and that all staff involved with this work show due consideration at every level. [Find out more about animal research at Imperial.](#)

We are committed to equality of opportunity, to eliminating discrimination and to creating an inclusive working environment for all. We therefore encourage candidates to apply irrespective of age, disability, marriage or civil partnership status, pregnancy or maternity, race, religion and belief, gender identity, sex, or sexual orientation. We are an [Athena SWAN Silver Award](#) winner, a [Disability Confident Leader](#) and a [Stonewall Diversity Champion](#).

August 2022