

Job description and selection criteria

Job title	Postdoctoral Research Assistant in Ion Trap Quantum Computing
Division	Mathematical, Physical and Life Sciences Division
Department	Physics
Location	Clarendon Laboratory, Parks Road, Oxford, OX1 3PU
Grade and salary	Grade 7: £31,076 – £38,183 per annum
Hours	Full time
Contract type	Fixed-term for 24 months with a possible extension depending on funding
Reporting to	Prof. David Lucas, Prof. Andrew Steane
Vacancy reference	130193
Additional information	Closing date – Midday (UK time) on Monday 2 October 2017

Research topic	Networked Ion Trap Quantum Computing
Principal Investigator / supervisor	Prof. David Lucas, Prof. Andrew Steane
Project team	Ion Trap Quantum Computing Group
Project web site	www.physics.ox.ac.uk/users/iontrap www.ngit.ox.ac.uk
Funding partner	The funds supporting this research project are provided by EPSRC.
Recent publications	“High-fidelity quantum logic gates using trapped-ion hyperfine qubits”, C.J.Ballance <i>et al.</i> , Phys. Rev. Lett. 117 , 06050 (2016) http://dx.doi.org/10.1103/PhysRevLett.117.060504 “High-fidelity trapped-ion quantum logic using near-field microwaves”, T.P.Harty <i>et al.</i> , Phys. Rev. Lett. 117 , 140501 (2016) https://doi.org/10.1103/PhysRevLett.117.140501



The role

Oxford is leading a multi-institution £38M EPSRC-funded “Hub” for Networked Quantum Information Technologies (www.nqit.ox.ac.uk). A central goal of this 5-year project is the development of a small prototype quantum information processor, consisting of trapped-ion qubits linked by photonic interconnects. The Oxford Ion Trap QC group has recently demonstrated the longest-lived single-qubit memory, the most precise single-shot qubit readout, and the highest-fidelity single- and two-qubit quantum logic gates, in any physical system, with all these elementary operations significantly surpassing recent estimates of the quantum computing “fault-tolerant threshold”.

We seek a highly-motivated and technically-skilled individual to join the team which is building the prototype device. Previous experience of experimental quantum optics, or ion/atom trapping techniques will be essential, and experience of ion/photon or atom/photon interfacing in the single-particle regime desirable. Candidates will be expected to demonstrate a good understanding of the relevant basic theory, skills in data analysis and numerical modelling, as well as familiarity with experimental techniques such as ultra-high vacuum systems, diode-based laser systems, cryogenics, r.f. and microwave electronics, and computer control. There will be significant scope for interaction with industrial partners in the Hub.

Responsibilities

- Be responsible for defining, developing and undertaking experiments directed towards the outlined research programme.
- Involvement in key decisions on research directions, methodologies and research responsibilities.
- Involvement in apparatus design, specification and purchasing.
- Contribute to the positive atmosphere, maintenance and smooth running of the laboratory, as required.
- Instruction and day-to-day supervision of graduate students and others working on the project, as required, and oversight of laboratory operations and procedures.
- Accepting delegated responsibility for safe laboratory practice, especially for the operation of laser systems for which training is required.
- Writing of research papers for internationally refereed journals and presenting results at national and international conferences.
- Contributing to the intellectual life of the research group and the collaboration, including participating in video and teleconference meetings as required, and travelling for national and international collaboration when required.
- Contribute to the writing of reports required for extant grants and contracts, including milestone reports, and final reports before the end of the contract.
- Assisting with other reasonable practical and administrative duties as required.
- The post-holder will have the opportunity to teach. This may include lecturing, small group teaching, and tutoring of undergraduates and graduate students.

Selection criteria

Essential

- A good first degree in physics or optics
- A Ph.D. (or to be close to obtaining one) in a relevant area
- Technical expertise in appropriate areas
- Ability to contribute to the outlined research programme
- Record of research experience, e.g. publications
- Ability to take forward a research project and to deliver output
- Skills in analysis, writing and communications
- Ability to both work in a team and assist in the supervision of students, as well as the ability to work independently

Desirable

- Knowledge of quantum information processing and ion/atom trapping
- Experience in atom/photon or ion/photon interactions in the single-particle regime
- Proven track record in atomic physics and/or quantum optics
- Practical experience with UHV systems, cryogenics, lasers, r.f./microwave electronics, control & detection systems
- A sound background and experience in experimental design
- A solid grasp of classical optics and light-matter interfaces
- A strong background of working with graduate students
- Data analysis and numerical modelling skills
- Good ability to interact with theory collaborators

About the University of Oxford

The University of Oxford aims to lead the world in research and education for the benefit of society both in the UK and globally. Oxford's researchers engage with academic, commercial and cultural partners across the world to stimulate high-quality research and enable innovation through a broad range of social, policy and economic impacts.

We believe our strengths lie both in empowering individuals and teams to address fundamental questions of global significance, and in providing all of our staff with a welcoming and inclusive workplace that supports everyone to develop and do their best work. Recognising that diversity is a great strength, and vital for innovation and creativity, we aspire to build a truly diverse community which values and respects every individual's unique contribution.

While we have long traditions of scholarship, we are also forward-looking, creative and cutting-edge. Oxford is one of Europe's most entrepreneurial universities. Income from external

research contracts in 2014/15 exceeded £522.9m and ranked first in the UK for university spin-outs, with more than 130 spin-off companies created to date. We are also recognised as leaders in support for social enterprise.

Join us and you will find a unique, democratic and international community, a great range of staff benefits and access to a vibrant array of cultural activities in the beautiful city of Oxford.

For more information please visit www.ox.ac.uk/about/organisation

Department of Physics

Oxford Physics is one of the largest and most eminent departments in Europe – pursuing forefront research alongside training the next generation of leaders in Physics.

With an academic staff of almost one hundred our activities range from fundamental particles to the furthest reaches of the universe to manipulating matter on an atomic scale. Oxford physicists are probing new ways to harness solar energy, modelling the Earth's atmosphere to predict the future climate, exploring computation on the quantum scale and executing calculations that reveal the fundamental structure of space and time.

For more information please visit: <http://www2.physics.ox.ac.uk/>

Atomic and Laser Physics Sub-department

The post-holder will be based in the Atomic and Laser Physics sub-department, which is one of the six sub-departments that together make up the Department of Physics; these are Astrophysics, Atomic and Laser Physics, Atmospheric, Oceanic and Planetary Physics, Condensed Matter Physics, Particle Physics and Theoretical Physics, with a seventh function (Central Physics) providing administrative and technical support to these sub-departments. Members of all sub-departments take part in research, teaching and matters such as examinations, discussion of syllabi, lectures and liaison with undergraduates and postgraduate students.

Athena Swan Charter

The Department of Physics holds a silver Athena Swan award to recognise advancement of gender equality: representation, progression and success for all.

Mathematical, Physical & Life Sciences Division

The Mathematical, Physical and Life Sciences (MPLS) Division is one of the four academic divisions of the University of Oxford.

The MPLS Division's 10 departments and 3 interdisciplinary units span the full spectrum of the mathematical, computational, physical, engineering and life sciences, and undertake both fundamental research and cutting-edge applied work. Our research addresses major societal and technological challenges and is increasingly focused on key interdisciplinary issues. We collaborate closely with colleagues in Oxford across the medical sciences, social sciences and humanities, and with other universities, research organisations and industrial partners across

the globe in pursuit of innovative research geared to address critical and fundamental scientific questions.

For more information please visit: <http://www.mpls.ox.ac.uk/>

How to apply

If you would like to apply, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a new user or log-in if you have applied previously. Please provide details of two referees and indicate whether we can contact them now. You will be asked to upload a CV and statement of research interests. Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

Please upload all documents **as PDF files** with your name and the document type in the filename.

All applications must be received by **midday** on the closing date stated in the online advertisement.

Information for priority candidates

A priority candidate is a University employee who is seeking redeployment because they have been advised that they are at risk of redundancy, or on grounds of ill-health/disability. Priority candidates are issued with a redeployment letter by their employing departments.

If you are a priority candidate, please ensure that you attach your redeployment letter to your application (or email it to the contact address on the advert if the application form used for the vacancy does not allow attachments)

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk. Further help and support is available from www.ox.ac.uk/about_the_university/jobs/support/. To return to the online application at any stage, please go to: www.recruit.ox.ac.uk.

Please note that you will be notified of the progress of your application by automatic emails from our e-recruitment system. **Please check your spam/junk mail** regularly to ensure that you receive all emails.

Important information for candidates

Pre-employment screening

Please note that the appointment of the successful candidate will be subject to standard pre-employment screening, as applicable to the post. This will include right-to-work, proof of identity and references. We advise all applicants to read the candidate notes on the University's pre-employment screening procedures, found at:

www.ox.ac.uk/about/jobs/preemploymentscreening/.

The University's policy on retirement

The University operates an employer justified retirement age for all academic and academic-related posts (grade 6 and above), for which the retirement date is the 30 September immediately preceding the 68th birthday. The justification for this is explained at: www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revaim/.

For **existing** employees any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revproc/

There is no normal or fixed age at which **support staff** in posts at **grades 1–5** have to retire. Support staff may retire once they reach the minimum pension age stipulated in the Rules of the pension scheme to which they belong.

Equality of Opportunity

Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. No applicant or member of staff shall be discriminated against because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

Benefits of working at the University

Training and Development

A range of training and development opportunities are available at the University. Further details can be found at www.ox.ac.uk/staff/working_at_oxford/training_development/index.html.

For research staff only: Support for Research Staff

There is a particularly wide range of support for career development for research staff. Please visit: www.ox.ac.uk/research/support-researchers to find out more.

Pensions

The University offers generous occupational pension schemes for eligible staff members. Further details can be found at www.admin.ox.ac.uk/finance/epp/pensions/pensionspolicy/.

Information for international staff (or those relocating from another part of the UK)

A wealth of information is available on the University's International Staff website for staff who are relocating to Oxford from abroad, at www.admin.ox.ac.uk/personnel/staffinfo/international/.

The University of Oxford Newcomers' Club

The Newcomers' Club is aimed at helping partners of newly-arrived visiting scholars, graduate students and academic members of the University to settle in and to meet people in Oxford.

Transport schemes

The University offers a range of travel schemes and public transport travel discounts to staff. Full details are available at www.admin.ox.ac.uk/estates/ourservices/travel/.

University Club and University Sports Facilities

The University Club provides social, sporting and hospitality facilities. It incorporates a Club bar, a cafe and sporting facilities, including a gym. See www.club.ox.ac.uk for all further details.

University staff can use the University Sports Centre at discounted rates, and have the chance to join sports clubs. Please visit www.sport.ox.ac.uk/oxford-university-sports-facilities.

Childcare and Childcare Vouchers

The University offers quality childcare provision services at affordable prices to its employees. For full details about the services offered, please visit www.admin.ox.ac.uk/childcare/. **NB: Due to the high demand for the University's nursery places there is a long waiting list.**

The University also offers nursery fee payment schemes to eligible staff as an opportunity to save tax and national insurance on childcare costs. Please visit www.admin.ox.ac.uk/childcare.

Disabled staff

The University is committed to supporting members of staff with a disability or long-term health condition and has a dedicated Staff Disability Advisor. Please visit www.admin.ox.ac.uk/eop/disab/staff for further details.

BUPA - Eduhealth

Bupa Eduhealth Essentials private medical insurance offers special rates for University of Oxford staff and their families www.eduhealth.co.uk/mini-site/.

All other benefits

For other benefits, such as free entry to colleges, the Botanic Gardens and staff discounts offered by third party companies, please see www.admin.ox.ac.uk/personnel/staffinfo/benefits/.