Department of Physics
Clarendon Laboratory
Parks Road, Oxford OX1 3PU

UNIVERSITY OF OXFORD

Job Description and Selection Criteria

Job title	Postdoctoral Research Assistant in Ion Trap Quantum Computing
Division	Mathematical Physical and Life Sciences
Department	Physics
Location	Clarendon Laboratory, Parks Road, Oxford OX1 3PU
Grade and salary	Grade 7: £38,674 – £46,913 per annum
Hours	Full time
Contract type	Fixed-term (2 years) With the possibility of extending subject to funding
Reporting to	Dr Joseph Goodwin (UKRI ERC Research Fellow)
Vacancy reference	177221
Additional information	Closing date – midday on 14 February 2025

Research topic	Fast networked quantum computing with ions in optical cavities
Principal Investigator / supervisor	Dr Joseph Goodwin
Project team	Ion Trap Quantum Computing / Ion-Cavity Optical Networks
Project web site	www.physics.ox.ac.uk/research/group/ion-trap-quantum-computing/research-areas/micron
Funding partner	The funds supporting this research project are provided by the UKRI Horizon Europe Guarantee fund, along with numerous supporting grants.
Recent publications	Stephenson et al, Phys. Rev. Lett. 124, 110501 (2020) E. Kassa et al – Effects of cavity birefringence on remote entanglement generation, New. J. Phys. 25 013004 (2023) W. J. Hughes et al - Mode mixing and losses in misaligned microcavities, Optics Express 31 32619 (2023)

The role

The Oxford Ion Trap Quantum Computing group currently hosts one of the world's foremost network quantum computing demonstrator systems. The group have since used this to demonstrate a series of major proof-of-principle network experiments, as well as record-breaking rates and fidelities for remote Bell-pair production. To further increase this rate and improve the scalability of the underlying systems, we now aim to integrate sub-millimetre scale optical cavities and other crucial subsystems into the structure of the 3D ion trap chips themselves.

By combining radical new approaches to cavity and trap fabrication, we will demonstrate a reliable and scalable 'matter-light network interface', capable of near-deterministic generation of high-fidelity ion-photon entanglement. This offers the potential for remote Bell pair production at rates of 100kHz, comparable to the speed of local entangling gates; a major step towards the realisation of large-scale networked quantum computation.

We seek a highly-motivated and technically-skilled scientist to join our team in pushing networked-based quantum computing to the next level. As well as driving forward the design and development of the cavity-mediated photonic entanglement experiment, duties will include preparing scientific papers, and presentations, assisting with the supervision of graduate and project students and contributing to the smooth running of the wider group.

Responsibilities

- Manage own academic research and administrative activities. This involves small scale project management, to co-ordinate multiple aspects of work to meet deadlines
- Adapt existing and develop new scientific techniques and experimental protocols
- Test hypotheses and analyse scientific data from a variety of sources, reviewing and refining working hypotheses as appropriate
- Contribute ideas for new research projects
- Develop ideas for generating research income, and present detailed research proposals to senior researchers
- Collaborate in the preparation of scientific reports and journal articles and occasionally present papers and posters
- Use specialist scientific equipment in a laboratory environment
- Act as a source of information and advice to other members of the group on scientific protocols and experimental techniques
- Represent the research group at external meetings/seminars, either with other members of the group or alone
- Carry out collaborative projects with colleagues in partner institutions & research groups
- The post-holder will have the opportunity to teach. This may include lecturing, small group teaching, and tutoring of undergraduates and graduate students.

Pre-employment screening

All offers of employment are made subject to standard pre-employment screening, as applicable to the post.

If you are offered the post, you will be asked to provide proof of your right-to-work, your identity, and we will contact the referees you have nominated. You will also be asked to complete a health declaration (so that you can tell us about any health conditions or disabilities so that we can discuss appropriate adjustments with you), and a declaration of any unspent criminal convictions.

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/.

Hazard-specific / Safety-critical duties
www.admin.ox.ac.uk/personnel/recruit/preempcheck/compulsorychecks/medical

This job includes the following hazards or safety-critical activities which will require successful pre-employment health screening through our Occupational Health Service before the successful candidate will be allowed to start work:

- Working with category 3b or 4 lasers (laser safety class)

Selection criteria

Essential

- A good first degree, and PhD (or to be close to obtaining) in physics or a related area
- Experience of experimental atomic physics, quantum optics or quantum information.
- 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
- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings
- Ability to work in a team and assist in the supervision and training of students, as well as the ability to work independently

Desirable

- Experience in ion/atom trapping and quantum information processing
- Knowledge of atom/photon or ion/photon interactions in the single-particle regime, particularly in the context of cavity QED physics
- Practical experience with: lasers; optical cavities; microfabrication; electro-optical systems; experimental control systems; rf electronics; UHV; cryogenics
- A sound background and experience in numerical modelling, experimental design and data analysis
- Good ability to interact with experimental, theoretical and industrial collaborators

About the University of Oxford

Welcome to the University of Oxford. We aim 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, while providing all our staff with a welcoming and inclusive workplace that enables everyone to develop and do their best work. Recognising that diversity is our strength, 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 and we rank first in the UK for university spin-outs, and in recent years we have spun out 15-20 new companies every year. 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 over 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.

Atomic and Laser Physics Sub-department

The post-holder will be based in the Atomic and Laser Physics (ALP) 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.

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

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/

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.

How to apply

Applications are made through our e-recruitment system and you will find all the information you need about how to apply on our Jobs website https://www.jobs.ox.ac.uk/how-to-apply.

Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description. As part of your application you will be asked to provide details of two referees and indicate whether we can contact them now.

You will be asked to upload a CV and a supporting statement. The supporting statement must explain how you meet each of the selection criteria for the post using examples of your skills and experience. This may include experience gained in employment, education, or during career breaks (such as time out to care for dependants)

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

All applications must be received by **midday** UK time 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)

If you need help

Application FAQs, including technical troubleshooting advice is available at: https://staff.web.ox.ac.uk/recruitment-support-faqs
Non-technical questions about this job should be addressed to the recruiting department directly *recruitment@physics.ox.ac.uk*
To return to the online application at any stage, please go to: www.recruit.ox.ac.uk.
Please note that you will receive an automated email from our online recruitment portal to confirm receipt of your application. **Please check your spam/junk mail** if you do not receive this email.

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/.

Important information for candidates

Data Privacy

Please note that any personal data submitted to the University as part of the job application process will be processed in accordance with the GDPR and related UK data protection legislation. For further information, please see the University's Privacy Notice for Job Applicants at: https://compliance.admin.ox.ac.uk/job-applicant-privacy-policy. The University's Policy on Data Protection is available at: https://compliance.admin.ox.ac.uk/data-protection-policy.

The University's policy on retirement

The University operates an Employer Justified Retirement Age (EJRA) for very senior research posts at **grade RSIV/D35 and clinical equivalents E62 and E82**, which with effect from 1 October 2023 will be 30 September before the 70th birthday. The justification for this is explained at: https://hr.admin.ox.ac.uk/the-ejra.
For **existing** employees on these grades, any employment beyond the retirement age is subject to approval through the procedures: https://hr.admin.ox.ac.uk/the-ejra.
There is no normal or fixed age at which staff in posts at other grades have to retire. Staff at these grades may elect to retire in accordance with the rules of the applicable pension scheme, as may be amended from time to time.

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

Employee benefits

University employees enjoy 38 days' paid holiday, generous pension schemes, travel discounts, and a variety of professional development opportunities. Our range of other employee benefits and discounts also includes free entry to the Botanic Gardens and University colleges, and discounts at University museums. See https://hr.admin.ox.ac.uk/staff-benefits

University Club and sports facilities

Membership of the University Club is free for all University staff. The University Club offers social, sporting, and hospitality facilities. Staff can also use the University Sports Centre on Iffley Road at discounted rates, including a fitness centre, powerlifting room, and swimming pool. See www.club.ox.ac.uk and https://www.sport.ox.ac.uk/.

Information for staff new to Oxford

If you are relocating to Oxfordshire from overseas or elsewhere in the UK, the University's Welcome Service website includes practical information about settling in the area, including advice on relocation, accommodation, and local schools. See https://welcome.ox.ac.uk/
There is also a visa loan scheme to cover the costs of UK visa applications for staff and their dependants. See https://staffimmigration.admin.ox.ac.uk/visa-loan-scheme

Family-friendly benefits

With one of the most generous family leave schemes in the Higher Education sector, and a range of flexible working options, Oxford aims to be a family-friendly employer. We also subscribe to the Work+Family Space, a service that provides practical advice and support for employees who have caring responsibilities. The service offers a free telephone advice line, and the ability to book emergency back-up care for children, adult dependents and elderly relatives. See https://hr.admin.ox.ac.uk/my-family-care
The University has excellent childcare services, including five University nurseries as well as University-supported places at many other private nurseries.
For full details, including how to apply and the costs, see https://childcare.admin.ox.ac.uk/

Disabled staff

We are committed to supporting members of staff with disabilities or long-term health conditions. For further details, including information about how to make contact, in confidence, with the University's Staff Disability Advisor, see https://edu.admin.ox.ac.uk/disability-support

Staff networks

The University has a number of staff networks including the Oxford Research Staff Society, BME staff network, LGBT+ staff network and a disabled staff network. You can find more information at https://edu.admin.ox.ac.uk/networks

The University of Oxford Newcomers' Club

The University of Oxford Newcomers' Club is an organisation run by volunteers that aims to assist the partners of new staff settle into Oxford, and provides them with an opportunity to meet people and make connections in the local area. See www.newcomers.ox.ac.uk.