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

UNIVERSITY OF OXFORD

Job description and selection criteria

Job title	Postdoctoral researcher in Data Analysis of Biological Images
Division	Mathematical, Physical & Life Sciences Division
Department	Department of Physics
Location	Kavli Institute for Nanoscience Discovery
Grade and salary	Grade 7 £37,524 - £45,763 per annum
Hours	Full time
Contract type	4-year fixed-term, with the possibility of an extension
Reporting to	Prof Achillefs Kapanidis
Vacancy reference	175408
Additional information	Closing date for applications is 12 noon on 15 November 2024

Introduction

The University

The University of Oxford is a complex and stimulating organisation, which enjoys an international reputation as a world-class centre of excellence in research and teaching. It employs over 12,000 staff and has a student population of over 22,000.

Our annual income in 2014/15 was £1,429.3m. Oxford is one of Europe's most innovative and entrepreneurial universities: income from external research contracts in 2014/2015 exceeds £522.9m p.a., and more than 80 spin-off companies have been created.

Oxford is a collegiate university, consisting of the central University and colleges. The central University is composed of academic departments and research centres, administrative departments, libraries and museums. There is a highly devolved operational structure, which

Athena SWAN Silver Award

is split across four academic divisions, Academic Services and University Collections and University Administrative Services. For further information, please see: www.ox.ac.uk/staff/about_the_university/new_to_the_university/structure_of_university.

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

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/

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/

CMP Sub-department

The post-holder will be based in the CMP 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.

The Kavli Institute for Nanoscience Discovery (Kavli INsD)

New Biochemistry Building, University of Oxford, South Parks Road, OX1 3QU
https://kavlinano.ox.ac.uk / info@kavlinano.ox.ac.uk

"Where the physical sciences are brought into the cell"

Leading scientific discovery into the most basic unit of life - the cell - the Kavli Institute for Nanoscience Discovery (Kavli INsD) is located at the heart of Oxford University's science area and was inaugurated in March 2021.

With over 30 faculty and 450 research staff and graduate students, world leading teams collaborate from multiple departments (biochemistry, cell biology, chemistry, physics, physiology, psychiatry, clinical neurosciences and engineering) to contribute to global health.

By bringing multiple disciplines together under the same roof to advance scientific research the Kavli INsD creates an environment that encourages the cross-pollination of ideas and inter-disciplinary cooperation. The Institute comes together to work on global health challenges and benefits from the close proximity of the scientific departments as well as advanced imaging facilities and state-of-the-art-instrumentation. As the first Director of Kavli INsD Professor Dame Carol Robinson and the research teams are creating a culture that is both bold and respectful.

The University of Oxford's, Kavli Institute for Nanoscience Discovery is the U.S based Kavli Foundation's 20th institute. The foundation, established in the year 2000 by Fred Kavli, has a mission "to advance science for the benefit of humanity". Research institutes in the fields of nanoscience, astrophysics, neuroscience, and theoretical physics have been endowed by the foundation which also supports programs that strengthen the connection between science and society. Learn more at kavlifoundation.org

Athena Swan Charter

The University of Oxford is a member of the Athena SWAN Charter and holds an institutional Bronze Athena SWAN award. The Department of Physics holds a departmental Silver Athena award in recognition of its efforts to introduce organisational and cultural practices that promote gender equality and create a better working environment for both men and women.

Job description

Research topic	Data Analysis of Biological Images: from single molecules to single cells
Principal Investigator / supervisor	Prof Achillefs Kapanidis
Project team	"Gene machines" group
Project web site	https://kapanidis.web.ox.ac.uk/
Funding partner	Wellcome Trust
Recent publications	Stracy M, Schweizer J, Sherratt D, Kapanidis AN, Uphoff S, Lesterlin C. Transient non-specific DNA binding dominates the target search of bacterial DNA-binding proteins, *Mol Cell* 2021, 81, 1499-1514.E6 Majumder A, Ebright RH, Kapanidis AN. Transcription initiation at a consensus bacterial promoter proceeds via a "bind-unwind-load-and-

	lock" mechanism. *eLife,* 2021, 10:e70090 DOI: 10.7554/eLife.70090 Shiaelis S, Tometzki A, Peto L, McMahon A, Hepp C, Bickerton E, Favard C, Muriaux D, Andersson M, Oakley S, Vaughan A, Matthews S, Stoesser N, Crook D, Kapanidis AN, Robb NC. Virus detection and identification in minutes using single-particle imaging and deep learning. *ACS Nano* 2023, 17, 697. Zagajewski A, Turner P, Feehily C, El Sayyed H, Andersson M, Barrett L, Oakley S, Stracy M, Crook D, Nellåker C, Stoesser N, Kapanidis AN. Deep learning and single-cell phenotyping for rapid antimicrobial susceptibility detection in *Escherichia coli. Nature Communications Biology* 2023, 6, 1164 El Sayyed H, Pambos O, Stracy M, Gottesman M, Kapanidis AN. Single-molecule tracking reveals the functional allocation, in vivo interactions and spatial organization of universal transcription factor NusG. *Mol Cell 2024,* 84 (5), 926-937. e4 Chatzimichail S, Turner P, Feehily C, Farrar A, El Sayyed H, Crook D, Andersson M, Oakley S, Barrett L, Kyropoulos J, Nellåker C, Stoesser N, **Kapanidis AN.** Rapid Identification of Bacteria From Clinical Isolates Using Microfluidic Adaptive Channels and Multiplexed Fluorescence Microscopy. *Lab on a chip* 2024, https://pubs.rsc.org/en/Content/ArticleLanding/2024/LC/D4LC00325J Farrar A, Turner P, El Sayyed H, Feehily C, Chatzimichail S, Crook D, Andersson A, Oakley S, Barrett L, Nellåker C, Stoesser N, **Kapanidis AN**. Ribosome Phenotypes Enable Rapid Antibiotic Susceptibility Testing in *Escherichia coli.* medRxiv 2024, https://doi.org/10.1101/2024.06.18.24309111
Technical skills	Image analysis, time-series analysis, software development, data management, software integration

Overview of the role

Member of the Gene Machines research group (led by Dr Achillefs Kapanidis) with responsibility for imaging-analysis and data-analysis aspects of a project that studies mechanistic and kinetic aspects of bacterial gene expression *in vitro* and *in vivo*. This will involve project such as tracking single molecules in living cells, analysis of super-resolution images of proteins and DNA in fixed bacteria, and analysis of time series of bacteria images.

Responsibilities/duties

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

Undertake comprehensive and systematic literature reviews and write up the results for publication in peer-reviewed journals

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, and research groups

Actively participate in group meetings and journal club meetings

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

1. Hold (or be close to obtaining) a PhD in Physics, Biophysics, Computer Science, Computer Vision, Biomedical Engineering, or a related field

2. Experience in software development using Python and MATLAB, and ability to write clean, modular, user-accessible code

3. Experience in image analysis

4. Experience in time-series analysis

5. Managing and maintaining large data sets

6. Experience in machine-learning and deep-learning approaches for data analysis

7. Excellent communication skills, including the ability to write text that can be published, present data at conferences, and represent the research group at meetings

8. Publications in peer-reviewed journals and experience in preparing scientific articles and reports.

9. Ability to work in a multi-disciplinary environment

10. Fit to the host research group (Kapanidis lab)

Desirable

1. Familiarity with biological systems or applications

2. Experience with parallelized data analysis
3. Experience in LabVIEW programming, especially in hardware control and integration in microscopy.
4. Experience in bacterial or cell imaging, and/or protein-DNA/RNA interactions
5. Experience in fluorescence microscopy
6. Some experience of experimental work.
7. Experience in maintaining code libraries with Git
8. Ability to supervise graduate and senior undergraduate students

The University's policy on retirement

The University operates an employer justified retirement age for all academic and academic-related posts (any grade above grade 5), 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 outlined at:
www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revproc/

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. All applicants must read the candidate notes on the University's pre-employment screening procedures, found at:

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

Working at the University of Oxford

For further information about working at Oxford, please see:

www.ox.ac.uk/about_the_university/jobs/research/

www.ox.ac.uk/about_the_university/jobs/professionalandmanagement/

www.ox.ac.uk/about_the_university/jobs/supportandtechnical/

How to apply

If you consider that you meet the selection criteria, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a user. You will then be required to complete a number of screens with your application details, relating to your skills and experience. When prompted, please provide details of two referees and indicate

whether we can contact them at this stage. You will also be required to upload a CV and supporting statement which explains how you meet the selection criteria for the post. Please upload all documents **as PDF files** with your name and the document type in the filename. The supporting statement should explain your relevant experience which may have been gained in employment, education, or you may have taken time away from these activities in order to raise a family, care for a dependant, or travel for example. Your application will be judged solely on the basis of how you demonstrate that that you meet the selection criteria outlined above and we are happy to consider evidence of transferable skills or experience which you may have gained outside the context of paid employment or education.

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 owing to the fact that he or she has 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 e-mail it to the contact address on the advert if the application form used for the vacancy does not allow attachments)
- explain in your supporting statement how you meet the selection criteria for the post.

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.