

Job Description and Selection Criteria

Job title	Postdoctoral Research Assistant in Photometric Redshift Estimation and Weak Lensing Measurement for Euclid
Division	Mathematical Physical and Life Sciences
Department	Physics
Location	Denys Wilkinson Building
Grade and salary	Grade 7: £31,604 - £38,833 per annum
Hours	Full time
Contract type	Fixed-term for 24 months
Reporting to	Prof. Matt Jarvis and Prof. Lance Miller
Vacancy reference	132220
Additional information	Closing date – midday (UK time) on 19 th January 2018

Research topic	Cosmology measurement
Principal Investigator / supervisor	Prof. Matt Jarvis & Prof. Lance Miller
Project team	
Project web site	www.ox.ac.uk/
Funding partner	The funds supporting this research project are provided by the UK Space Agency, the Beecroft Fellowships Program and the Hintze Centre for Astrophysical Surveys.
Recent publications	



The role

Oxford astrophysicists play a leading role in future surveys spanning optical, near-infrared and radio wavelengths leading up to the LSST, Euclid, SKA & the EELT. Particular roles and interests within the Euclid and LSST projects are the development of Point Spread Function (PSF) modelling, measurement of the weak lensing signal and estimation of spectral energy distributions (SEDs) and photometric redshifts (photo-z) from ancillary data. The aim of this post is to bring together these areas in order to ensure the best results from the weak lensing analyses. Specifically, the post holder will investigate the optimal approach to estimating SEDs and photo-z, accounting for photometric redshift uncertainties, and the propagation of uncertainties and biases on both photo-z and PSF estimation into the weak lensing analyses.

Candidates will be expected to collaborate with other members of the Euclid Consortium and LSST Dark Energy Science Collaboration and with faculty, postdoctoral and graduate student members of the Department of Physics.

Candidates should address questions to Professor Matt Jarvis and Professor Lance Miller.

Responsibilities

- Investigate and develop measurement and analysis methods in the scientific area specified above, aiming to meet the requirements of the Euclid mission
- 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 research methodologies and contribute ideas for new research directions
- Collaborate in the preparation of research publications
- Present papers at conferences
- Take part in collaborative discussion with other members of the group and of the Euclid Consortium and LSST DESC on methodologies and procedures
- Take part in regular teleconferences and discussions with the Science Working Groups and Organisational Units of the Euclid Consortium and LSST DESC
- 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, particularly within the Euclid Consortium and LSST DESC.

Selection criteria

Essential

- Hold or be close to obtaining a relevant PhD/DPhil, together with relevant experience
- Possess sufficient specialist knowledge in the discipline to work within established research programmes
- Ability to manage own academic research and associated activities
- Previous experience of contributing to publications/presentations
- Ability to contribute ideas for new research projects and research income generation
- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings and teleconferences

Desirable

- Experience of independently managing a discrete area of a research project
- Experience of actively collaborating in the development of research articles for publication
- Experience in the field of Bayesian methods, weak lensing measurement for cosmology and/or photometric redshift techniques

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

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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/>

Astrophysics Sub-department

The post-holder will be based in the Astrophysics 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 Head of Astrophysics is Professor Steven Balbus. The sub-department consists of approximately 25 tenured research staff, 40 research fellows and associates, 45 graduate student and 5 support staff. In addition, we have a significant number of visiting academics and students. The sub-department hosts the Oxford Centre for Astrophysical Surveys (OCAS) funded through a generous donation from the Hintze Family Charitable Foundation. The sub-department also hosts the Beecroft Centre for Particle Astrophysics and Cosmology and funds a rolling program of Beecroft fellowships. We are also members of the Large Synoptic Survey Telescope (LSST) Corporation, in addition to participating through the Science and Technology Facilities Council (STFC) LSST UK collaboration, and are involved in preparations for ESA's Euclid mission (see below).

The Sub-Department is situated in the Denys Wilkinson Building, close to the centre of Oxford and the extensive University Parks. The site has excellent teaching and workshop facilities and a canteen on-site. Research is conducted into instrumental, observational, computational and theoretical astrophysics, and is supported by grants from a wide range of sources including STFC, the UK Space Agency, the European Research Council, the Leverhulme Trust and the Royal Society.

The observational astrophysics and cosmology programme at Oxford spans a wide range of topics including cosmology, galaxy formation and evolution, the evolution of atomic and molecular gas, stellar dynamics and populations, high-redshift galaxies, the epoch of reionization, dark matter, and the physics of active galaxies and exotic objects. It also covers aspects of jet physics, pulsars, star formation and the interstellar medium and a growing activity in exoplanet research.

Theoretical research groups study a range of topics including stellar evolution, cosmology, galaxy formation and evolution, dark matter, dark energy and gravitation. Data from a range of ground-based and satellite observatories are interpreted with simulations and increasingly realistic and complex models, and the development of novel techniques and approaches.

We have an instrumentation programme to develop and construct innovative instruments for astronomical research. A number of visible, infrared and radio instruments have been deployed on telescopes, and design work is underway for the next generation of instruments, including systems for the proposed European Extremely Large Telescope (we host the PI for HARMONI) and the Square Kilometre Array radio telescope.

The European Space Agency's Euclid mission, the LSST and related research at Oxford

Euclid is an M-class mission of the European Space Agency (ESA), due to launch in 2021. It is a cosmology experiment designed to measure the large scale structure of the Universe with exquisite accuracy. There are two main experiments on board: one is to carry out a redshift survey of distant galaxies; the other is to make a galaxy weak lensing survey. Together they will probe the distribution of matter in the Universe, the evolution of cosmic structure, the relationship between dark and luminous matter, test the applicability of general relativity on cosmological scales and, within the framework of standard cosmological models, provide measurements of cosmological parameters, including the dark energy equation of state and its possible evolution, to unprecedented accuracy. The scientific analysis is being carried out by a consortium of around 1300 European and US astronomers. For more information on the Euclid Consortium and on the mission see the [Consortium pages](http://www.euclid-ec.org) <http://www.euclid-ec.org> and the [ESA mission pages](http://sci.esa.int/euclid) <http://sci.esa.int/euclid>

The Euclid telescope has two imaging systems: a very broad band optical system (VIS) for making the weak lensing galaxy shape measurements; and an infrared channel for galaxy photometry and the grism slitless spectroscopic survey. Development work for Euclid at Oxford is being led by Professor Matt Jarvis, working on photometric redshifts, and Professor Lance Miller, working on weak lensing shear measurement and Point Spread Function (PSF) modelling. The successful applicant would be expected to work with Professors Jarvis and Miller and co-workers, and also with other groups across the Euclid consortium, on the next stages of development and testing. This role is fundamental to the success of the mission and the tasks of photometric redshift and SED estimation, PSF modelling and shear measurement carry a high weight within the consortium. The successful applicant would also have the opportunity to become involved in weak lensing shear measurement and other aspects of the mission, either technical or related to the astrophysics and cosmology goals of Euclid, and would be expected to become a member of the Euclid Consortium.

Oxford Astrophysics is a member of the LSST Corporation and there are a number of faculty and postdoctoral members of the Dark Energy Science Collaboration (<http://lsst-desc.org/>). Work towards LSST includes: detector characterization within the Particle Physics sub-department, led by Prof Ian Shipsey; photometric redshift estimation (Prof Matt Jarvis); PSF modelling and weak lensing shear measurement (Prof Lance Miller); as well as transients detection. Postdoctoral researchers within Oxford Astrophysics are involved in developing the DESC cosmology analysis and have a significant role in developing the DESC Core Cosmology Library as well as taking part in the organization and management of DESC.

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 also 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 (EJRA) for all academic posts and some academic-related posts. From 1 October 2017, the University has adopted an EJRA of 30 September before the 69th birthday for all academic and academic-related staff in posts at grade 8 and above. 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/

From 1 October 2017, there is no normal or fixed age at which staff in posts at **grades 1–7** 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

University Club and sports facilities

The University Club provides social, sporting and hospitality facilities. It incorporates a bar, café and sporting facilities, including a gym. 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 www.sport.ox.ac.uk/oxford-university-sports-facilities.

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

If you are relocating to Oxfordshire from overseas, or elsewhere in the UK, the University's International Staff website includes practical information related to moving to and settling in Oxford such as advice on immigration, relocation, accommodation, or registering with a doctor. See: www.internationalstaffwelcome.admin.ox.ac.uk/

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 to settle into Oxford and to provide them with an opportunity to meet people in the area. See www.newcomers.ox.ac.uk/

Childcare

The University has excellent childcare services with 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 www.admin.ox.ac.uk/childcare.

Family-friendly benefits

The University subscribes to My Family Care (www.admin.ox.ac.uk/personnel/staffinfo/benefits/family/mfc/) and staff are eligible to register for emergency back-up childcare and adultcare services, a 'speak to an expert' phone line and a wide range of guides and webinars through a website called the Work + Family space.

Disabled staff

We are committed to supporting members of staff with disabilities or long-term health conditions. Please visit www.admin.ox.ac.uk/eop/disab/staff for further details including information about how to make contact, in confidence, with the University's Staff Disability Advisor.

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 www.admin.ox.ac.uk/eop/inpractice/networks/

Other benefits

Staff can enjoy a range of other benefits such as free visitor access to the University's colleges and the Botanic Gardens as well as a range of discounts. See www.admin.ox.ac.uk/personnel/staffinfo/benefits