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

UNIVERSITY OF OXFORD

Job description and selection criteria

Job title	HARMONI Spectrograph AIT Engineer
Division	Mathematical, Physical and Life Sciences Division
Department	Department of Physics
Location	Denys Wilkinson Building, sub-dept of Astrophysics
Grade and salary	Grade 8: £45,585 - £54,395 p.a.
Hours	Full time
Contract type	Fixed-term for 3 yrs (with a possible extension of 3 more years)
Reporting to	Prof. Niranjan Thatte
Vacancy reference	170735
Additional information	Closing date: 12:00 midday on 4 March 2024 The dept. will help with costs for the visa, relocation and health charges

Background

The European Southern Observatory's Extremely Large Telescope (ESO ELT) will be the world's largest visible/infrared telescope (https://elt.eso.org/). With a primary mirror diameter of 39 m, it will have nearly as much light collecting area as all the world's telescopes built to date, combined. HARMONI is the first light spectrograph for the ELT, providing visible and near-infrared integral field spectroscopy, assisted by laser star and natural star adaptive optics. The HARMONI consortium consists of partner institutes in the UK, France and Spain, and the design and development of the instrument is jointly led by the University of Oxford and the UK Astronomy Technology Centre, Edinburgh. The project preliminary design phase kicked-off in Oct 2015, the Preliminary Design Review was held in Nov/Dec 2017. The project is now undergoing Final Design Review (FDR), with first light of the ELT foreseen in late 2027.

HARMONI will provide medium resolution (R $\equiv\lambda/\Delta\lambda$ of 3000 to 17000) spectra of every point in a ~150 $\times$ 200 spatial pixel field of view. This integral field spectroscopic capability, combined with the exquisite spatial resolution provided by the ELT (coupled with HARMONI's laser tomographic adaptive optics), will allow HARMONI to play a transformational role in observational astrophysics. HARMONI's science covers a wide range of astrophysical programmes, ranging from observations of solar system bodies and extra-solar planets, to

Athena SWAN Silver Award

understanding the formation and evolution of galaxies at the earliest epochs in the history of the Universe.

Oxford's leadership role in building the HARMONI integral field spectrograph (IFS) involves a number of key project posts, that of Principal Investigator (Prof. Niranjan Thatte), Lead Instrument Scientist (Dr. Fraser Clarke), Instrument Scientist for the Integral Field Spectrograph System (Dr. Matthias Tecza) and Project Administrator (Vanessa Ferraro-Wood).
Oxford is also responsible for the spectrograph Work Package – namely the design, fabrication, assembly and cryogenic testing of four spectrograph units providing visible and near-infrared long slit spectroscopy covering the 0.47-2.45 micrometre range. A team of researchers, engineers, technicians and D.Phil. students contribute to the design and development of the spectrograph units, led by an "Institute Project Manager" (Zeynep Ozer) and the "Spectrograph Technical Lead (Edgar Castillo). The Rutherford Appleton Laboratory of STFC (RAL-Space) are associate partners, assisting with the spectrograph WP.

The role

We are seeking an experienced instrumentation engineer/scientist to fulfil the role of Assembly, Integration and Test Lead for the Spectrograph work package. You will provide co-ordination, and guidance to the spectrograph technical team.

You will be responsible for ensuring technical compliance with the module, units, assemblies, sub-assemblies and component requirements throughout the Manufacturing, Assembly, Integration and Test (MAIT) phase. The final step is the delivery of the fully tested spectrograph assemblies to UKATC, Edinburgh, integrated with the detector assemblies (supplied by ESO) for installation in the integral field spectrograph (IFS) cryostat.

The ideal candidate will be capable of combining formal project reporting/monitoring duties with hands-on expertise in the laboratory, and be able to ensure all aspects of the modules with mechanisms function together as a coherent unit.

The spectrograph subsystem is a complex opto-mechanical assembly, composed of several modules: (i) collimator, (ii) articulated fold mirrors, (iii) a grating wheel allowing grating exchange, and (iv) camera modules for near-IR and visible wavelengths, all modules held in place by the (v) Spectrograph Mechanical Structure. Detector arrays located in the spectrograph's focal plane are provided by ESO.

Once integrated, spectrographs will be tested in the cryogenic operating environment at 130 K (near-IR detectors are operated colder, at 40 K) at Oxford. All optical elements are procured as custom items from specialist optics manufacturers worldwide, with their assembly, integration, alignment and performance verification at cryo temperatures being carried out in-house by the spectrograph team. Our laboratories are equipped with specialist infrastructure and metrology equipment. Four spectrograph units are to be manufactured, assembled and tested, each roughly 2.2m × 1m × 1m, weighing ~500 kg. Testing and performance verification will be carried out at module level (collimator, grating wheel, cameras), and then for the entire spectrograph, prior to its integration into the next larger assembly (IFS cryostat).

This is an exciting opportunity to join an international collaboration that will provide the work-horse spectrograph for the world's largest telescope at first light. The role is for the entire remaining duration of the work package at Oxford, although current funding limits the initial appointment to 3 years. (a renewal of funding by UKRI, including for this role, is fully expected) Beyond HARMONI, there are likely to be opportunities to work with other ground and space-based instrumentation projects.

The appointment is at Grade 8, but consideration will be given to underfill the post at Grade 7 with the appropriate adjustment in duties, based on amount of experience and degree qualification level.

You will be part of a vibrant spectrograph team at Oxford, including the Spectrograph Project Manager; the Spectrograph Technical Lead, optical lead engineer, and mechanical engineers; Instrument systems engineers, the HARMONI instrument scientist and the HARMONI Project administrator. Mechanical, cryogenics and electronics technicians from the Physics department central resources will also be involved in the assembly, integration and test. In addition, there is assistance available from specialist services in the Oxford Physics department (e.g., Finance) and the University administration (e.g., tendering, contracts, VAT / duties). You will be responsible for leading the technical efforts of the team to Assemble, Integrate and Test the four spectrographs for HARMONI. You will report to the Spectrograph Technical lead and the Institute Project Manager, and will assist them with the writing and collating of technical documentation, as appropriate.

Responsibilities

This is a research role. In this position, you will have the following specific responsibilities:

- During the phase prior to the AIT, provide technical leadership on the prototyping to the Spectrograph Team, co-ordinating and guiding their activities in the prototypes definition, design, assembly, integration, testing, execution of the final tests and reporting the results.
- Provide technical leadership of the AIT activities to the Spectrograph Team, co-ordinating and guiding their activities in the tests definition, design, assembly, integration, execution of the tests and reporting the results.
- Create the AIT detailed procedures for the Spectrographs, also the related forms and documents to maintain the configuration management.
- Provide assistance to the Technical Lead in the planning of the prototyping activities according to the project priorities.
- Supervise the daily activities of the dedicated technicians, while they are supporting prototype development or any of the other planned activities.
- Maintain regular inspections of all the HARMONI labs, to be sure they are in suitable condition for the execution of the diverse test activities.
- Prepare the information and/or report the prototyping activities in diverse meetings as the group bi-weekly meeting, spectrograph progress meeting or ESO progress meetings and reviews.

Selection Criteria

Essential

- Professional degree at Masters level or above in Physics / Engineering, and at least 3 years of post-qualification experience actively engaged with designing, building and commissioning cryogenic instruments. (The appointment level will be tailored to the experience and qualification level)
- Experience developing prototypes or increasing the maturity level (TRL) of relevant technology
- Experience in two or more of (a) manufacture, (b) assembly, (c) integration and (d) testing of a major instrumentation project at visible or near-infrared wavelengths.
- Experience working in a cleanroom environment
- Ability to be part of a specialised engineering team, and to work collaboratively.

- Demonstrated prowess in writing research papers or technical reports, and making presentations to an international audience.

Desirable

The following criteria would be beneficial, as they represent specific areas likely to be encountered in this position. They are not however essential or expected from the candidate.

- Experience in optical testing and performance validation.
- Knowledge of systems engineering practices relevant to astronomical instrumentation, either via course-work or hands-on experience
- Experience assembling and testing optomechanical assemblies with stringent tolerance requirements
- Experience developing or assisting in the development of techniques for alignment of cryogenic optical systems and their performance evaluation.
- Knowledge of programming for lab equipment control
- Demonstrated abilities of data analysis / scientific computing.

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/.

If following interview, it is evident that there is in-sufficient knowledge or experience of a candidate to achieve the essential and desired criteria an offer of lower grade and so pay scale may be made (Grade 7 £32,817 - £40,322 p.a.).

Hazard-specific / Safety-critical duties

This job is generally office based, requiring DSE assessment. The post holder will frequently be required to work in a laboratory (incl. work with lasers at visible and near-infrared wavelengths) and will therefore need to be conversant with the relevant safety procedures and standards operating in that area. They will be required to attend relevant safety training offered by the University for lasers, cryogenic equipment, etc.

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 2016/17 exceeded £564m 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.

The University employs over 10,000 staff and has a student population of over 22,000. Most staff are directly appointed and managed by one of the University's 130 departments or other units within a highly devolved operational structure - this includes over 6,500 'academic-related' staff (postgraduate research, computing, senior library, and administrative staff) and over 2,700 'support' staff (including clerical, library, technical, and manual staff). There are also over 1,600 academic staff (professors, readers, lecturers), whose appointments are in the main overseen by a combination of broader divisional and local faculty board/departmental structures. Academics are generally all also employed by one of the 38 constituent colleges of the University as well as by the central University itself. 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.

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

Astrophysics

The post-holder will be based in the sub-department of Astrophysics, which is one of 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. Central Physics provides administrative and technical support to these sub-departments. The department also provides state-of-the-art facilities, including mechanical and electronics workshops, an engineers' group, helium liquefier, thin-film coating plant, photo-fabrication facilities, clean rooms, nano-fabrication facilties and many specialised research laboratories. 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.

Astrophysics Instrumentation is a vibrant group with major stakes in two very large projects, the ELT and the SKA. In addition, we also play a leadership role in the WEAVE spectrograph for the WHT. We have a world-renowned group in Terahertz detectors, and significant involvement in the CTA. We are also involved in the R&D for the ELT exoplanet instrument, PCS.

We have a leadership role in the HARMONI instrument, with a large team (~14) of motivated people including scientists, engineers and D.Phil students. Past successes of Astrophysics instrumentation include the KMOS and FMOS multi-object spectrographs, the SWIFT integral field spectrographs in the visible / near-infrared, and several CMB experiments at microwave frequencies.

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

Before submitting an application, you may find it helpful to read the 'Tips on applying for a job at the University of Oxford' document, at www.ox.ac.uk/about/jobs/supportandtechnical/.

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 at least two (preferably three) professional referees and ask them to send letters of reference directly to vanessa.ferraro-wood@physics.ox.ac.uk by the closing date of this advert. Reference letters will be acknowledged.

You will also 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). 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

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: www.admin.ox.ac.uk/councilsec/compliance/gdpr/privacynotices/job/. The University's Policy on Data Protection is available at: www.admin.ox.ac.uk/councilsec/compliance/gdpr/universitypolicyondataprotection/.

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