

Job Description and Selection Criteria

Job title	Silicon Detector Development Engineer
Division	Mathematical Physical and Life Sciences
Department	Department of Physics
Location	Denys Wilkinson Building, Oxford
Grade and salary	Grade 10: £55,750 - £64,605 per annum
Hours	Full time
Contract type	Permanent
Reporting to	Ian Shipsey and Daniela Bortoletto Professors of Experimental Physics
Vacancy reference	143281
Additional information	Closing Date: 06 November 2019 – midday (UK time)

Research topic	Silicon Detector Development Engineer for particle physics
Principal Investigator / supervisor	Professors Ian Shipsey and Daniela Bortoletto
Project team	
Project web site	https://www2.physics.ox.ac.uk/research/atlas/our-research-activities/advanced-sensor-development
Funding partner	The funds supporting this research project are provided by the Department of Physics and the STFC
Recent publications	



The role

Oxford Physics has a tradition of excellence in instrumentation. The Oxford Physics Microstructure Detector Lab (OPMD) facilitates the design and development of new microstructure detectors, especially pixel semiconductor detectors, for upgrades to ATLAS for the High Luminosity Large Hadron Collider, International Linear Collider, CLIC. Future Energy Frontier Circular Colliders and other future high priority international projects in particle physics. Other projects include the construction of the silicon tracker for Mu3e at PSI, the development of sensor arrays for photon science at FELs and synchrotrons, the characterization of CCDs for astrophysics (LSST), and additionally sensors and arrays for applications to other disciplines both at Oxford and more broadly in the UK and internationally.

The post holder will lead the Oxford effort in the mechanical design of new silicon microstructure detectors, and manage their prototyping and assembly and test in OPMD. This will entail intellectual leadership in the design and development of all mechanical and thermal aspects of customized solid state microelectronic sensor modules and detectors constructed from arrays of modules, developing and supervising the development of CAD models with full mechanical and thermal FEA and the development and modelling of the associated assembly sequence, and implementation and execution of the assembly sequence in OPMD. The post holder will lead multi-university consortia engaged in the design and construction of silicon detectors for large global international scientific collaborations that will be enabled by OPMD. The preparation of technical reports, oral presentations of results and reports at meetings and conferences, and the publication of results in peer-reviewed journals are an essential part of the responsibilities for this position. The post holder will play a leading role in managing the OPMD facility. The supervision duties of the post holder will evolve with the course of the research and will include OPMD staff and postdoctoral researchers, and often include supervision of staff from the Physics Department service groups including mechanical and electrical engineers and technicians when they working on OPMD projects.

Responsibilities/duties

- Developing the mechanical and thermal design of customized solid state microelectronic sensor modules, and detectors composed of arrays of sensor modules, for particle physics and astrophysics, and other fields of science
 - i. Developing highly-detailed CAD models with full mechanical and thermal FEA meeting the challenges of very low mass support structures and integrated cooling for thermal management that meet micron level positional accuracy and stability requirements. The scope of the models will include the overall high precision module assembly sequence and the high precision detector assembly sequence.
 - ii. Supervising mechanical engineers developing CAD models for each aspect of the module design and the detector design and for each stage of the module assembly and detector assembly sequence
 - iii. Designing the prototyping strategy for the various assembly sequences for modules and detectors and their analysis and refinement
 - iv. Supervising staff prototyping these assembly sequences in the laboratory
- Preparation of detailed technical reports and drawings, oral presentations to physicists and engineers within large global scientific collaborations and at international conferences, and co-development of scientific proposals to funding agencies and the EU.

- Leading and supervisory roles in multi-university consortia engaged in the design and construction of silicon detectors for large global international scientific collaborations.
- Management of OPMD. This will include:
 - i. Overseeing OPMD which consists of 140 m² of Class 10000 and 20 m² of Class 100 of fully equipped clean room space
 - ii. Ensuring the cleanroom metrics are maintained
 - iii. Identifying across the market and procuring future equipment via the tendering process with the PIs.
- Establishing process flows for existing and new assembly processes. This will include:
 - i. Having complete understanding of the facilities capabilities and capacity
 - ii. Extending capabilities in the future as appropriate
 - iii. Ensuring the Quality, ESD and cleanliness of OPMD and the product flow is maintained across its operations
 - iv. Ensuring compliance with safety regulations
- The day to day management of OPMD, including:
 - i. Scheduling of work
 - ii. Managing the split of work between Research and Development and production activities
 - iii. Developing strategic partnerships with other laboratories and industrial suppliers
- Surveying future opportunities and needs of OPMD
 - i. Working with the PIs to plan forward the operations of the facility
 - ii. Work with Department Management to develop plans for future investment in the facility
 - iii. Planning the facilities strategic fit with other institutes and capabilities elsewhere in the UK and internationally

Place of Work

The normal place of work will be within the Physics Department in Oxford; some travel and work away from Oxford may be required, normally not more than a total of 8 weeks in any one year.

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

This job includes the following hazard which will require successful pre-employment health screening through our Occupational Health Service before the successful candidate will be allowed to undertake them:

- Travel other than in Europe or North America on University Business

Selection criteria

Essential

- Applicants should hold a Ph. D. in experimental particle physics or a degree in physics, mechanical engineering or related subjects and extensive experience in the mechanical and thermal aspects of the design and development of silicon detectors for particle physics.
- Established international authority in the design-prototype cycle involved in silicon module design and assembly and detector design and assembly for particle physics and astrophysics and extensive experience supervising in all of these areas.
- Established record of supervisory roles in multi-university consortia engaged in the design and construction of silicon detectors for large global international scientific collaborations
- Extensive familiarity designing and building modules and arrays using novel thermal interface materials, active and passive cooling including two phase cooling, and ultra-low mass materials
- Comprehensive experience in CAD and mechanical and thermal FEA, with composite layout, rapid prototyping, programming and operation of coordinate measuring machines in contact and optical modes, the design and development of programs for, and the use of, automated gantry module assembly, optical pattern recognition, custom mechanical fixturing, including vacuum fixturing, contact and non-contact metrology, cryogenic systems, vacuum systems, high vacuum dewars, residual gas analysers, gas systems, beam test apparatus, design and execution of beam tests
- Considerable practice in the preparation of detailed technical drawings and reports, and oral presentations at conferences and to collaboration members.
- Provide evidence of an established international publication record

Desirable

- Experience of probe station operation, operation of manual and semi-automated wedge, ball and ribbon bonders, flip chip bonding, encapsulation, dicing
- Experience of leading research programmes, including setting the strategic direction
- Experience of providing specialist advice to external industry, universities, or research councils

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.

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: <https://www2.physics.ox.ac.uk/>

PP Sub-department

The post-holder will be based in the Particle 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.

The Oxford particle physics group is the largest university-based group in the UK, with 30 permanent academics; about 30 temporary academics, fellows and post-docs; 70 graduate students and 30 support staff. It is housed in the Denys Wilkinson Building with excellent electronics and mechanical workshops. Our research programme covers experiments at accelerators as well as in particle astrophysics. We are currently involved in the ATLAS and LHCb experiments at the LHC in both analysis of current data and preparation for detector upgrades. Other activities include the measurement of neutrino oscillations with the T2K experiment, the preparation of HyperK and LBNF including a program of R&D towards large liquid Argon TPCs, the Mu3e experiment searching for the lepton-flavour violating decay of a muon, the SNO+ experiment to measure solar neutrinos and search for neutrinoless double beta decay, and preparations for the LUX-ZEPLIN dark matter search and dark energy science with the Large Synoptic Survey Telescope. Research in accelerator physics is carried out within the John Adams Institute, including projects for future linear colliders, light sources and laser plasma acceleration, the MICE demonstration of muon cooling, and applications of accelerators to cancer therapy.

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

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 three referees. You will also be required to upload a Curriculum Vitae and Supporting Statement **as PDF files** with your name and the document type in the filename. The supporting statement should demonstrate how you meet 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).

Applicants should **ask the referees to send their letters of reference directly to Mrs Sue Geddes**

Denys Wilkinson Building
Keble Road
Oxford, OX1 3RH
United Kingdom
Fax: (01865) 273417

E-mail: sue.geddes@physics.ox.ac.uk **by the closing date** (a letter by e-mail is sufficient). Not more than one of the three referees should be from the same institution and one should consider the selection criteria in the further particulars when writing their letters of reference, and to mark their letters "strictly confidential" if they do not wish the applicant to have automatic right of access.

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/](http://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 receive an automated email from our e-recruitment system 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/.

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/acrelretire8+/.

For **existing** employees, any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8+/.

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

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 www.admin.ox.ac.uk/personnel/staffinfo/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 www.sport.ox.ac.uk/oxford-university-sports-facilities.

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 www.welcome.ox.ac.uk. There is also a visa loan scheme to cover the costs of UK visa applications for staff and their dependents. See www.admin.ox.ac.uk/personnel/permits/reimburse&loanscheme/.

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 My Family Care, 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 www.admin.ox.ac.uk/personnel/staffinfo/benefits/family/mfc/.

Childcare

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 www.admin.ox.ac.uk/childcare/.

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 www.admin.ox.ac.uk/eop/disab/staff.

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/.

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.