

# MBE Growth Scientist

## Department of Physics

Closing date: 13<sup>th</sup> October 2024  
Job Reference: KA43224



## MBE Growth Scientist

**Salary:**

£33,966 – £44,263 (Grade 7)

**Contract:**

Permanent

**Location:**

West Cambridge

**Faculty / Department:**

Physics

**Responsible to:**

Cleanroom Manager

**Working Pattern:**

Full Time

**Purpose of the role**

The Cavendish MBE growth facility's primary focus is III-V arsenide-based materials across a wide range of applications including ultra high mobility two dimensional electron gases, epitaxial quantum dots for quantum light sources, and GaAs-on-2D materials growth. The two arsenide MBE machines are complemented by a twin-chamber MBE system for topological insulators (Bi-Sb-Te), Weyl semi-metals (MoTe<sub>2</sub>), ferromagnetic and antiferromagnetic Mn alloys, which together deliver material to support fundamental research, R&D and small-scale production.

The role holder will undertake the growth of a wide range of semiconductor structures on these systems, and will be required to liaise with facility customers; both academic and industrial. They will utilise specialist knowledge to provide significant technical advice on wafer design and sample growth as required.

The role holder will also conduct basic characterisation of the grown materials using electrical, optical, x-ray diffraction and microscopy techniques as appropriate. They will be able to conduct structured trials and small-scale research work to develop new device architectures, in collaboration with the rest of the team – and should have experience of doing so, with PhD level experience (or equivalent). They will schedule their work both independently and in cooperation with the facility manager according to the facility's needs.

They will cooperate with team members and staff to ensure efficient use of the equipment and fulfilment of academic needs, whilst also supporting the day to day operation and routine maintenance of the MBE growth facility. They will assist with the training staff and students on the use of the facility, and ensure all the health and safety forms and procedures are followed. The role holder will help with the set up and organisation of any required Nanofabrication facility activities, such as industrial or academic workshop and outreach activities. Occasional UK and worldwide travel may be required.

**Key responsibilities**

- 1 Develop wafer growth methods and techniques to support the effective delivery of bespoke wafers to requestors including research groups and national facility users / customers. Review journals, other publications and attend relevant scientific meetings with peers to identify new techniques and methods for introduction to the facility. Contribute to peer reviewed publications and presentations.



**Key responsibilities continued**

- 2 Management of technical resources within the facility. Operate and maintain the molecular beam epitaxy systems in the MBE cleanrooms, for the growth of III-V semiconductors, upgrade equipment as required in response to changing requirements and advances in technology in order to further develop MBE and nanofabrication facility capabilities as a whole Lead in the assessment of equipment failures, quality assurance of equipment bought in and made in house.  
  
Routine inspection and maintenance of equipment, testing and tuning of the instruments to keep them operating at or above manufacturers specification.
- 3 Characterise MBE grown wafers using electrical, optical, x-ray and other inspection and metrology techniques to assess and confirm material and device properties. Analyse experimental data and interpret results in order to contribute to scientific understanding. Use results to make changes to experimental equipment and methods. Provide advice to research groups and facility users on analytical strategy and data interpretation.
- 4 Contribute to planning of joint research projects. Interact with users of MBE materials to discuss their requirements and to help plan and design wafer structures and growth campaigns. Discuss objectives and progress of various research projects, provide critical and constructive comments during meetings and 1:1 interaction with research staff, raise any concerns about scientific results or research conducted as necessary.
- 5 Act as Safety officer responsible for ensuring safe operation of equipment/apparatus. Review and draw up risk assessments for processes, document safety procedures, advise staff, research students and others when new safety procedures are developed, advise the department and wider division on safety considerations on experiments undertaken, represent the research group(s) in safety committee meetings.
- 6 Responsibility for training and induction of new research and technical staff, visitors and students, including, ensure that staff, visitors and students are properly and safely trained in core scientific services offered by the laboratory, train users in the use of instruments/apparatus, provide training in research techniques and methodologies to staff.
- 7 Responsible for the specification and supply of chemicals/ consumables and equipment, agree joint purchasing with their manager/ research group. Provide input into the purchase of high value equipment for the facility.
- 8 Shared responsibility for the organisation of local computing facilities for the group in collaboration with the computer officer. Give specification on use of computers and software appropriate for equipment control, data acquisition and analysis. Responsible for maintenance of group website, decide on layout, update technical information as required, liaise with academic staff to ensure content reflects group priorities.

# Person Specification

Criteria	Essential	Desirable
<p><b>Qualifications</b></p> <ul style="list-style-type: none"> <li>Degree or equivalent experience in physics, engineering or a related discipline.</li> <li>A PhD in Physics, Materials Science or Engineering</li> </ul>	<p>E</p> <p>E</p>	
<p><b>Experience</b></p> <ul style="list-style-type: none"> <li>Experience in the operation of MBE or MOCVD systems for the growth of III-V semiconductor material</li> <li>Experience of maintenance and development of MBE systems</li> <li>Experience of developing growth recipes and conducting research / device development projects to realise new device architectures and to optimise existing ones.</li> <li>Experience of dealing with a variety of research projects and communicating research results to a wide variety of audiences</li> <li>Experience of implementing health and safety requirements within a research environment</li> <li>Knowledge of and experience in the characterisation of III-V semiconductor materials and devices using electrical, optical x-ray and other metrology techniques</li> </ul>	<p>E</p> <p>E</p> <p>E</p> <p>E</p> <p>E</p> <p>E</p>	
<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Sufficient care and dexterity to work with small and delicate scientific apparatus.</li> <li>High degree of precision and accuracy</li> <li>Excellent communication skills</li> <li>Excellent organisational skills</li> <li>Ability to work independently and also within a large team</li> <li>Demonstrated problem solving skills</li> <li>Experience of teaching / training others in the use of complicated scientific apparatus and providing routine guidance</li> </ul>	<p>E</p> <p>E</p> <p>E</p> <p>E</p> <p>E</p> <p>E</p>	<p>Highly desirable</p>
<p><b>Additional requirements</b></p> <ul style="list-style-type: none"> <li>Experience of software packages such as AutoCAD, Origin, LabView, Matlab, Mathematica.</li> </ul>		<p>Highly desirable</p>

# Behavioural Attributes

This section summarises the behavioural attributes (or competencies) that we expect the role holder to be able to demonstrate, at what level and whether this is an essential or desirable requirement.

Full definitions are at: <https://www.hr.admin.cam.ac.uk/policies-procedures/behavioural-attributes>

Please review these and provide specific examples in your application of how you have demonstrated these attributes in your work, education or other experience. It will assist your application if you explain the situation, what you did and what the outcomes were.

Attribute	Level
Valuing Diversity	A
Achieving Results	B
Communication	C
Innovation and Change	C
Negotiating and Influencing	C
People Development	C
Relationship Building	B
Strategic Focus	C



# Department of Physics | Cavendish Laboratory



**James Clerk Maxwell as the first Cavendish Professor. It has a distinguished history of contribution to science.**

**32 Nobel prize winners have worked for considerable periods within the laboratory, and the Cavendish is associated with many notable discoveries, including the identification of the electron and neutron, the structure of DNA, and the discovery of pulsars.**

A new era is beginning for Physics at Cambridge, with construction work underway for a new purpose-built centre for world-leading research, replacing our current buildings which date from 1971. The new building, the Ray Dolby Centre, and our strategic plan, both represent a renaissance in the way we carry out physics research and achieve our research goals. The spirit of adventure and innovation will be fostered in the Cavendish tradition, but adapted to the new needs of frontier research.

### **About the Department**

At the heart of the new approach is a more flexible alignment of our research activities into research themes.

physics research.

See: <https://www.phy.cam.ac.uk/research>.

In addition to serving as a home for physics research at Cambridge, the new Cavendish Laboratory will be a top-class facility for the nation—much of the specialised research equipment in the new building will be made available to other institutions. The new facility has been designed to match the more exacting standards of current research, and to serve the educational needs of future generations of students much better than is possible at our existing site. Capacity for public events has also been incorporated into the design, so that our extensive programme of outreach work with schools, and with the general public, will continue to serve the local population well into the future. We are looking forward to moving into our new home in 2024.

### **Key information**

Currently the Department comprises about 55 academic staff, 200 postdoctoral researchers, and 300 graduate students.



Together with administrative and technical support staff and academic visitors, the Department hosts around 1000 people.

### Research themes

Research activities at the Cavendish span a wide range of physics.

There are seven strategic themes: Astrophysics, High Energy Physics, Biological and Biomedical Physics, Energy Materials, Emergent Quantum Phenomena, Assembly and Function of Complex Systems, and Quantum Devices and Measurements.

The themes encompass a growing range of research groupings: Astrophysics; Atomic, Mesoscopic and Optical Physics; Biological and Soft Systems; High Energy Physics; Microelectronics; Molecular Engineering; NanoPhotonics; Optoelectronics; Quantum Matter; Quantum Sensors; Scientific Computing; Semiconductor Physics; Surfaces, Microstructure and Fracture; Theory of Condensed Matter and Thin Film Magnetism.'

Information about the current research activities in these areas is available at: [www.phy.cam.ac.uk/research/](http://www.phy.cam.ac.uk/research/).

### Recent developments

The Department is engaged in a number of new inter- and cross-disciplinary research programmes.

In 2008 it established a new **Physics of Medicine** programme focusing on biological and biomedical applications of physics which is based in a purpose-built interdisciplinary centre on the Laboratory site. The **Battcock Centre for Experimental Astrophysics** opened in October 2013, adjacent to the **Kavli Institute for Cosmology** in Cambridge and to the main buildings of the Institute of Astronomy. This has enabled all Cambridge astronomers to be brought together in a single complex of buildings for the first time. The **Maxwell Centre**, designed to promote industrial collaboration, opened in April 2016.

### The future

The complete replacement of the main laboratory buildings which date from the 1970s, has been approved, and the Ray Dolby Centre is due to open in 2024/5, housing the majority of the laboratory's activities.

# The school

The School of the Physical Sciences is one of the six Schools in the University of Cambridge and comprises the following Departments:

- Applied Mathematics and Theoretical Physics (DAMTP)
- Chemistry
- Earth Sciences
- Geography (including the Scott Polar Research Institute)
- Institute of Astronomy
- Issac Newton Institute of Mathematical Sciences
- Materials Science and Metallurgy
- Physics (Cavendish Laboratory)
- Pure Mathematics and Mathematical Statistics (DPMMS)

The School is responsible for allocating core funds to departments and provides broad strategic focus across its constituent departments in a number of areas including; research activity, undergraduate and graduate education, estate needs, fundraising and human resources. As part of the University's annual planning cycle, the School prepares a financial and academic plan which sets out strategic objectives, determines budgets as well as the flow of resources to departments. The School manages a wide range of administrative activities and projects across its departments and works alongside other Schools to further interdisciplinary research.

The School has over 1500 members of staff, over 3000 students and an annual budget of over £100 million.

The Department is keen to promote support for staff with family commitments and a summary of some of the services on offer is at

[http://www.phy.cam.ac.uk/internal\\_resources/resources/families-at-the-cavendish-web.pdf](http://www.phy.cam.ac.uk/internal_resources/resources/families-at-the-cavendish-web.pdf)





# Terms of Appointment

## Tenure and probation

The position is permanent.

Appointments will be subject to satisfactory completion of a 6 months probationary period.

## Hours of Work and Working Pattern

The hours of work for the position are full-time working Monday – Friday. (37 hours).

## Pension

You will automatically be enrolled to become a member of USS (Universities Superannuation Scheme) – a hybrid pension scheme. For further information please visit: [www.pensions.admin.cam.ac.uk/](http://www.pensions.admin.cam.ac.uk/).

## Annual leave

Full time employees are entitled to annual paid leave of 41 days inclusive of public holidays. For new part-time employees, annual leave will be pro rata'd based on days worked.

## General information

### Pre-employment checks

### Right to work in the UK

We have a legal responsibility to ensure that you have the right to work in the UK before you can start working for us.

If you do not have the right to work in the UK already, any offer of employment we make to you will be conditional upon you gaining it.

**Health declaration** Once an offer of employment has been made the successful candidate will be required to complete a work health declaration form.

### Qualifications

The person specification for this position lists qualifications that are essential and/or desirable. Please note that if you are offered the post you will be asked to provide your relevant original certificates of these qualifications.

**References** - offers of appointment will be subject to the receipt of satisfactory references.

## Screening Checks

This role requires a security check. Any offer of employment we make to you will be conditional upon the satisfactory completion of this check; whether an outcome is satisfactory will be determined by the University.

## Information if you have a disability

The University welcomes applications from individuals with disabilities. We are committed to ensuring fair treatment throughout the recruitment process. We will make adjustments to enable applicants to compete to the best of their ability wherever it is reasonable to do so and, if successful, to assist them during their employment.

Information for disabled applicants is available at [http:// www.admin.cam.ac.uk/offices/hr/staff/disabled/](http://www.admin.cam.ac.uk/offices/hr/staff/disabled/)

We encourage you to declare any disability that you may have, and any reasonable adjustments that you may require, in the section provided for this purpose in the application form. This will enable us to accommodate your needs throughout the process as required. However, applicants and employees may declare a disability at any time.

If you prefer to discuss any special arrangements connected with a disability, please contact, the Department Administrator, who is responsible for recruitment to this position.

# The University

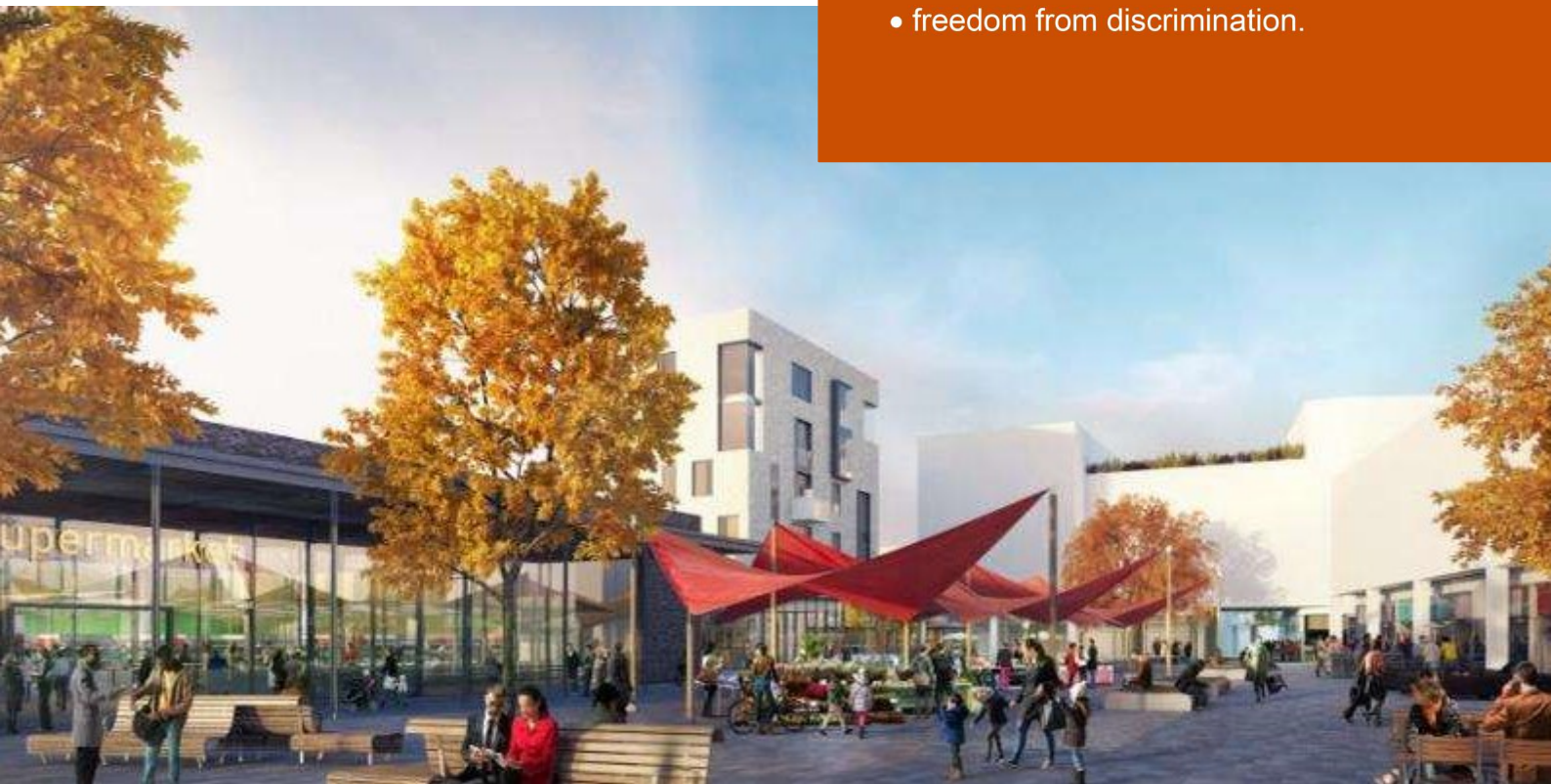
**The University of Cambridge is one of the world's oldest and most successful universities. We are a renowned centre for research, education, and scholarship that makes a significant contribution to society. The University is consistently ranked amongst the top universities in the world. Our affiliates have won more Nobel Prizes than any other University.**

Our sustained pursuit of academic excellence is built on a long history of first-class teaching and research within a distinctive collegiate system. For eight centuries our ideas and innovations have shaped the world. Our principal goal is to remain one of the world's leading universities in an increasingly competitive global higher education sector. Today the University of Cambridge is at the centre of a cluster of over 4,300 businesses employing 58,000 people.

Our capital investment projects include the West Cambridge site, the North West Cambridge development and the growth of the Biomedical Campus in the south of the city. The North West Cambridge development includes the opening of a primary school – the first in the UK to be managed by a University. So we are deeply embedded in, and committed to serving, our local community. These are all conspicuous signs of a University that is not only adapting to new needs, but also anticipating the future.

Our mission is to contribute to society through the pursuit of education, learning, and research at the highest international levels of excellence. Our core values are:

- freedom of thought and expression; and
- freedom from discrimination.



# About Us

**The University is one of the world's leading academic centres. It comprises 150 faculties and departments, together with a central administration and other institutions. Our institutions, museums and collections are a world-class resource for researchers, students and members of the public representing one of the country's highest concentrations of internationally important collections.**

The University has an annual income of £2 billion. Research income, won competitively from the UK Research Councils, the European Union (EU), major charities and industry, exceeds £500 million per annum and continues to grow.

The Colleges and the University remain committed to admitting the best students regardless of their background and to investing considerable resources both in widening access and financial support. The 31 Colleges are self-governing, separate legal entities which appoint their own staff. Many academic staff are invited to join a College as a Teaching Fellow, which provides a further social and intellectual dimension. The Colleges admit students, provide student accommodation and deliver small group teaching.

The University awards degrees and its faculties and departments provide lectures and seminars for students and determine the syllabi for teaching and conducting research.

Our instinct for seeking out excellence and setting

up enduring and mutually beneficial collaborations has led us to establish strategic partnerships across the globe. Whether it is the successful Cambridge-Africa Programme involving universities in Ghana, Uganda and elsewhere on the African continent; or the close association with the government of India to pursue new research in crop science; or the creation, with Germany's Max Planck Institutes, of a Cambridge-based centre for the study of ethics, human economy and social change – international partnerships are now an inextricable part of the University's make-up.

“Cambridge graduates and researchers have made – and continue to make – a colossal contribution to human knowledge and the understanding of the world around us. Their work touches on the lives and livelihoods of everyone from patients diagnosed with life-threatening diseases, to residents of areas critically affected by climate change, to children growing up in conflict zones. It has a lasting impact on our society, our economy and our culture: the world is truly a better place thanks to their efforts.”

*Stephen Toope, Vice Chancellor 2019*





# Working at the University

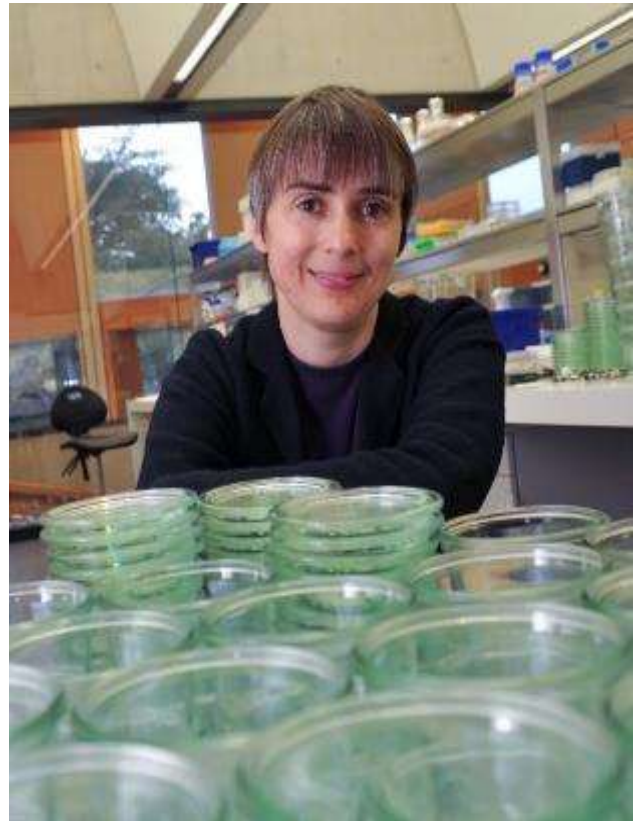
**Working at Cambridge you will join a diverse, talented and innovative community, with more than 18,000 students and over 16,000 staff from all walks of life and corners of the world.**

The University continually explores strategies to attract and retain the best people. It is committed to supporting its staff to achieve their best. We are a fair, diverse and inclusive society and we believe our staff are our greatest asset. There is strong commitment to developing institutional leadership and supporting and encouraging staff development at all levels.

We offer a variety of roles including academic, research, professional, managerial and support roles. We also offer extensive benefits and excellent learning opportunities within a stimulating working environment.

The University's estate is undergoing the most significant transformation in its history. Cambridge has been able to create a new science and technology campus to the west of the city centre, and is now expanding further to the north west of Cambridge including investing in affordable homes for University key workers and community facilities. Even with our continued development, the University remains within walking or cycling distance across the campus. The University is a major partner on the Cambridge Biomedical Campus and we continue to redevelop our historic city centre sites demonstrating our determination to ensure that we can offer the best facilities and opportunities for our staff and students. **Equality & diversity**

The University has built its excellence on the diversity of its staff and student community. We aim to be a leader in fostering equality and inclusion, and in promoting respect and a sense of belonging for all. We encourage applications from all sections of society. All appointments are made on the basis of merit. We have an Equal Opportunities Policy, along with a range of diversity networks for women, black and minority ethnic and lesbian, gay, bisexual and transgender



staff. More details are available here: <http://www.equality.admin.cam.ac.uk/>

The University has a bronze Race Equality Charter aware, with framework for improving the representation, progression and success of minority ethnic staff and students within higher education. Furthermore, the University's Athena SWAN award recognises and celebrates good practice in recruiting, retaining and promoting women.



# Living in Cambridge

**Cambridge is rich in cultural diversity. From beautiful University and College buildings, museums and art galleries, quaint gardens and punts on the River Cam, to a vibrant restaurant and café scene, our employees are surrounded by the wonderful features of this unique city.**

You can find a wide-range of high street shops and 3 shopping centres, with independent alternatives at the historic market and nestled within the passageways in the city centre. You will find a cinema, bowling alley, a nightclub and various live performances At the Cambridge Leisure Park, with further entertainment options at the Corn Exchange, Arts Theatre and the ADC Theatre. Further information can be found on the Visit Cambridge website.

If you prefer the faster pace of life, London is a 45 minute train journey away. For those travelling from overseas, Stansted Airport is just 45 minutes away and Heathrow Airport under 2 hours away. The University is a short distance from a host of other attractions such as Ely Cathedral, Newmarket Races and various wildlife parks and stately homes. Cambridge is also within easy reach of the beautiful Broads and coastlines of Norfolk and Suffolk.

## Relocation Support

The University recognises the importance of helping individuals to move and settle into a new area. We provide support and guidance to those relocating internationally or domestically to take up a post at the University of Cambridge, liaising with other University offices and selected partners to ensure comprehensive relocation

support is available. This includes: accommodation, childcare, schools, banking, immigration and transport. If you would like further information, please visit <https://www.accommodation.cam.ac.uk/>. The Shared Equity Scheme and the Reimbursement of Relocation Expenses Scheme provide financial assistance to qualifying new members of staff with the costs of relocating to Cambridge.

## Accommodation Service

The University Accommodation Service helps staff, students and visiting scholars who are affiliated to the University in their search for suitable accommodation in Cambridge. The dedicated accommodation team can provide access to a wide range of University-owned furnished and unfurnished properties, and has a database of private sector accommodation available for short and long-term lets. For further information and to register with this free service please visit <https://www.accommodation.cam.ac.uk/>



# What Cambridge can offer

**We offer a comprehensive reward package to attract, motivate and retain high performing staff at all levels and in all areas of work.**

The University offers a wide range of competitive benefits, from family leave entitlement, to shopping and travel discount schemes. Our generous annual leave package contributes to the positive wellbeing of our University employees. Sabbatical leave enables academics to focus on research and scholarship, whilst still maintaining their full salary. The University also has a [career break scheme for academic and academic-related staff](#), with additional flexible working policies for all other staff.

## Pay and benefits

The University salary structure includes automatic service-related pay progression in many of its grades and an annual cost of living increase. In addition to this, employees are rewarded for outstanding contribution through a number of regular pay progression schemes. The University offers attractive pensions schemes for employees, with an additional benefit of a salary exchange arrangement providing tax and national insurance savings. Payroll giving is also a simple, tax-efficient way for employees to make monthly donations to charity.

## CAMBens employee benefits

We offer a CAMBens scheme for University employees, providing access to online and in-store shopping discounts and cashback. With



more than 2,000 participating retailers, employees can save money on a wide range of household expenses, from groceries and clothes, to holidays and insurance and much more. A range of local discounts are also available, helping employees to save money whilst also supporting local Cambridge businesses and a CAMBens Cycle to Work salary sacrifice scheme is also available, which enables employees to save money on transport costs. A 10% discount rate on the [purchase of train season tickets, bulk buy tickets](#) and an interest free travel to work loan are also available for staff of the University.



# What Cambridge can offer

## Family-friendly policies

The University recognises the importance of supporting its staff. We have a range of family-friendly policies to aid employees' work-life balance including a generous maternity, adoption and shared parental leave entitlement of 18 weeks full pay and emergency family care support via My Family Care.

Other family-friendly support includes:

Our highly regarded workplace nurseries, a childcare salary exchange scheme and a high quality holiday Playscheme may be available to help support University employees with caring responsibilities (subject to demand and qualifying criteria). Further childcare information can be found here: <https://www.childcare.admin.cam.ac.uk/>

The [Newcomers and Visiting Scholars Group](#) is an organisation within the University run by volunteers whose aim is to help newly arrived wives, husbands, partners and families of Visiting Scholars and members of the University to settle in Cambridge and give them an opportunity to meet local people. The Office of Postdoctoral Affairs supports the postdoctoral community within Cambridge. Further details are available here: <https://www.opda.cam.ac.uk/>

## Your wellbeing

The University's Sport Centre, Counselling Services and Occupational Health are just some of the support services available to University employees

to promote their physical and mental wellbeing. There are many societies in Cambridge catering for almost every taste and interest. Whether you want to take part in a sport, participate in music or drama, pursue a hobby, or join a political group, you will almost certainly find that a society exists for this purpose. The University also hosts the [Cambridge Science Festival](#) and [Cambridge Festival of Ideas](#), as well as [Open Cambridge](#) weekend, which together attract over 50,000 visitors per year. The festivals are a great opportunity to get your first taste of public engagement, through volunteering, supporting hands-on activities or proposing a talk.

## Development opportunities

We support new employees to settle in through various activities. The encouragement of career development for all staff is one of the University's values and we put this into practice through various services and initiatives. Our Personal and Professional Development Department provides development opportunities and courses for all University employees. These include face-to-face sessions, online learning modules and webinars. Employees may also apply for financial support to undertake training that will lead to a qualification. We offer reduced staff fees for University of Cambridge graduate courses and the opportunity to attend lectures and seminars held by University departments and institutions. The [CareerStart@Cam](#) programme also supports employees in assistant staff roles who do not hold higher education qualifications to develop their skills, experience and qualifications.





# How to apply

Applications should be submitted online via the University of Cambridge jobs page [www.jobs.cam.ac.uk](http://www.jobs.cam.ac.uk) by clicking "Apply online" in the job advert. You will need an email address to register for our online system.

Conversations about flexible working are encouraged at the University of Cambridge. Please feel free to discuss flexibility prior to applying (using the contact information below) or at interview if your application is successful.

Informal enquiries are welcomed and should be addressed to Prof David Ritchie, Professor of Experimental Physics ([dar11@cam.ac.uk](mailto:dar11@cam.ac.uk)) and Dr Dave Ellis, Cleanroom Manager ([djpe2@cam.ac.uk](mailto:djpe2@cam.ac.uk))

If you have any queries regarding this role please contact [hr@phy.cam.ac.uk](mailto:hr@phy.cam.ac.uk)