UNIVERSITY OF CAMBRIDGE

Department of Applied Mathematics and Theoretical Physics

Athena SWAN Bronze Award

Postdoctoral Research Assistant/Associate

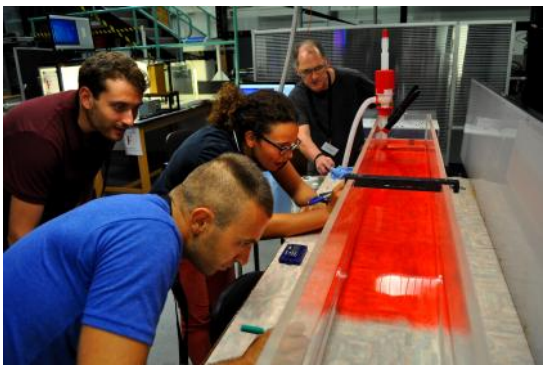
to work on the

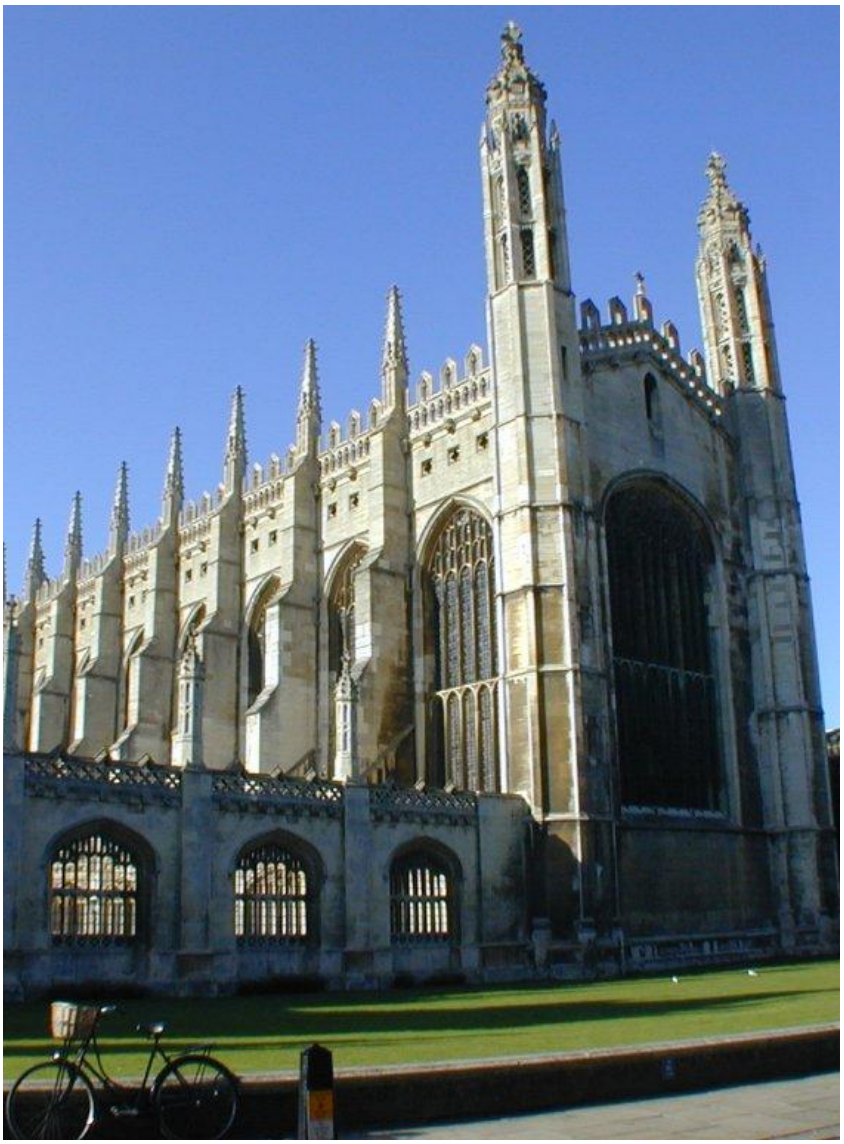
Fluid Mechanics of Decontamination

Department of Applied Mathematics and Theoretical Physics

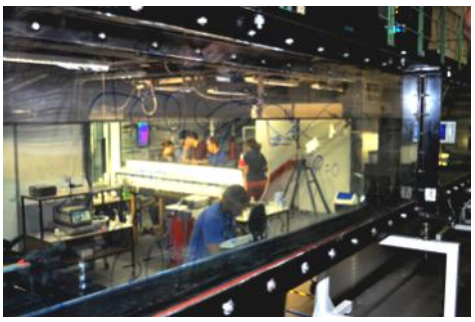
Job reference: LE46328

Closing date: 04 July 2025





Terms of appointment



Specific terms

Tenure and probation
The appointment will be made on a fixed-term basis for a period of one year in the first instance, but may be extended for a further year if funding permits. The appointment will be subject to satisfactory completion of a six-month probationary period.

Hours of Work and Working Pattern
The hours of work for the position are 37 hours per week, working Monday – Friday.

Pension
You will automatically be enrolled to become a member of USS (Universities Superannuation Scheme) – a defined benefit and defined contribution pension scheme. For further information please visit: www.pensions.admin.cam.ac.uk/.

Annual leave
Full time employees are entitled to annual paid leave of 6.6 weeks (33 days for those working full time), inclusive of public holidays.

General information

Right to work in the UK
We are required to ensure that you have the legal 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 Further Particulars document lists qualifications that are essential and/or desirable. Please note that if you are offered the post you may be asked to provide your relevant original certificates of these qualifications.

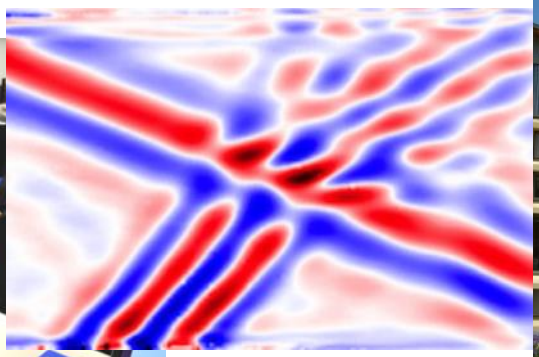
References

Offers of appointment will be subject to the receipt of satisfactory references.

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.hr.admin.cam.ac.uk/policies-procedures/disabled-applicants-and-members-staff

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.

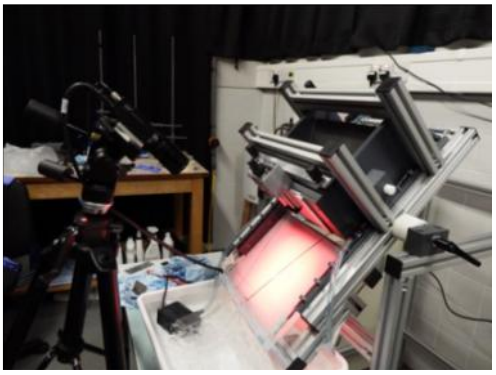
If you prefer to discuss any special arrangements connected with a disability, please contact the Departmental Administrator, who is responsible for recruitment to this position, by e-mail at: hr-office@maths.cam.ac.uk



The Project

The removal and neutralisation of unwanted chemical contaminants is particularly important if the contaminant is harmful. The greater the level of risk posed by the chemical, the more important it is to understand the removal process to ensure the contaminated material is rendered safe.

Problems of this type arise in industrial processes, but perhaps most critically in dealing with the aftermath of an attack using chemical weapons agents. By their nature, these agents are amongst the most toxic substances known to mankind, and their toxicity so high that even microscopic quantities continue to pose significant hazards.

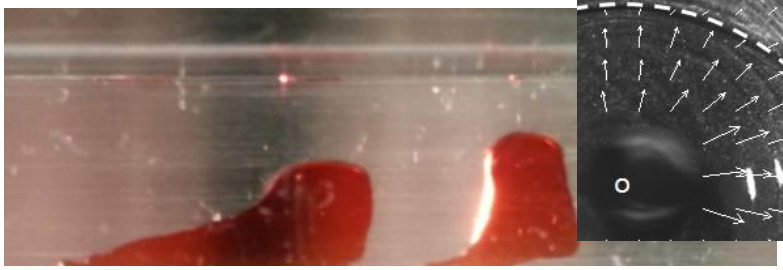


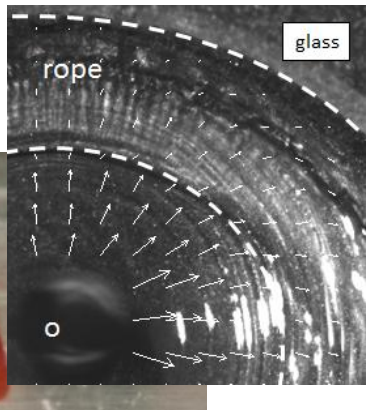
While chemical kinetics play an important role in transforming the chemical agent into less toxic forms, fluid mechanics plays a vital role in the transport of reactants and products alike. The combination of advection, diffusion and reaction are all needed to complete the necessary task.

For a simple flat surface made from impervious materials, understanding the various component processes is not too challenging. However, porous materials offer significantly greater decontamination challenges. The challenge increases further if the contaminant is immiscible or only sparingly miscible with the decontaminant. The complex geometry across an extremely broad range of scales and inherent inhomogeneity of the constituent materials found in concrete, for example, pose a significant modelling challenge even in the miscible fluid-filled case. For an initially dry medium with an immiscible contaminant/decontaminant pair, there are four distinct chemical phases to be considered: the porous material (which itself may be heterogeneous), the air it initially contains, the contaminant that has soaked into it and the decontaminant intended to clean the material.

To understand and model the decontamination, we must first understand the ingress of the contaminating agent and how it is distributed both on the surface and through the interior of the substrate. Subsequent attempts at decontamination through procedures such as surface washing may then alter this distribution, possibly increasing the physical extent of the contamination and increasing the potential hazard.

This project seeks to build and validate the mathematical models necessary to understand the decontamination process. The modelling requires not only analytical and numerical approaches in their formulation, but also experimental work to provide the necessary physical insight essential to ensure the models are appropriate and against which the models will be validated.





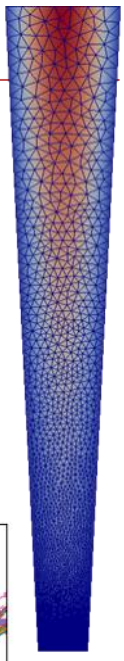
Project title:
Decontamination-induced Contamination Redistribution

Sponsor:
Dstl
(Defence Science and Technology Laboratory)

Project team:
Professor Stuart Dalziel[1] (PI)
Professor Julien Landel[2] (Co-I)
Dr Georgia Ioannou[1] (Senior Postdoc)
This postdoc[1]

Institutions:
1. Department of Applied Mathematics and Theoretical Physics, University of Cambridge
2. Department of Mechanics, University Claude Bernard Lyon 1

University of Cambridge
www.cam.ac.uk



The Role

Salary:
£37,174—£45,413 per annum

Contract:
Three years, subject to funding

Location:
GK Batchelor Laboratory,
Centre for Mathematical Sciences

Department:
Department of Applied Mathematics and Theoretical Physics

Responsible to:
Professor Stuart Dalziel
(Principal Investigator)

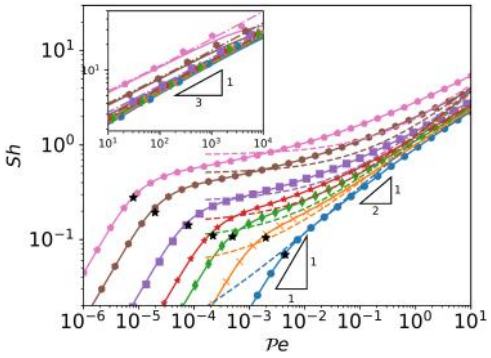
Working pattern:
Full-time

Closing date:
4 July 2025

Start Date:
On or before 4 August 2025

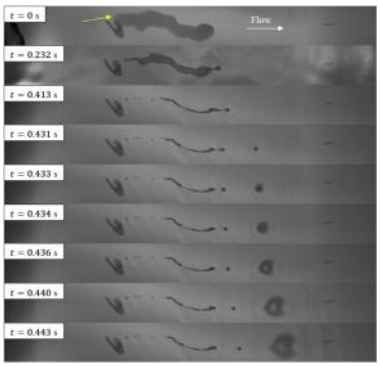
We are seeking a researcher to join our multidisciplinary collaboration with the Defence Science and Technology Laboratory (Dstl). The work, based in the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge, will be at the cross-roads between quantitative laboratory experiments employing novel diagnostic techniques and mathematical modelling.

The principal focus of this position is experimental work on decontamination of initially dry porous materials, although it is also expected that the successful candidate will contribute strongly to analytical and numerical modelling efforts.



The successful candidate will have or be about to receive a PhD in mathematics, engineering or a closely related area, and have experience in conducting quantitative laboratory experiments. Familiarity with porous media, low Reynolds-number flows, developing novel experimental techniques and/or chemically reacting flows are also desirable. The starting salary is dependent on qualifications and experience.

Duties include running and analysing experiments, mathematical modelling, developing and conducting individual and collaborative research objectives, and liaising with project sponsors. The role holder will be expected to plan and manage their own research and administration, with guidance if required. They must be able to communicate material of a technical nature and be able to build internal and external contacts. They may also be asked to assist in the supervision of student projects, the development of student research skills, provide instruction or undertake other activities related to research area.

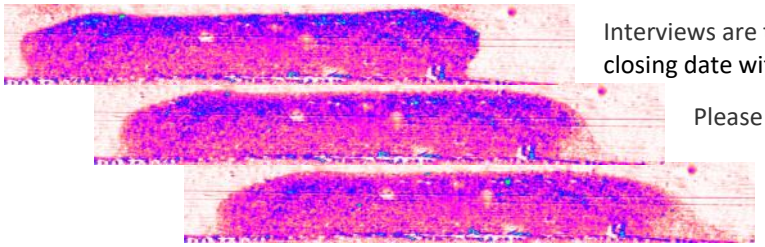


Informal inquiries can be made by contacting Prof. Stuart Dalziel (s.dalziel@damtp.cam.ac.uk).

If you have any questions about the application process, please contact the HR Office at LE46328@maths.cam.ac.uk.

Applications for this position should be made online via the University of Cambridge jobs page https://www.jobs.cam.ac.uk

Please indicate the contact details of two academic referees on the online application form and upload a full curriculum vitae and a description of your recent research (not to exceed three pages). Please ensure that at least one of your referees is contactable at any time during the selection process. Your referees should be aware that they will be contacted by the Mathematics HR Office Administrator to request that they upload a reference for you to our Web Recruitment System, and that their prompt response will help the process.



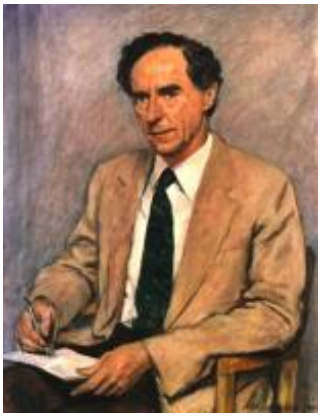
Interviews are to be held in person or via Zoom soon after the 4 July closing date with a view to starting on or before 4 August 2025.

Please quote reference LE46328 on your application and in any correspondence about this vacancy.

The GK Batchelor Laboratory

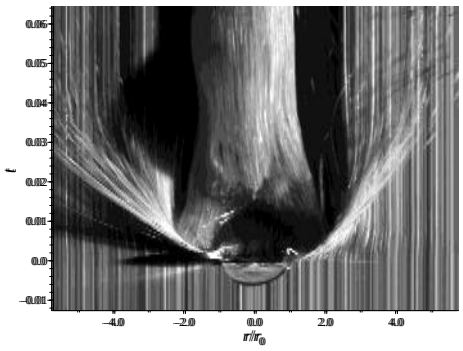
"But I thought this is a maths department!" This is often the response when someone discovers the Department of Applied Mathematics and Theoretical Physics has an experimental laboratory — and has had one since 1964 due to the vision of Prof. G.K. Batchelor, the inaugural head of department.

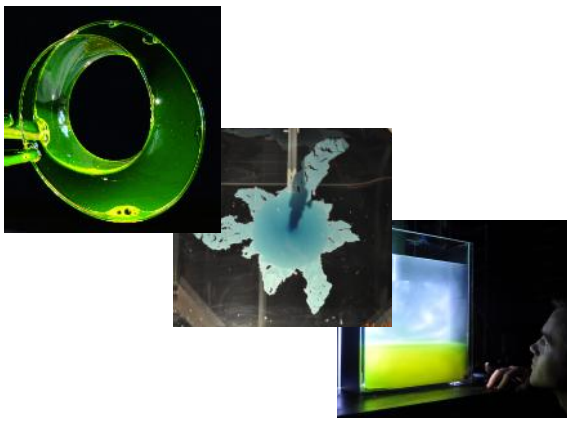
The GK Batchelor Laboratory is a unique purpose-built experimental environment to provide essential physical insight into a number of the complex areas of mathematical research in the Department of Applied Mathematics and Theoretical Physics, and to enable Cambridge mathematicians to test their theoretical ideas and make progress on a diverse range of challenging problems.



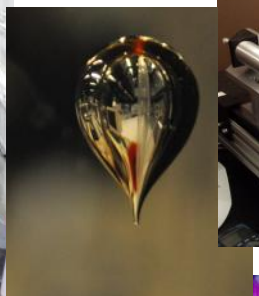
Professor GK Batchelor (1920-2000)
Head of department 1959-1983

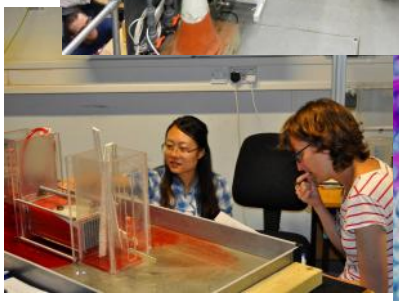
Professor Stuart Dalziel
Director of the GK Batchelor Laboratory
s.dalziel@damtp.cam.ac.uk

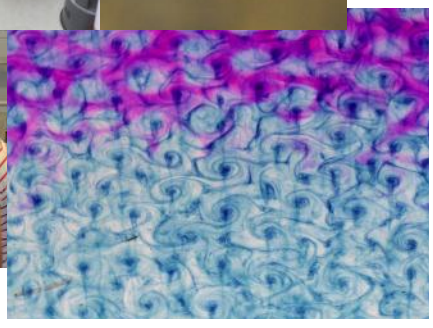




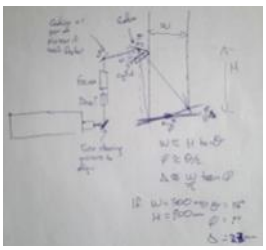
Since its creation a little over 60 years ago, the Laboratory has proved itself of tremendous value, not only to research efforts at Cambridge, but also internationally and to industry. The laboratory acts as a breeding ground for current research, future innovation and discovery, teaching and inspiring future generations of researchers while at the same time driving forwards important ground-breaking research.

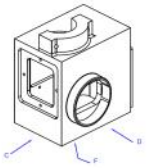


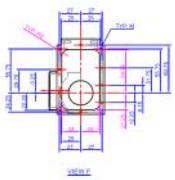


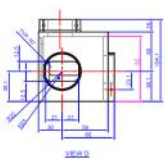


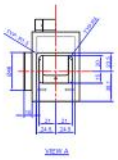
The GK Batchelor Laboratory (continued)





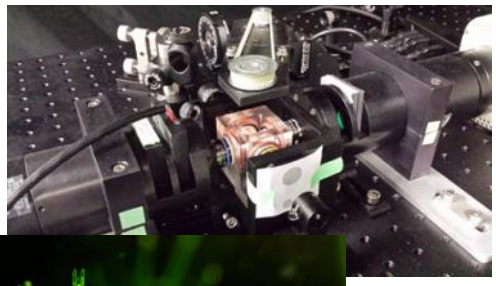


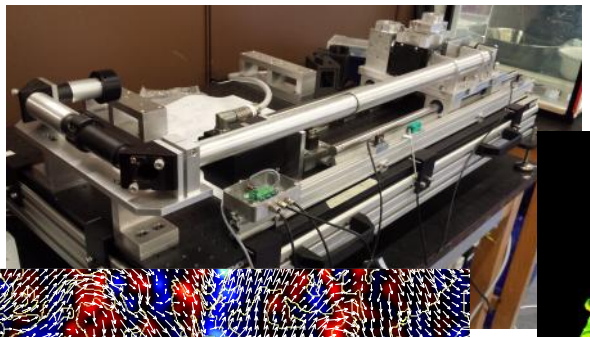


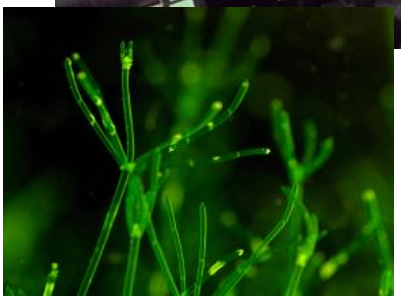


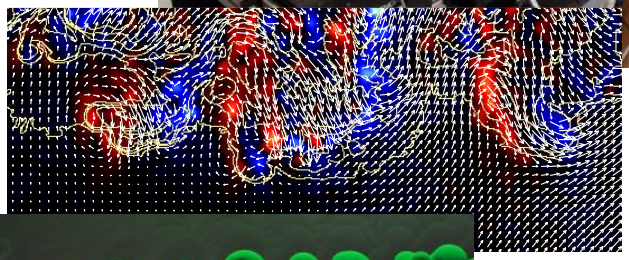
In pushing forwards the scientific frontiers, so technology has also advanced, and many of the ideas and techniques developed for research in the Laboratory are now used at other leading universities around the world.

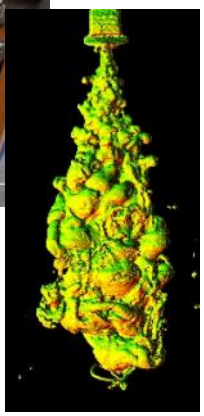
The workshop and highly skilled technicians that support the Laboratory are a key component of the Laboratory's success. Even the best mathematicians and experimentalists are no match for the skill of the Laboratory's technicians in converting their (sometimes brilliant but poorly thought through) ideas into the practical equipment necessary for the experiment to be a success. The end result is a team effort, synergistically combining the skills of the craftsman with the mathematical insight of the researcher.





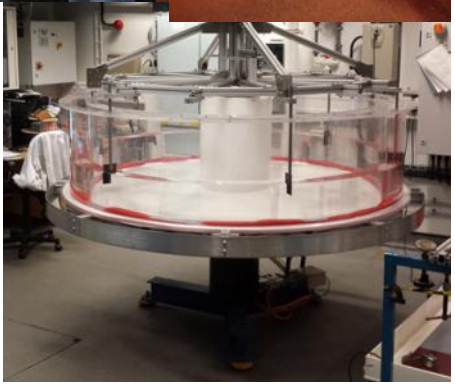






The present Laboratory has around 820 m^2 of research space and houses a diverse portfolio of research motivated by biology, the natural and man-made environments, and industry. The problems can be described as including biological physics, fluid mechanics and granular media, but such titles do not capture the full scope of the research. Individual experiments range from over 10m in length to details of processes occurring within individual biological cells.

This important and internationally leading work is enabled by the efforts of the workshop, whether constructing unique electro-mechanical wave makers, providing innovative solutions for driving granular flows, or creating vessels and manipulators for use on high-power microscopes.



The Department

The Department of Applied Mathematics and Theoretical Physics (DAMTP)

The Department of Applied Mathematics and Theoretical Physics is one of the largest and strongest departments of its kind in Europe. DAMTP is a large Department with around 50 academics (professors, readers and lecturers) and almost 100 contract research staff. There are also 20 – 30 visiting academics, 130 postgraduate research students and 100 graduate students Over 800 undergraduate and postgraduate students are enrolled in Parts I to III (years 1 to 4) of the Mathematical Tripos. Part III is not only the 4th year of the undergraduate course, but attracts more than 100 students each year from outside Cambridge, who take it as a one-year postgraduate course, leading to a Masters degree.

DAMTP shares responsibility for teaching in the Mathematical Tripos with its sister Department, the Department of Pure Mathematics and Mathematical Statistics (DPMMS). DAMTP also has responsibility for teaching mathematics to undergraduates taking Natural Sciences. DAMTP and DPMMS are accommodated, along with the Isaac Newton Institute for Mathematical Sciences and the Betty and Gordon Moore Library (covering mathematics, physical sciences and technology) at the Centre for Mathematical Sciences, a purpose-built complex in Wilberforce Road.

The Faculty of Mathematics is a supporter of the Good Practice Scheme developed by the London Mathematical Society's Women in Mathematics Committee (http://www.lms.ac.uk/women/good-practice-scheme). The Faculty is actively engaged with the Athena SWAN Award Scheme (holding a Bronze Award from 2013). The Department would particularly welcome applications from women, since women are, and have historically been, underrepresented on our academic staff. The Department is also keen to attract applications

from candidates who have a genuine interest in, and commitment to, developing the role of women in Mathematics and who can demonstrate the potential to be strong role models to female mathematicians.

Research

Current research in DAMTP is loosely organised into eight broad subject areas: Applied and Computational Analysis, Astrophysics, Geophysics, Fluid and Solid Mechanics, Mathematical Biology, Quantum Information, High Energy Physics and General Relativity and Cosmology. The boundaries between the areas are not rigid and evolve with time. Many members of staff contribute to more than one area and this is regarded as a key factor in the continuing success of DAMTP.

Research in each of DAMTP's subject areas involves collaboration with strong groups nationally and internationally, and participation in numerous interdisciplinary projects and programmes. Many members of DAMTP have valuable links with industry and other non-academic sectors. For more information please see: http://www.damtp.cam.ac.uk/research.

There are strong links with the Isaac Newton Institute for Mathematical Sciences. At any time the Institute runs two parallel research programmes, each usually lasting six months and attracting several dozen mathematical scientists nationally and internationally. In several areas there are also links to research in DPMMS https://www.dpmms.cam.ac.uk/, including in general relativity and the analysis of Einstein's equations, and to other Departments within the School of Physical Sciences (https://www.physsci.cam.ac.uk/research).

Further general information about the University of Cambridge, the Department of Applied Mathematics and Theoretical Physics, and Mathematics in Cambridge may be found on the websites: http://www.cam.ac.uk, http://www.damtp.cam.ac.uk and http://www.maths.cam.ac.uk.

The School of Physical Sciences

The School of the Physical Sciences is one of six Schools making up the academic work of the University. The other schools are Arts and Humanities, Biological Sciences, Clinical Medicine, Humanities and Social Sciences, and Technology.

About the school

The School of Physical Science's aim is to contribute to our understanding of the physical world through excellence in observational, theoretical and experimental science and to extend quantitative, qualitative and combined methodologies to address problems in the fields of biology, technology, medicine, social science and the humanities. In pursuit of these goals, the School coordinates objectives in research, teaching, and infrastructure.

The School comprises the following Departments:

Applied Mathematics and Theoretical Physics (DAMTP)

Chemistry

Earth Sciences

Geography (including the Scott Polar Research Institute)

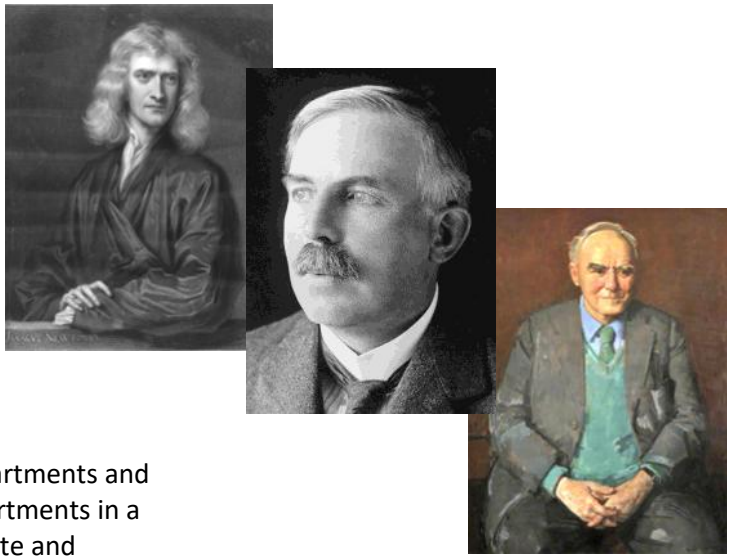
Institute of Astronomy

Issac Newton Institute of Mathematical Sciences

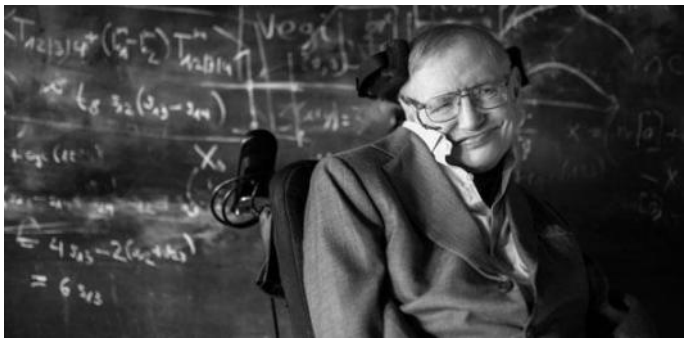
Materials Science and Metallurgy

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.

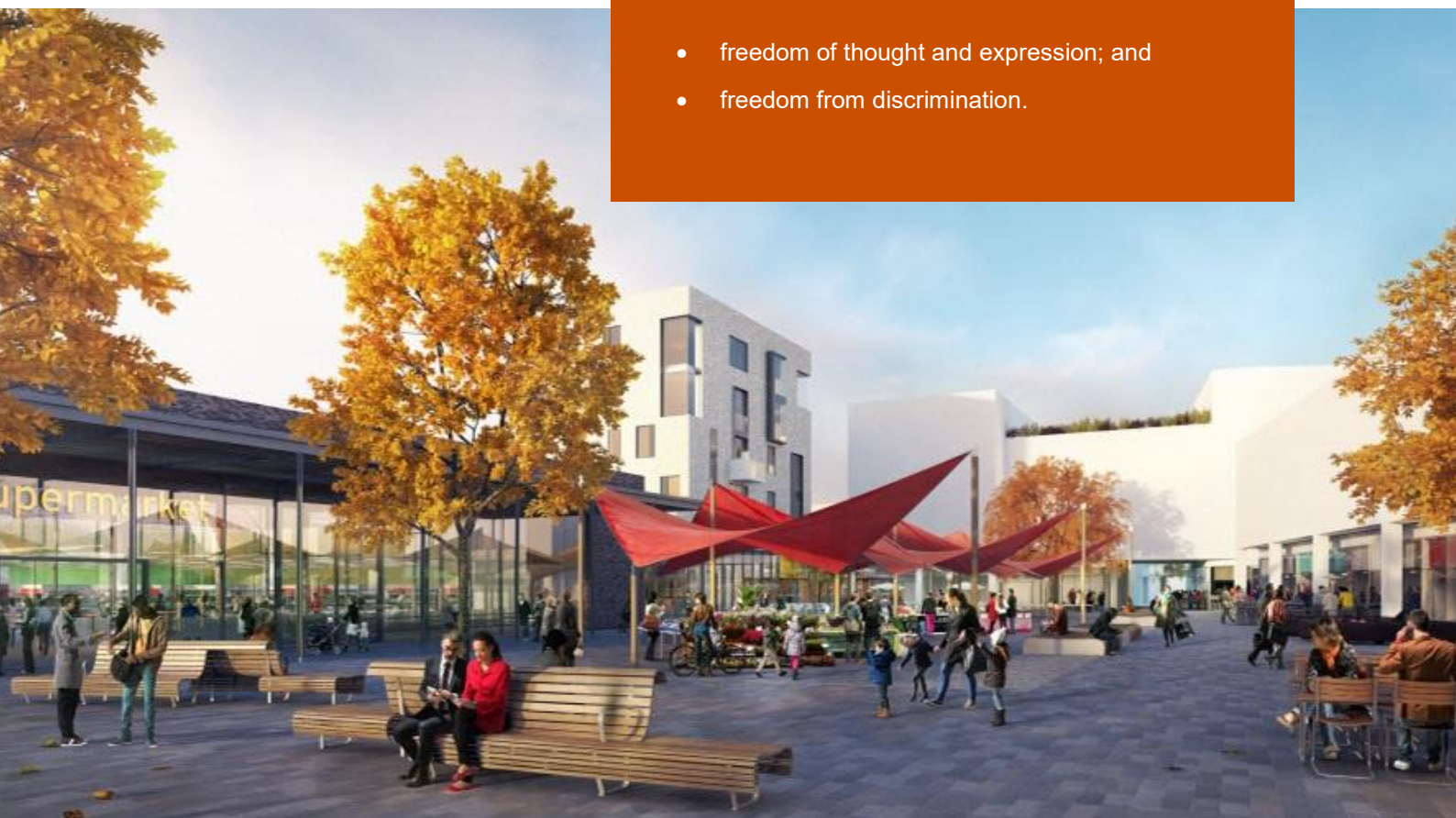
The University

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 £1.66 billion. Research income, won competitively from the UK Research Councils, the European Union (EU), major charities and industry, exceeds £400 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.

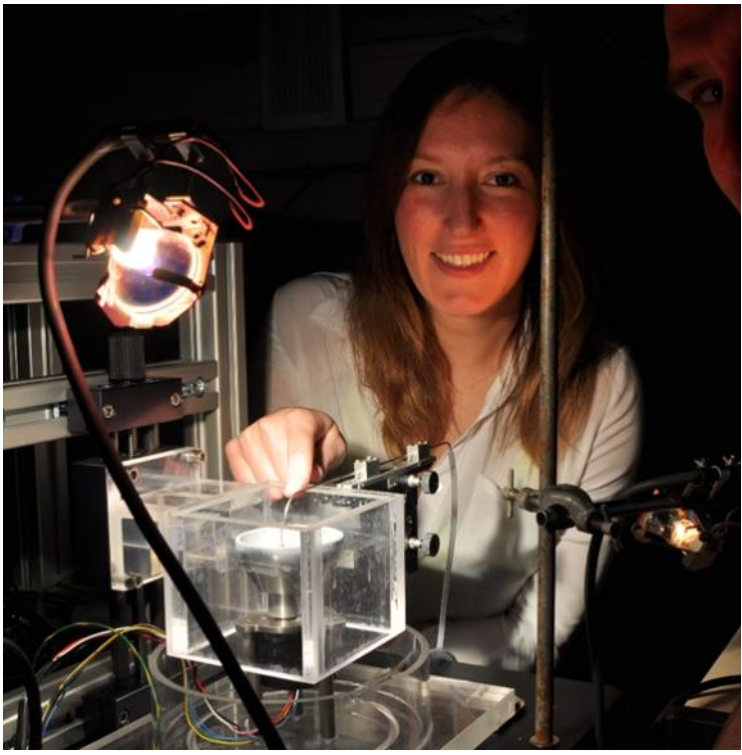
Our ideas and innovations have shaped the world. Our campaign, 'Dear World... Yours, Cambridge', will raise £2 billion to help us shape all our futures.

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.

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.

Working at the University

Working at Cambridge you will join a diverse, talented and innovative community, with more than 18,000 students and over 11,000 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. Furthermore, the University's Athena SWAN award recognises and celebrates good practice in recruiting, retaining and promoting women. 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 has signed up to the Race Equality Charter, a notional framework for improving the representation, progression and success of minority ethnic staff and students within higher education.

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.

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.

Further information about attractions in and around Cambridge can be found at https://www.visitcambridge.org/, the official tourism website for the city.

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.

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. CAMbens Cars and CAMbens Cycle to Work salary sacrifice schemes are also available, which enable 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 of Cambridge.

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. In addition, our highly regarded workplace nurseries, childcare vouchers, a childcare salary sacrifice scheme and a high quality holiday play scheme are available to help support University employees with caring responsibilities. 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 the 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.

What Cambridge can offer

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.

Relocating to Cambridge
The University Accommodation Service exists to help employees in their search for a rental home in Cambridge. A new University development at North West Cambridge called Eddington offers subsidised rented accommodation to University staff. The development consists of high quality furnished one and two bedroom apartments. For more information about the development and how to apply please visit the website https://www.nwcambridge.co.uk

The importance of helping individuals settle into a new area is also recognised by the University. The Shared Equity Scheme https://www.hr.admin.cam.ac.uk/pay-benefits/cambens-employee-benefits/financial/shared-equity-scheme provides financial assistance to qualifying new members of staff with the purchase of living accommodation, where they have to relocate to take up their appointment. Removal expenses are also available for qualifying new members of staff. The University has introduced a Rental Deposit Loan Scheme to support new starters and existing employees with the set up costs of renting privately in the Cambridge area: https://www.hr.admin.cam.ac.uk/pay-benefits/cambens-employee-benefits/relocation-housing/rental-deposit-loan-scheme

Equality & diversity
The University has a vibrant and varied community. We support and encourage under-represented groups and we value diversity. We welcome applications from individuals with disabilities. Our recruitment and selection procedures follow best practice. 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/

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.

Whether it is understanding the molecular basis of neurodegenerative diseases, or helping farmers in India increase their yield, or discovering better ways to live in large cities – I know that what we do in Cambridge affects lives, and livelihoods, the world over.

Vice Chancellor Emeritus, Professor Sir Leszek Borysiewicz, 2016

How to apply

Applications should be submitted online via the University of Cambridge jobs page https://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.

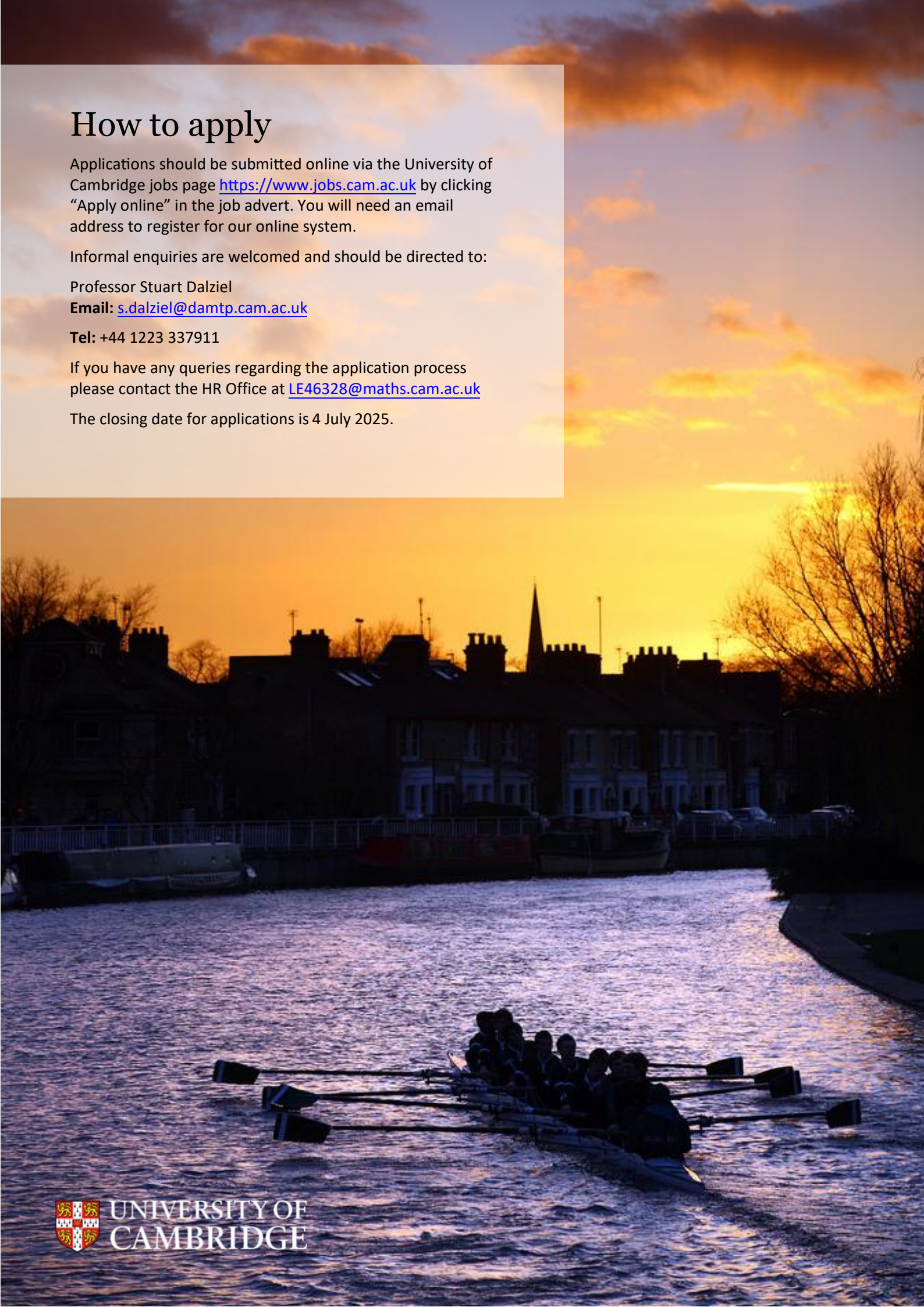
Informal enquiries are welcomed and should be directed to:

Professor Stuart Dalziel
Email: s.dalziel@damtp.cam.ac.uk

Tel: +44 1223 337911

If you have any queries regarding the application process please contact the HR Office at LE46328@maths.cam.ac.uk

The closing date for applications is 4 July 2025.



UNIVERSITY OF CAMBRIDGE