

Research Associate

Department of Physics

Closing date: 28 October 2024
Job Reference: KA43275



Research Associate in Quantum Sensing of Emergent Magnetism in Layered Materials

Salary:

£32,982 - £33,966 (Grade 5)

£36,024- £44,263 (Grade 7)

Contract:

36 months Fixed Term

Location:

Cambridge

Faculty / Department:

Physics

Responsible to:

Professor Mete Atatüre

Working Pattern:

Full Time

Purpose of the role

The role is funded by the university to conduct research in emergent magnetism in layered materials using nanoscale quantum magnetometry.

The Quantum Optical Materials & Systems Group, led by Prof Atatüre, investigates light-matter interaction with multiple material platforms including 2d layered materials, diamond and semiconductor quantum dots. We develop systems, tools, and protocols with hybrid physical components that enable a fundamental understanding of the interaction of few and many quantum objects, including photons, spins, and excitons, with two main aims: to investigate emergent nanoscale quantum phenomena and to develop devices towards quantum technologies from sensing to communication.

The aim of this role is to study emergent magnetism and the formation of nanoscale spin textures in a plethora of 2d layered material heterostructures using diamond-based scanning quantum magnetometry.

This project will leverage and combine recent developments in layered material synthesis and multilayer heterostructure device fabrication and in parallel the capability to detect faint magnetic field patterns in the nanoscale using scanning diamond magnetometry. The research group is equipped with the necessary facilities to fabricate pristine devices using layered materials and in parallel a state-of-the-art quantum magnetometry suite capable of operating at 4K-300K and up to 9-T magnetic field. The goal of this ambitious research program, with a strong interdisciplinary nature across quantum optics, quantum sensors, materials science and magnetism, is to capture emergent magnetic phenomena and their dynamics under electrical, magnetic, temperature and current control.

Appointment at research associate is dependent on having a PhD including those who have submitted but not yet received their PhD (in which case appointment will initially be made at research assistant and amended to research associate when the PhD is awarded).



The University of Cambridge is a signatory of the San Francisco Declaration on Research Assessment (DORA). DORA recognises the need to improve the ways in which the outputs of scholarly research are evaluated. The University expects candidates to apply the principles of DORA when preparing their applications. We do not use journal-level metrics when assessing the quality of research outputs. Applicants should not include journal-level metrics, such as the Journal Impact Factor, anywhere in their application materials. More information about DORA, its principles and aims can be found at: <https://sfdora.org/> and <https://www.research-strategy.admin.cam.ac.uk/research-policy/DORA>.

Key duties and responsibilities

Specific Tasks include ability to:

- perform ODMR (optically detected magnetic resonance) and ESR (electron-spin resonance) on NV (nitrogen vacancy) centres in diamond nanostructures
- perform photoluminescence and spectroscopy of layered materials
- perform atomic force microscopy on layered material devices
- perform cleanroom-based fabrication and processing of layered-materials (receive training as necessary)
- design and fabricate microwave and radio frequency micro-antennas
- perform coding relevant to instrumentation control
- perform coding relevant to numerical simulation work
- design mechanical, electrical and optical components for experiments
- contribute to the maintenance of current laboratory equipment
- contribute to the purchase of new laboratory equipment

Research and scholarship

- conduct research individually and collaboratively within the project
- write up research for monitoring, presentation and publication
- help develop objectives and proposals for the research project
- continue developing knowledge and understanding of the broader research area
- translate knowledge of advances in the subject into research activity
- manage own research and administrative activities, with guidance if required
- assist in the preparation of proposals and applications to external funding bodies
- communicate material of a specialist or highly technical nature

Teaching and learning support:

- assist in the supervision of postgraduates and undergraduates
- provide limited supervision to undergraduate teaching
- assist in the development of student research skills

Liaison and networking:

- liaise with colleagues and students
- participate in networks to exchange information and to form potential collaborations

Planning and organising

- plan the use of research resources, laboratories and workshops
- plan and manage own research activity in collaboration with others
- contribute to planning of joint research projects led by principal investigator

Person Specification

This section details the knowledge, skills and experience we require for the role.

Criteria	Essential	Desirable
Education & Qualifications		
A high first degree (first-class or equivalent)		✓
PhD (or close to obtaining) in Physics or a closely related discipline such as materials science and engineering	✓	
Specialist knowledge & skills		
Ability to pursue scientific investigation from the conception stage through to publication	✓	
Ability to code for analysis, simulation, and instrumentation	✓	
Ability to design and build experimental apparatus	✓	
Interpersonal & Communication Skills		
Proven organisational, communication and team working skills.	✓	
Proven abilities to mentor students		✓
Relevant Experience		
Strong background in quantum condensed matter	✓	
Strong background in spin control and quantum sensing		✓
Strong background in the physics of layered materials	✓	
Strong background in material characterisation	✓	
Strong background in atomic force microscopy	✓	
Strong background in cryogenic experiments		✓
Additional Requirements		
Proven ability to write reports, present results and contribute to academic publications	✓	
High level of precision and attention to detail in device fabrication and measurements	✓	
Experience of managing own workload	✓	

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



The Cavendish Laboratory was founded in 1871, with the simultaneous appointment of James Clerk Maxwell as the first Cavendish Professor. It has a distinguished history of contribution to science.

Twenty-nine 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.

This change of emphasis has been inspired by a number of changes in the nature of contemporary 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 around 80 academic staff, 200 postdoctoral researchers, and 300 graduate students. Together with



administrative and technical support staff and academic visitors, the Department hosts around 1200 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/.

Recent developments

The Department is engaged many 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 and hosts the Maxwell Programme embedding researchers from multiple departments and industry.

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 2025, 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.



Athena SWAN

The Cavendish Laboratory is committed to providing a community where all have the opportunity to reach their full potential. We are incredibly proud of our efforts over the last 5-10 years which have increased the representation of women throughout our teaching and research activities. This has been accompanied by a culture change at every level which has greatly improved equality, diversity and inclusiveness within the department. We are currently working on efforts to target EDI issues surrounding race and LGBTQ+.

The Department is the holder of a prestigious [Athena SWAN Silver award](#) and is an [Institute of Physics' Project Juno Champion](#)

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

Terms of Appointment

Tenure and probation - Appointments will be made on a fixed-term basis for a period of 36 months, with possibility for a one-year extension. Appointments 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 100% of full-time, working Monday-Friday.

Pension - You will automatically be enrolled to become a member of USS (Universities Superannuation Scheme) – a defined benefits 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 41 days inclusive of public holidays. For new part-time employees, annual leave will be pro rata'd based on days worked. The leave year runs from 1 October to 30 September.

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 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. Candidates are requested to provide references at the point of application.

Equality and Diversity - We particularly encourage women and/or candidates from a Black, Asian and Minority Ethnic background to apply for this vacancy as they are currently under-represented at this level within our 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/>

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



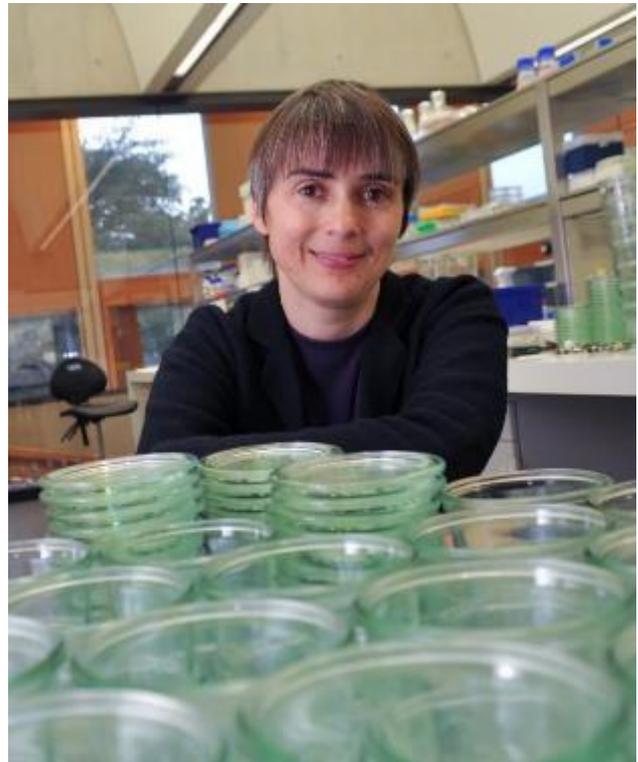
Working at the University

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 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 directed to:

Professor Mete Atatüre

Email: ma424@cam.ac.uk

If you have any queries regarding the application process please contact rutherford.hr@phy.cam.ac.uk

The closing date for applications is: **28 October 2024**

The interview date for the role is: **5-12 November 2024**