

University Lectureship in Biological/Biomedical Physics:

Further Information for Applicants

These notes are intended as an introduction to the Department and a brief overview of our research in biological/biomedical physics, together with a few remarks about the Cambridge system that may be of benefit to those unfamiliar with it.

1. The Department

The Cavendish Laboratory was founded in 1871, along with the appointment of James Clerk Maxwell as the first Cavendish Professor. It has a distinguished intellectual history, with 29 Nobel prizewinners who worked for considerable periods within its facilities, and is associated with many notable discoveries, including the electron and the structure of DNA. In 1973, the Laboratory moved from the historic centre of Cambridge to a greenfield site, a mile west of the city centre. This formed the nucleus for the University's development of a new physical science campus in West Cambridge, and we are now planning major redevelopment associated with new research activities.

The Department of Physics, housed in the Cavendish Laboratory, is large. Currently there are approximately 60 teaching staff, 150 postdoctoral fellows and 300 graduate students – in total (including administrative and technical support staff and academic visitors) a complement of about 800 people. Total research grant income was over £20M in 2010-11, and has roughly doubled in the last decade. The Department submitted the research of 141 members for the 2008 National Research Assessment Exercise performed by the Higher Education Funding Council for England (HEFCE) and 95% of submissions were rated as internationally recognised, excellent or world-leading. The undergraduate teaching programme is a vigorous one, with about 120 students annually proceeding to the 4-year MSci degree in Physics. In the first year, about 400 students take physics as part of the Natural Sciences Tripos.

Research activities span all the areas of physics, and are organised under research groupings: Astrophysics, Atomic, Mesoscopic, and Optical Physics, Biological and Soft Systems, Detector Physics, High Energy Physics, Optoelectronics & Microelectronics, Nanophotonics, Quantum Matter, Theory of Condensed Matter, Scientific Computing, Semiconductor Physics, Structure and Dynamics, Surface and Fracture and Thin-film Magnetism. Information about current research activities in these areas is available at: <http://www.phy.cam.ac.uk/research/http://www.phy.cam.ac.uk/research/>

2. Biological and Soft Systems and the Physics of Medicine

Over the past decade significant investment has been made by the University and the Department in the general area of Biological/Biomedical and Soft Matter Physics including the appointment of 4 lecturers and an RCUK fellow, the building and fitting out of the Physics of Medicine Building and the recent appointment of Professor Ben Simons to the Herschel Smith Chair in the Physics of Medicine. This area of work fits squarely within one of the School of Physical Science's five strategic research areas: the Physics, Chemistry and Mathematics of Life. The activity in Physics has been steadily growing over the past 5 years, with links into many departments within the School of Physical Science, but also beyond into the School of Biological Sciences, the Clinical School and the School of Technology. This field of research is inherently interdisciplinary, though the physics approach sits at the heart of many of the problems. The newly appointed Herschel Smith Chair is currently

evaluating a strategic plan for the Physics of Medicine initiative and its position within the wider university which will also directly impact on this whole field.

BSS is a large group of over 100 researchers. There are 8 permanent staff members (3 professors, 1 reader and 4 lecturers) plus a number of research fellows. The principal research areas of the group are covered by permanent staff members (to whom informal inquiries can be directed), headed by Professor Donald (amd3@cam.ac.uk).

Professor Athene Donald is an experimentalist whose research deals with structure-property relationships (with an emphasis on microscopy and microrheology) in both soft matter and biological systems, including protein aggregation and cellular biophysics and has links with the Vet School and Genetics within the university;

Professor Eugene Terentjev performs both theory and experimental research, with a particular focus on materials containing liquid crystal elastomers and carbon nanotubes and filamentous materials (eg for electrospinning but also amyloid aggregates); he has strong links with research in engineering and chemistry;

Professor Ben Simons, is a theorist who sits in the TCM group. He has research interests in the fields of biophysical, mesoscopic physics, correlated quantum systems and ultracold atom physics. He currently holds the Herchel Smith Chair in the Physics of Medicine;

Professor Ulli Steiner's group study micro- and nanoscale pattern formation processes that take place at surfaces and in thin films, these aspects being relevant to displays, bio-chips, and surfaces with special properties such as anti-reflective coatings and self-cleaning surfaces; their work allies closely with OE/ME/NP.

Dr Ulrich Keyser focusses on understanding and controlling transport processes through membranes of both biological and technological origin, using a range of techniques (optical tweezers, fluorescence microscopy, ionic current detection, micro- and nanofluidics) to study soft matter and biological physics at the micro- and nanometer scale.

Dr Pietro Cicuta is interested in understanding soft materials and related problems in biology such as membrane physics and infectivity, using techniques including optical tweezers, microrheology, advanced confocal microscopy and image analysis methods. He has strong links with the Vet School and PDN within the University.

Dr Richard Ansorge works closely with the Medical School developing MRI/PET instrumentation and associated algorithms for image analysis.

Dr Erika Eiser holds a joint appointment with the BP Institute and also has strong links with Chemistry; her research focusses on structure and rheology of colloids, including novel materials involving DNA base pairing to structure the fluid.

Dr Jochen Guck now holds a 20% appointment, having recently moved to Dresden; he has developed a novel optical tool for characterising the mechanical properties of biological materials using crossed laser beams, and also has a strong interest in the properties of the central nervous system.

3. Person Specification

We are looking for an internationally leading researcher, with a first and higher (PhD) degree in physics or a closely related field and who has already established a degree of research independence, with evidence of publishing high quality papers in the interdisciplinary area of biological/biomedical physics. Additionally, it would be expected that the successful candidate is likely to have shown an ability to attract research funding; have made oral presentations at international conferences; have established some interdisciplinary research links; to have undertaken some teaching; and also have shown a contribution to other activities such as outreach or research supervision.

4. Some notes on the Cambridge and UK system

For those unfamiliar with it, our system has some quirks, most of which provide hidden advantages. Academic Positions. There are four levels of permanent academic position in Cambridge, University Lecturer, University Senior Lecturer, Reader, and Professor, with promotion between them determined by an annual promotions procedure. Lecturers are generally appointed for a probationary period of five years, and subject to satisfactory performance, are then re-appointed to the retiring age (currently 67). As a rough approximation, a University Lecturer when first appointed corresponds to an assistant professor in the US system, and the vast majority of appointments are confirmed at the end of the probation period. In recent years, our most successful staff have been promoted rapidly to Readerships, and then to personal Professorships – more than half the academic staff at the Cavendish are full Professors.

The University, the Departments, and the Colleges are linked in a complicated historical relationship that is mutually beneficial but not simple. Students (both graduate and undergraduate) are admitted by one of the 31 colleges, although in the case of graduate students the Departments determine admissions before the Colleges are involved. Almost all undergraduates, and many graduate students, live in a college. The teaching of students is shared between the Colleges and the Department, with the Colleges arranging small group teaching (“supervision”) in the first two years, and the Department providing lecturing, laboratory classes, and advanced supervisions. Most academic staff will also be invited to join a college as a teaching or professorial “fellow”. College teaching is remunerated separately from the University teaching, and appointment to a College is a separate matter from a University appointment. Membership of a College adds an important social and intellectual dimension for many of the academic staff. The Head of Department and senior faculty can give more advice.

Undergraduate teaching.

Science students in Cambridge “read” for the Natural Sciences Tripos, which covers all the Physical and Biological Sciences, but is separate from Medicine, Engineering, and Mathematics. In their first year (“Part 1A”), they will typically divide their time between three experimental sciences and mathematics (about 400 students take physics). In the second year (Part 1B) about 150 physicists spend two-thirds of their time studying physics and one third another subject, usually mathematics. In the third year (Part II) they concentrate on physics and they can graduate at this point with a BA degree. Most of our students (around 120) choose to continue to a fourth year (Part III) where they take a range of masters level courses in physics and related disciplines, do an advanced project, and

graduate with both a BA and an MSci degree. This structure ensures that in the early years our students are exposed to a range of disciplines. The very competitive nature of entry to Cambridge means that they are hand-picked for their motivation to learn about science; none are taking our courses simply to score required credits. The teaching term is short and intense (three terms of eight weeks) and in the first three years most of the assessment is by end-of-year examination. A typical teaching load in the department is a 16 or 24 lecture course (in one term out of three), a laboratory class or advanced option course (again in one term out of three), supervision of one or two advanced undergraduate projects, and examination duties most years. Further details of the teaching programme can be found on the departmental website:

<http://www.phy.cam.ac.uk/teaching>

5. Terms and conditions

The appointment will be subject to the *Statutes and Ordinances* of the University and will be until the retiring age, subject to the satisfactory completion of a probationary period of five years (see 3 above). The stipend will be on the scale of £36,862-£46,696 per *annum* with the initial point determined according to experience. The person appointed will be eligible to become a member of the Universities Superannuation Scheme. The University has a scheme to assist with relocation expenses. College Fellowships (see 3 above) normally attract separate, additional, remuneration.

The Department is committed to developing its working practices and environment to the benefit of all: it is the only Department in the University to hold an Athena SWAN Silver award in recognition of its initiatives in encouraging women in science. Details of the University's policies in support of families are at <http://www.admin.cam.ac.uk/offices/hr/policy/>

6. Application procedure

Applications, including a curriculum vitae, a statement (up to six pages) of research experience to date and of research plans for the future, and a completed CHRIS/6 application cover sheet (<http://www.admin.cam.ac.uk/offices/hr/forms/chris6/>) Parts I and III only, should be sent by email to the Head of Department's Office (email hod@phy.cam.ac.uk), to arrive no later than Friday 2 March 2012.

Candidates should ask their three referees to write directly on their behalf to the Head of Department, Professor James Stirling, (email hod@phy.cam.ac.uk) by Friday 2 March.

Cavendish Laboratory

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