University of St Andrews

School of Physics and Astronomy

Research Fellow in Cell Mechanics and Biophotonics – AR1976AC

Further Particulars for Applicants

Soft Matter Photonics Group

The School of Physics and Astronomy has a world-leading research profile that covers a broad spectrum from fundamental to applied physics. The research is broadly grouped into three areas: photonics, condensed matter physics, and astronomy. In the 2014 Research Assessment Exercise, the School was rated third in the UK on quality of research. (Bio)photonics is internationally recognised as one of the strengths of Scottish universities, and the research groups in St Andrews are among the leading groups in their fields. The School has around 30 academic staff, 40 contract research staff, 80 postgraduate students, and 25 technical and administrative staff. Most of the work is carried out in the purpose-built accommodation on the North Haugh site of the University, right next to the new Medical & Biological Sciences building. The School is a founder member of SUPA, the Scottish Universities Physics Alliance, a trans-institutional alliance embodying a common strategy for physics across Scotland, undertaking world-leading research initiatives, and running an innovative Scotland-wide graduate school.

The Soft Matter Photonics Lab led by Professor Malte C Gather develops new photonic tools for the life sciences. It was established at the School in 2013 with funds from the second SUPA phase and from other funding bodies, including the Human Frontier Science Program and the European Research Council. Prof Gather has previously led research groups at TU Dresden in Germany and at Harvard Medical School in the US. He is possibly most well-known for the invention of the biological laser, which was recognized as one of the top 10 breakthroughs in physics in 2011. Inspired by the idea of these unique lasers, the group works on functional imaging modalities for cellular biomechanics and recently developed a new interference-based method to image cellular forces with unprecedented spatial and temporal resolution [Nature Cell Biology 19, 864 (2017)]. Other research is on embedding micro-lasers into living cells for cell-tracking and on organic LEDs as light source for optogenetics. Since 2010, Prof Gather and his team have published over 100 papers, including twelve in Nature or Science titled journals.

The group provides a dynamic, innovative, highly creative and constructive working environment. It has now completed setting up a modern state-of-the-art biophotonics lab, containing amongst other infrastructure a range of highly sensitive cameras, tuneable lasers, high-end spectrometers, a special atomic force microscope for cell imaging and manipulation (a first-of-its-kind in the U.K.), several custom-made functional imaging systems, and a fully equipped cell culture facility for exclusive use by the group. Through close collaboration with the Biomedical Sciences Research Complex (BSRC) – an interdisciplinary research centre spanning biology, chemistry, physics and medicine – the team has access to further outstanding research facilities, including confocal and super-resolution microscopes, NMR and mass spectrometry, CL3 containment laboratories, cells sorting, electrophysiology, etc. The School operates two state-of-the-art cleanroom facilities (one just recently opened), a major new processing line for organic semiconductor devices, electron beam lithography, a modern fast-spectroscopy lab, and several other key pieces of equipment. The group maintains a wide range of external collaborations, including with teams at Harvard Medical School, University of Cambridge, Columbia University, Universität Heidelberg and University of Iceland.

The group and its infrastructure are now well established but remain in a phase of dynamic growth and high flexibility. Thus, this is a particularly productive time for the whole team and new members will find exciting opportunities to develop their own projects and to expand the activities of the group further.

The job description for this role is attached below.

Job Description

Job Title: Research Fellow	Working Hours: Full time/36.25 hours per week
School/Unit: Physics & Astronomy	Grade/Salary Range: 6/£32,004 - £36,001 pa
Reporting to: Professor Malte C. Gather	Reference No: AR1976AC
Job Family: Academic (Research)	Start Date: As soon as possible
Duration of Post: up to 5 years	

Main Purpose of Role

We are looking to recruit a candidate with expertise in cell biology or photonics, excellent skills in advanced microscopy, device fabrication and/or optical design, and ideally with experience in cellular biomechanics. The fellowship may be available for up to five years, although appointment will normally be for one year in the first instance.

A central part of the work will be to further advance and to apply optical methods for studying biomechanics. In particular, the successful candidate will work with our new interference-based method for imaging cellular forces. Systematically developed by the group over the past few years, this pre-commercial phase method provides extreme mechanical sensitivity (in particular to vertical forces), long-term time-lapse capability, robust operation without zero-force reference images and fully automated data acquisition and analysis. The group uses the method to address a number of open questions and to study different biological systems, both in cooperation with other groups and independently. The appointed person will have full access to this technique and will influence its future development, e.g. towards measuring cell forces in 3D-tissue culture, applications in diagnostics, integration with microfluidics for controlled shear force stress and chemotaxis, or combination with optogenetics. The successful candidate is likely to work with a range of different biological systems, e.g. stem cells, neurons, immune cells, podocytes, bacteria biofilms, or potentially certain microorganisms.

As a senior member of the research group, the appointed person will be expected to take on responsibilities within the group, in particular with regards to training other group members and managing the fabrication and testing of the optical chips used for imaging cellular force, which involves work in our clean room facility. These activities provide a very good opportunity to become involved in different projects and to contribute widely to the scientific output of the group. Initiative to establish research on questions not currently addressed within the group will be supported.

The appointed person will have a PhD in physics, biology, chemistry or a relevant area. The work is highly interdisciplinary by its very nature and requires an interest in biophysics, photonics and cell biology / cell mechanics. Previous exposure to all of these would be useful but is not essential. A high level of self-motivation, confidence, creativity as well as eagerness to explore new fields is important. Enthusiasm to work with developmental stage equipment is expected. There is a possibility to appoint two candidates with complementary expertise.

A further requirement is to occasionally coordinate and organise group activities. Tasks could include liaising and organising meetings with external visitors, academics and industry. This is an exciting opportunity for people to join an internationally recognised activity with very good future career prospects.

Key Duties and Responsibilities

1. Conduct relevant individual and collaborative research projects
2. Design and perform experiments
3. Analyse and interpret research data
4. Plan and manage own research activity
5. Write up research for publication
6. Take a lead in preparing reports for collaborators and external funding bodies
7. Set an example of good research practice to research students, and assist in the supervision of student projects

Special Requirements:

International travel to meet collaborators and to present research may be required.

Please note that this job description is not exhaustive, and the role holder may be required to undertake other relevant duties commensurate with the grading of the post. Activities may be subject to amendment over time as the role develops and/or priorities and requirements evolve.

Person Specification

This section details the attributes e.g. skills, knowledge/qualifications and competencies which are required in order to undertake the full remit of this post.

Attributes	**Essential**	**Desirable**	**Means of Assessment** (i.e. application form, interview, test, presentation etc)
Education & Qualifications (*technical, professional, academic qualifications and training required)*	PhD in physics, biology, chemistry, medical research, photonics or similar		CV, application form, certificates
Experience & Knowledge (*examples of specific experience and knowledge sought*)	Physics, biology or chemistry Optics	Cell mechanics Photonic devices Advanced microscopy	CV, interview, application form
Competencies & Skills (*e.g. effective communication skills, initiative, flexibility, leadership etc*)	Working well with people Initiative Oral communication Paper and report writing Literature research	Optics alignment Device fabrication Live cell imaging Atomic force microscopy	Interview, presentation, publication track record
Other Attributes/Abilities	Keen interest in biophysics and desire to develop photonic tools for cell biology and biotechnology		Interview, presentation, application form

	Conference presentation Strong organisational skills		

Essential Criteria – requirements without which a candidate would not be able to undertake the full remit of the role. Applicants who have not clearly demonstrated in their application that they possess the essential requirements will normally be rejected at the short listing stage.

Desirable Criteria – requirements which would be useful for the candidate to hold. When short listing, these criteria will be considered when more than one applicant meets the essential requirements.

Other Information

We encourage applicants to apply online at www.vacancies.st-andrews.ac.uk/welcome.aspx, however if you are unable to do this, please call +44 (0)1334 462571 for a paper application form.

For all applications, please quote ref: AR1976AC

The University of St Andrews is committed to promoting equality of opportunity for all, which is further demonstrated through its working on the Gender and Race Equality Charters and being awarded the Athena SWAN award for women in science, HR Excellence in Research Award and the LGBT Charter; http://www.st-andrews.ac.uk/hr/edi/diversityawards/.

The University of St Andrews is a charity registered in Scotland (No SC013532).

Obligations as an Employee

You have a duty to carry out your work in a safe manner in order not to endanger yourself or anyone else by your acts or omissions.

You are required to comply with the University health and safety policy as it relates to your work activities, and to take appropriate action in case of an emergency.

You are required to undertake the Information Security Essentials computer-based training course and adhere to its principles alongside related University Policy and Regulations.

You are responsible for applying the University's equality and diversity policies and principles in your own area of responsibility and in your general conduct.

You have a responsibility to promote high levels of customer care within your own area of work/activities.

You should be adaptable to change, and be willing to acquire new skills and knowledge as applicable to the needs of the role.

You may, with reasonable notice, be required to work within other Schools/Units within the University of St Andrews.

You have the responsibility to engage with the University's commitment to Environmental Sustainability in order to reduce its waste, energy consumption and carbon footprint.

The University & Town

Founded in the early 15th century, St Andrews is Scotland's first university and the third oldest in the English speaking world.

Situated on the east coast of Scotland and framed by countryside, beaches and cliffs, the town of St Andrews was once the centre of the nation's political and religious life.

Today it is known around the world as the 'Home of Golf' and a vibrant academic town with a distinctively cosmopolitan feel where students and university staff account for more than 40% of the local population.

The University of St Andrews is a diverse and international community of over 11,000, comprising students and staff of over 120 nationalities. It has 8,800 students, just over 7,000 of them undergraduates, and employs approximately 2,540 staff - made up of c. 1,190 in the academic job families and c 1,350 in the non-academic job families.

St Andrews has approximately 50,000 living graduates, among them former Scottish First Minister Alex Salmond and the novelist Fay Weldon. In the last 90 years, the University has conferred around 1000 honorary degrees; notable recipients include Benjamin Franklin, Rudyard Kipling, Alexander Fleming, Iris Murdoch, James Black, Elizabeth Blackadder, Tim Berners-Lee and Hillary Clinton.

The University is one of Europe's most research intensive seats of learning. It is the top rated university in Scotland for teaching quality and student satisfaction. In the Research Excellence Framework (REF) 2014 the University was ranked top in Scotland for quality of research output and one of the UK's top 20 research universities.

St Andrews is consistently held to be one of the United Kingdom's top ten universities in university league tables compiled by The Times and The Sunday Times, The Guardian and The Complete University Guide. The University has eight times been named the top multi-faculty university in the UK in the National Student Survey – a direct reflection of the quality of teaching, assessment and facilities. In international and world rankings St Andrews scores highly for teaching quality, research, international outlook and citations. It is established as a World Top 100 institution in annual rankings produced by QS and Times Higher Education.

Its international reputation for delivering high quality teaching and research and student satisfaction make it one of the most sought after destinations for prospective students from the UK, Europe and overseas. In 2015 the University received on average 12 applications per place. St Andrews has highly challenging academic entry requirements to attract only the most academically potent students in the Arts, Sciences, Medicine and Divinity.

The University is closely integrated with the town. The Main Library, many academic Schools and Service Units are located centrally, while the growth in research-active sciences and medicine has been accommodated at the North Haugh on the western edge of St Andrews.

As the University enters its seventh century, it is delivering a varied programme of strategic investment, including the refurbishment of its Main Library and a major investment in its collections, the opening of a research library, the development of a major arts centre and a Music Centre, the refurbishment of the Students' Union, the provision of 900 additional students beds, the relocation of professional services to purpose built accommodation and the development of a wind-farm and green energy centre to offset energy costs.