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| **University of St Andrews**  **School of Physics and Astronomy**  **Research Fellow – AR2186AS**  **Further Particulars for Applicants** |

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| **Physics and Astronomy** |

The School of Physics and Astronomy has an internationally recognised set of research programmes in astrophysics, condensed-matter physics, and photonics. Detailed information provided by the groups can be accessed via the links above.

Around 30 academic staff work with approximately 50 research fellows and contract research staff, and about 55 PhD students. Our work is carried out in modern laboratories in St Andrews, as well as at major international research facilities in the UK and abroad.

The Synthetic Optics group ([www.st-andrews.ac.uk/physics/synthopt](http://www.st-andrews.ac.uk/physics/synthopt)) in the School of Physics and Astronomy at the University of St Andrews has a large portfolio of research projects aimed at designing and exploiting light matter interactions at the nanoscale. The range of applications targeted is equally wide and includes the development of advanced materials, nonlinear and complex photonic and biophotonics. All these strands converge in Dr Di Falco’s ERC consolidator grant “AMPHIBIANS”, started in February 2019, aimed at developing a novel biophotonic platform based on the all optical manipulation of photonic metasurfaces in microfluidic environments. This research position is open to candidates with a strong PhD in photonics, with a proven background in experimental optics and a strong interest in nanophotonics, also demonstrated through journal and conference dissemination.

The current trend in biophotonics is to try and replicate the same ease and precision that our hands, eyes and ears offer at the macroscopic level, e.g. to hold, observe, squeeze and pull, rotate, cut and probe biological specimens in microfluidic environments. The bidding to get closer and closer to the object of interest has prompted the development of extremely advanced manipulation techniques at scales comparable to that of the wavelength of light. However, the fact that the optical beam can only access the microfluidic chip from the narrow aperture of a microscopic objective limits the versatility of the photonic functions that can be realized.

AMPHIBIANS aims to introduce a new biophotonic platform based on the all optical manipulation of flexible photonic metasurfaces. These artificial two-dimensional materials have virtually arbitrary photonic responses and have an intrinsic exceptional mechanical stability. This cross-disciplinary project, bridging photonics, material sciences and biology, will enable the adoption of the most modern and advanced photonic designs in microfluidic environments, with transformative benefits for microscopy and biophotonic applications at the interface of molecular and cell biology.

The applicant should have demonstrated experimental experience in optical trapping and microscopy. A strong candidate will also have demonstrated or clear interest in acquiring expertise on the design and fabrication of the photonic membranes, using our clean room and nanolithography facilities. It is expected that the successful applicant for the advertised position will take these ideas further.

The initial contract is for 2 years with possible extension. The project is a unique opportunity for a motivated individual to work at the forefront of a cross-disciplinary and timely topic, which will most certainly produce results publishable in high impact factor journals.

**The job description for this role is attached below.**

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| **Job Description** |

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| Job Title: Research Fellow  School: School of Physics and Astronomy  Reporting to: Andrea Di Falco  Job Family: Academic Research  Duration of Post: 2 years in the first instance | Working Hours: Full-time/36.25 hours per week  Grade/Salary Range: Grade 6/£33,199 – £39,609 per annum  Reference No: AR2186AS  Start Date: As soon as possible |

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| **Main Purpose of Role** |

The Research Assistant will be required to develop an all optical manipulation protocol in microfluidics environments and contribute to the design and fabrication of photonic nanomembranes.

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| **Key Duties and Responsibilities** |

The key duty of the fellow entails the development of an optical microscopy setup for the all optical manipulation of the photonic metasurfaces, using holographic optical tweezers. The system will be based on an inverted microscope and interfaced with trapping and probing lasers, through spatial light modulators and digital micromirrors devices, controlled by a custom computer interface.

The system will later be extended through the addition of appropriate collection optics, a spectrometer and a sensitive camera, able to detect light from single fluorophores. This will enable later biological spectroscopy experiments. Additionally, the microscope will be equipped with suitable microfluidic incubator for cell-based experiments.

One aspect of the project requires the fabrication of tailored metamaterials and microfluidic chips, using the nanofabrication facilities of the School. It is expected that the fellow will engage productively with the members of the research team directly responsible for this activity. Additionally, the fellow will be encouraged to be directly involved in the fabrication work, in the measure required by the development of his/her primary duty.

It is expected that the fellow will independently and in collaboration with the rest of the research team analyse, interpret and write up results of the research. This will take the form of research reports, publications and contribution to conferences and workshops.

The fellow will also be involved in the assessment of students knowledge and supervision of undergraduate level projects and assist with the day to day supervision of post-graduate staff associated with the project.

It is expected that the fellow will work with colleagues on new potential joint projects directly related to this one, and collaborate with academic colleagues on areas of shared research interest.

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| **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.

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| **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 subjects relevant to the topic including strong component of photonics | One or more years post-doctoral research experience | Application form |
| Experience & Knowledge  (*examples of specific experience and knowledge sought*) | Experimental expertise in optical trapping, including the development of advanced microscopy systems and their control via computer interface (e.g. labview). | Working knowledge of plasmonics and nonlinear optics, e.g. for imaging or sensing applications.  Soft lithography for microfluidics applications.  Holography.  Nanofabrication, including electron beam lithography. | Application, publication record, Presentation, Interview |
| Competencies & Skills  (*e.g. effective communication skills, initiative, flexibility, leadership etc*) | Strong communication and collaboration skills.  Initiative and proactivity  Track record of published papers | Personal ambition to develop a research-oriented career | Application, interview |

**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.

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| **Other Information** |

We encourage applicants to apply online at [www.vacancies.st-andrews.ac.uk/welcome.aspx](http://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: AR2186AS

The University is committed to equality for all, demonstrated through our working on diversity awards (ECU Athena SWAN/Race Charters; Carer Positive; LGBT Charter; and Stonewall). More details can be found at <http://www.st-andrews.ac.uk/hr/edi/diversityawards/>.

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

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| **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.

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| **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.