LONDON'S GLOBAL UNIVERSITY

Department of Electronic & Electrical Engineering

Job Description

Research Fellow - Theoretical & Computational Modelling of Quantum Photonic Material and Devices

Grade: 7 - £35,328 per annum inclusive of London Allowance of £3092 per annum

Ref: 1792529

Department: Electronic & Electrical Engineering

Location: London

Reports to

Professor Nicolae Panoiu

Context

We wish to recruit a Research Fellow from 1st April 2019 or as soon as possible thereafter, until 31st May 2020 to work on an ERC funded project, ***Quantum Metamaterials: A Theoretical and Computational Approach Towards Seamlessly Integrated Hybrid Classical/Quantum Nano-structures (QUANTUMMETALINK)***. The overarching aim of this project is to initiate and advance an integrated theoretical and computational research programme in an emerging area of metamaterials research, namely Quantum Metamaterials. Unlike ordinary materials, which are assembled at the atomic level, metamaterials are composite materials built up from artificially engineered meta-atoms and meta-molecules. The fundamental idea in this area of research is that remarkable physical properties beyond those available in naturally occurring materials can be achieved by designing the meta-constituents of the metamaterial and structuring it at a scale comparable or smaller than the optical wavelength. In this context, a new paradigm in metamaterials research emerges when the building blocks of metamaterials are quantum resonators, e.g., quantum dots, graphene dots, and quantum nanowires, case in which the macroscopic properties of quantum metamaterials are determined by the quantum properties of their basic constituents. We have organised this research programme along three synergistically integrated themes. The first will focus on the development of a general theory of the effective, macroscopic properties of quantum metamaterials. The key challenge is to build a theoretical framework in which the macroscopic properties of quantum metamaterials are derived directly from those of their quantum building blocks. The second theme will be geared towards developing a set of numerical methods and software tools for ab initio simulations of fundamental physical properties of quantum metamaterials. Finally, the third theme is devoted to the exploration of new science and novel applications of quantum metamaterials. Throughout the duration of the project, there will be two Research Fellows working collaboratively on this project, one on the classical electrodynamics aspects of the project and the other one on its quantum mechanical aspects.

Funding:

The post is available from 1st April 2019 or as soon as possible thereafter until 31st May 2020, in the first instance. Further funding to support the post may be available.

Main purpose of the job

Duties and responsibilities

The Research Fellow in Theoretical and Computational Modelling of Quantum Photonic Materials and Devices will be responsible for developing theoretical models and high-performance computer codes for modelling the interaction between dielectric and plasmonic nano-particles and quantum resonators, such as molecules and quantum dots. The following is indicative of the duties and responsibilities associated with this post:

- Lead on the development of theoretical models and high-performance computer codes for describing the interaction between nano-particles and quantum resonators, such as molecules and quantum dots.
- Validate the theoretical models and software tools by studying specific test problems.
- Regularly communicate and work in close collaboration with the post supervisor and national and international collaborators.
- Publish research in leading journals and present it at national and international conferences.
- Contribute to the preparation of reports and the presentation of results at progress meetings.
- Contribute to the overall activities of the research team and department as required.
- Ensure that equipment is safe and maintained in working order and to maintain an awareness of UCL Fire and Health and Safety regulations.
- Actively follow UCL policies including Equal Opportunities policies.

As duties and responsibilities change, the job description will be reviewed and amended in consultation with the postholder, and will carry out any other duties as are within the scope, spirit and purpose of the job as requested by the line manager or Head of Department/Division.

The post is to be held in the UCL Department of Electronic and Electrical Engineering. Access to UCL's Legion HPC cluster will be provided. The commercial aspects of the project will be carried out in collaboration with UCL Business (UCLB) and potential Industrial partners.

Person Specification

Criteria	Essential or Desirable
Qualifications & Skills	
PhD in relevant area of physical sciences or engineering. (or about to submit)	Essential
A first degree in theoretical physics, applied mathematics, materials sciences or electrical engineering	Essential
In-depth knowledge of quantum description of light-matter interaction	Essential
Expertise in scientific programming - C/C++ or FORTRAN	Essential
Knowledge of quantum and nonlinear optics	Essential
Strong mathematical skills.	Essential
Extensive knowledge of one or more computational quantum mechanics methods, including DFT, TD-DFT, and Monte Carlo	Desirable
In-depth knowledge of electromagnetic theory	Desirable
Ability to analyse and write up data in the form of journal papers and reports.	Essential
Ability to organise and plan work effectively to meet deadlines.	Esseential
Capability to develop an independent research profile within the period of the grant.	Desirable
Personal	
Excellent interpersonal and communication skills .	Essential
Ability to present technical information effectively to a range of audiences.	Essential
Commitment to high quality research.	Essential
Ability to work collaboratively and as part of a team.	Essential
Commitment to UCL's policies eg equal opportunity, health and safety.	Essential

If the successful candidate has not yet been awarded their PhD, appointment will be made as a Research Assistant (Grade 6B)*. Payment at Grade 7 will be backdated to the date of final submission of the PhD thesis including corrections, once the PhD has been awarded.

* Research Assistant (Grade 6B): point 24-26. Salary range £30,922 to £32,607 (inc. London Allowance of £3,092 pa).

About UCL and the Department of Electronic and Electrical Engineering

University College London (UCL) was founded in 1826 as the third university in England, after Oxford and Cambridge. UCL is the first university in England to admit students of any race, class or religion, and the first to welcome women on equal terms with men. UCL is organized into 11 constituent faculties, within which there are over 100 departments, institutes and research centres. UCL has 983 professors and more than 7000 academic staffs who are dedicated to research and teaching of the highest standards. Its student community is almost 36,000, the largest in the UK. There are 29 Nobel Prize winners and three Fields medalists amongst UCL's alumni and current and former staff. UCL is the top rated university in the UK for research excellence (REF2014). It has a strong tradition and large knowledge base in medical research with a dedicated institute on Healthcare Engineering and 10+ hospitals. UCL has world-class support for researchers and has been voted the best place for postdoctoral researchers to work for consecutive years by The Scientist magazine. The main campus of UCL is located in central London, close to British Museum, West-End and Thames River.

The Department of Electronic and Electrical Engineering at UCL was established by Professor Sir Ambrose Fleming in 1885 and has a very strong research culture, state-of-the-art research equipment and facilities, and a very rich history of many fundamental research achievements in electronic and electrical engineering. The department has received top ratings in every UK research evaluation carried out to date.

Further information regarding UCL may be found at:
www.ucl.ac.uk/

Information about the departments may be found at:
www.ucl.ac.uk/eee

How to Apply

Interested applicants are encouraged to make Informal enquiries about the post to Professor Panoiu.

+ 44 (0)20 7679 2819 | n.panoiu@ucl.ac.uk

All applications should be submitted via UCL online recruitment system at the following link:
http://www.ucl.ac.uk/hr/jobs/

Job Reference: **1792529**

If you have any queries regarding the application process please contact Vicky Coombes at v.coombes@ucl.ac.uk quoting reference **1792529**

UCL Taking Action for Equality