

<b>Title:</b>	Research Associate in Silicon-based Quantum Computing
<b>Reference:</b>	1684675
<b>Grade:</b>	UCL Grade 7
<b>Salary:</b>	£34,635 – £41,864 (including London Allowance) per annum
<b>Terms and Conditions:</b>	In accordance with the conditions of employment as laid down in the relevant UCL Staff policies
<b>Accountable to:</b>	Prof John Morton

### **Job Summary:**

The *Quantum Spin Dynamics* group at UCL, led by Prof John Morton, is inviting applications for at least one post-doctoral research associate in silicon quantum devices. This position is funded for 2 years in the first instance.

The aim of the project will be to work on the experimental development of silicon-based quantum computing architectures, funded by a recently start-up, *Quantum Motion Technologies*.

Successful candidates will be involved in the design of silicon-based quantum devices, liaise with advanced fabrication facilities regarding their fabrication, work with theory and modelling colleagues on developing fault-tolerant architectures, and perform low-temperature characterisation and coherent control experiments using the devices.

### **Duties and Responsibilities:**

- Design silicon nanodevices to realise elementary building blocks of a silicon quantum information processing architecture, and liaise with fabrication facilities regarding their fabrication
- Characterise and measure silicon nanodevices, for example performing transport and reflectometry measurements at cryogenic temperatures, and coherent control techniques to realise quantum operations
- Use cleanroom fabrication techniques for limited post-processing of devices – in most cases, the bulk of the fabrication will have been performed elsewhere
- Work with theory and modelling collaborators on this project on the refinement and development of fault-tolerant quantum computing architectures
- Specify, procure, commission and maintain instruments, fabrication tools, cryostats and magnets
- Prepare progress reports on research for funding bodies as required.

- Prepare manuscripts for submission to peer-reviewed journals
- Prepare invention disclosures
- Prepare presentations, including text and images, for delivery by self as well as others
- Travel to meetings both domestically and abroad to discuss results and to learn about related developments elsewhere
- Travel to facilities, both domestic and abroad, to perform experiments characterizing devices and/or enhancing/testing fabrication processes
- Contribute to the preparation and drafting of research bids and proposals.
- Contribute to the overall activities of the research team and department as required.
- Contribute to the induction and direction of other research staff and students as requested.
- Carry out any other duties as are within the scope, spirit and purpose of the job as requested by Prof Morton.
- Actively follow UCL policies including Equal Opportunities and Race Equality policies.
- Maintain an awareness and observation of Fire and Health and Safety Regulations.

### **Person Specification**

#### **Essential Qualifications**

- A PhD in Engineering, Physics or a related discipline, by the time of taking up the appointment.

#### **Essential Experience**

- Experience in experimental quantum information OR in measuring silicon nano-devices
- Good oral, written and presentation skills.
- Excellent IT skills, including word-processing, presentation software, and computational software for analysing experimental data such as MATLAB or MATHEMATICA.
- Experience of managing a research project and setting research targets; evidence of creativity in research and an understanding of the requirements of research and the publication of scientific papers.

#### **Desirable Experience**

- Experience in performing measurements at liquid helium temperatures
- Experience in performing measurements at mK temperatures, including the use of microwaves, and/or operating a dilution fridge
- Experience in transport and/or RF reflectometry measurements of quantum devices
- Experience in designing, fabricating and measuring silicon nano-devices at cryogenic temperatures
- Experience in coherent control of spins or spin qubits
- An understanding of the principles of quantum information processing, coherent control and decoherence of spins and/or semiconductor physics
- A strong track record in publishing high impact research

**Essential skills and abilities**

- Well-organised, attention to detail and ability to meet deadlines.
- Ability to think logically, create solutions and make informed decisions.
- Fluency and clarity in spoken English.
- Good written English.
- Ability to work collaboratively as part of team.
- Commitment to high quality research.
- Ability to deliver adequate training and support to other lab users

## **London Centre for Nanotechnology**

The London Centre for Nanotechnology is an interdisciplinary joint enterprise between University College London and Imperial College London. In bringing together world-class infrastructure and leading nanotechnology research activities, the Centre aims to attain the critical mass to compete with the best facilities abroad. Research programmes are aligned to three key areas, namely Planet Care, Healthcare and Information Technology and exploit core competencies in biomedical, physical and engineering sciences.

The Centre occupies a purpose-built eight storey facility in Gordon Street, Bloomsbury, as well as extensive facilities within different departments at South Kensington. LCN researchers have access to state-of-the-art clean-room, characterisation, fabrication, manipulation and design laboratories. This experimental research is complemented by leading edge modelling, visualisation and theory.

LCN has strong relationships with the broader nanotechnology and commercial communities, and is involved in much major collaboration. As the world's only such facility to be located in the heart of a metropolis, LCN has superb access to corporate, investment and industrial partners. LCN is at the forefront of training in nanotechnology, and has a strong media presence aimed at educating the public and bringing transparency to this emerging science.

### **About UCL**

UCL is one of the world's top universities. Based in the heart of London, it is a modern, outward-looking institution. At its establishment in 1826, UCL was radical and responsive to the needs of society, and this ethos – that excellence should go hand-in-hand with enriching society – continues today.

UCL's excellence extends across all academic disciplines; from one of Europe's largest and most productive hubs for biomedical science interacting with several leading London hospitals, to world-renowned centres for architecture (UCL Bartlett) and fine art (UCL Slade School).

UCL is in practice a university in its own right, although constitutionally a college within the federal University of London. With an annual turnover exceeding £1 billion, it is financially and managerially independent of the University of London.

### The UCL community

UCL's staff and former students have included 29 Nobel prizewinners. It is a truly international community: more than one-third of our student body – more than 35,000 strong – come from 150 countries and nearly one-third of staff are from outside the UK.

UCL offers postgraduate research opportunities in all of its subjects, and provides more than 200 undergraduate programmes and more than 400 taught postgraduate programmes. Approximately 54% of the student community is engaged in graduate studies, with about 29% of these graduate students pursuing research degrees.

## Quality of UCL's teaching and research

UCL is independently ranked as the most productive research university in Europe (SIR).

It has 983 professors – the highest number of any university in the UK – and the best academic to student ratio of any UK university (*The Times*, 2014), enabling small class sizes and outstanding individual support.

In Research Excellence Framework 2014 (REF2014), UCL was rated the top university in the UK for 'research power' (the overall quality of its submission multiplied by the number of FTE researchers submitted). It was rated top not only in the overall results, but in each of the assessed components: publications and other research outputs; research environment; and research impact. REF2014 confirmed UCL's multidisciplinary research strength, with many leading performances across subject areas ranging from biomedicine, science and engineering and the built environment to laws, social sciences and arts and humanities.

## Equality

UCL is proud of its longstanding commitment to equality and to providing a learning, working and social environment in which the rights and dignity of its diverse members are respected.

Some highlights below:

- **Race Charter Mark** - UCL holds a Bronze Race Equality Charter Mark award, recognising UCL's commitment to improving the representation, progression and success of minority ethnic staff and students.
- **Athena SWAN** - UCL holds an institutional Silver **Athena SWAN** award – this recognises our commitment to and impact in addressing gender equality. Departments at UCL are also engaged in the Athena SWAN charter, with 29 departments holding an award; 16 Silver and 13 Bronze.
- **Staff networks** - We have a number of staff networks that run a range of social and development activities, for example **Out@UCL**, **PACT**, **Enable@UCL**, **the race equality staff network**, **Astrea** and **UCL Women**.
- **B-MEntor** – **B-MEntor** is a mentoring scheme for black and minority ethnic staff. The mentoring scheme is a collaborative initiative with a number of London-based universities.
- **Sabbatical Leave following maternity** – UCL provides one term of sabbatical leave without teaching commitments for research-active academics returning from maternity, additional paternity, adoption or long-term carer's leave. This support for returners enables staff to more quickly re-establish their research activity.

Please see our **Equalities and Diversity Strategy 2015-2020** for information on our current priorities.

## Location and working environment

Based in Bloomsbury, UCL is a welcoming, inclusive university situated at the heart of one of the world's greatest cities.

UCL's central campus is within easy reach of Euston, Kings Cross and Marylebone mainline stations, the new Eurostar terminal at St. Pancras and the following Underground stations - Euston Square, Warren Street, Goodge Street and Russell Square. Road connections to the M1 and M40 motorways give easy access to the north and west road networks. There are also good public transport links to Heathrow airport.

## **Application procedure**

Further details about the post and the application procedure are available at [www.london-nano.com](http://www.london-nano.com). If you are unable to apply online please contact Denise Ottley at the London Centre for Nanotechnology, [d.ottley@ucl.ac.uk](mailto:d.ottley@ucl.ac.uk) or 17-19 Gordon Street, London WC1H 0AH, for advice.