



**A FOUR-YEAR, FULLY-FUNDED PHD SCHOLARSHIP  
OPEN TO ALL APPLICANTS**

## **Nonlinear dynamics and control of the electrophysiology of atrial fibrillation**

**Location:** School of Mathematics and Statistics, University of Glasgow, Glasgow, UK.

Remark: The University of Glasgow is the fourth-oldest university in the English-speaking world and is ranked amongst the top 100 research Universities of the world.

**Supervisors:**

- Dr R Simitev (lead, Mathematics),
- Dr A Workman (Cardiovascular and Medical Sciences),
- Prof A Rankin (Medicine),
- Prof M Cartmell (external collaborator, Engineering, Sheffield).

**Scholarship details:** The scholarship:

- is for a four (4) year period of PhD studies,
- fully covers all tuition fees,
- provides a stipend of GBP 13,590 per every year of the project to sustain the PhD Scholar,
- provides GBP 3,500 per year for research, travel and conference attendance costs.

Remark: This is a prestigious "Lord Kelvin & Adam Smith Scholarship" for PhD studies funded by the University of Glasgow. The 4-year duration is especially generous and will provide ample time for independent research.

**Eligibility:** The scholarship is open to ALL including UK, EU and Overseas applicants.

**Project details:** Atrial fibrillation (AF) is a common and debilitating cardiac arrhythmia in which internal electrical properties of the heart are adversely affected. Clinical treatment is not entirely satisfactory, partly because the ionic mechanisms underlying AF are incompletely understood. A wealth of data from clinical and physiological experiments in single atrial cells exists, and detailed mathematical models of single-cell atrial electrical excitation are available. The accuracy of the mathematical models in recent years has become very impressive, but the price to pay is their complexity, which precludes any possibility of analytical treatment and reduces the theory to mere empirical studies based on numerical experimentation. With this in mind the challenge in the project is to reduce the available detailed models to a minimally complicated form that is amenable to mathematical analysis, but at the same time keep them sufficiently detailed so that they can reproduce as much relevant data as possible and answer specific questions arising from physiology and clinical practise. One specific challenge is, for instance, to use mathematical techniques to devise a robust feedback control algorithm that can suppress abnormal rhythms such as atrial fibrillation and then test it in physiological experiments. The student will also have plenty of opportunity to steer research in his/her desired direction. This field is full of interesting related mathematical problems, and there is ample scope to widen one's view beyond the specific problems around which this PhD is centered.

**Professional development opportunities:**

- On the mathematical side, you will gain experience in singular perturbation methods, asymptotic theory, numerical and computational methods and mathematical modelling techniques applied to real-life physical and biological problems.
- On the physiological side, you will learn various electrophysiological techniques, including voltage-clamping of ion currents, and current clamping of action potentials, from enzymatically-isolated human atrial cells, obtained from patients undergoing cardiac surgery in Glasgow, using sophisticated, advanced patch-clamp techniques.
- You will become unique in our team in the ability to link experimental work and mathematical modelling.
- Upon completion the you will be a Postdoctoral researcher with broad interdisciplinary education. You will not only be prepared for an independent scientific career, but will be much sought after by both academia and industry for the rare combination of experimental and mathematical skills.

**Requirements for the applicants:** Essential requirements:

- MSc or a first-class honors degree in Mathematics, Physics, or a relevant field with a strong quantitative background.
- Interest in Mathematical Biology, Biological Physics, Bioengineering.
- Interest in Biology.
- Interest and affinity to physiological experiments.
- Interest and affinity to numerical modeling and computation.

## Desirable criteria:

- Specialization/Experience in Mathematical Biology, Biological Physics, Bioengineering, Computational Physics.

**How to apply:** Please, send

- a current CV,
- an Academic Transcripts from your University studies,
- evidence of your knowledge of English (if a non-native speaker),
- a statement of relevant experience and research interests including undergraduate and postgraduate project work, dissertations or any publications you might have written.
- the names and emails of two referees who can be contacted in case you are shortlisted for the Scholarship,

to

**Radostin.Simitev@glasgow.ac.uk**

Remark: Please, describe your qualifications and experience in the best possible way. We are interested to hear from you even if you cannot meet some of our criteria.

**Deadline for application:** Please, sent applications by **2012-07-312**. After this deadline, please inquire if the position is still open.