Background
Mathematical models of cardiac electrophysiology are beginning to be used for safety testing of new pharmaceutical compounds, to identify potential for increased pro-arrhythmic risk as a drug side effect [1], [2]. There are substantial challenges in identifying the most appropriate models, parameterising them whilst considering uncertainty and variability, and designing experiments to do these tasks efficiently [3], [4].

We are recruiting up to two Level 4 postdoctoral research assistants to work on a new £2M Wellcome Trust funded programme of research. The grant will be developing and refining mathematical cardiac electrophysiology models for ion channels and cardiac cells for use in predicting pharmaceutical drug-induced changes to cardiac activity and subsequent risk in the clinic.

There will be a team of at least five people working on the project and based in Mathematical Sciences in Nottingham: the Principal Investigator; a senior research associate/fellow; these two research associate/fellow positions; and a dedicated research software engineer. In addition, we will be working closely with a number of experimental laboratories and industrial partners, and the post holders will undertake research visits to conduct their own experiments and collaborate with experimental electrophysiology groups, particularly in UMC Utrecht in the Netherlands and the Victor Chang Cardiac Research Institute in Sydney, Australia. As a result of the unique collaborative opportunities described above, applicants should have a very strong interest in interdisciplinary and team-based research.

We are looking for expertise in EITHER mathematical modelling of the dynamics of a biological system, involving numerical simulations e.g. ODE, PDE or agent-based modelling OR extensive statistics/data science experience – for instance, fitting statistical/mechanistic models to data, performing uncertainty quantification/inference with methods such as MCMC.

The particular research areas for these roles are respectively: 1) to develop methods and experiments to tailor mathematical models of cellular electrophysiology (action potential models) to particular batches of stem-cell derived cardiomyocytes and other cell types, particularly considering use of data from the dynamic clamp technique [5]; and 2) to develop an uncertainty quantification framework in which to consider our models’ inputs and parameters (and also model structures/equations); to compare model predictions with real experiments, and to infer whether the underlying drug effects are consistent with what we already know the drug does, or whether the drug is having additional effects.

For informal enquiries please contact gary.mirams@nottingham.ac.uk

References

Additional Information
The School of Mathematical Sciences is in the top ten mathematics departments nationally, and was recognised for the quality of its research in the most recent national Research Excellence Framework (REF). The REF assesses UK higher education institutions in all subject areas and is based on submissions provided by each university detailing their research and the wider societal impact that it has had. In the School, 32% of our research was recognised as world-leading and a further 56% as internationally excellent. Its research environment was classified as 75% world-leading in vitality and sustainability, with the remaining
25% internationally excellent - reflecting the outstanding setting the School provides for its 80 academic staff as well as its postdoctoral and postgraduate researchers.

The School has a substantial student population which includes 850 undergraduate students, 80 postgraduate MSc students and 120 postgraduate PhD students.

The School is committed to promoting Equality and Diversity. This has been recognised in the awarding of an Athena SWAN Bronze Award, and the School is working hard towards further progress. Athena SWAN http://www.athenaswan.org.uk/ recognises and celebrates good employment practice for women working in STEM subjects.