

Melanie I. Stefan

Professional Appointments

- Apr 2015 – **Edinburgh-Zhejiang Lecturer**, *Edinburgh Medical School: Biomedical Sciences*.
University of Edinburgh (UK)
- Jan 2015 – **Visiting Scientist**, *Modelling of allosteric synaptic proteins*.
Mar 2015 Babraham Institute, Cambridge (UK), Le Novère lab
- Jul 2013– **Lecturer and Curriculum Fellow**, *Quantitative Biology*.
Dec 2014 Harvard Medical School, Boston (US), Department of Neurobiology and Curriculum Fellows Program
- Nov 2010– **Postdoctoral Fellow**, *Modes of regulation of postsynaptic proteins*.
Jun 2013 California Institute of Technology, Pasadena (US), Kennedy lab
- Jan 2010– **Visiting Fellow**, *Understanding CaMKII regulation through modelling and experiment*.
Jun 2010 University of Tokyo (JP), Kuroda lab
- Oct 2005– **Research Fellow**, *Allosteric regulation and cooperativity in synaptic plasticity*.
Oct 2010 EMBL-European Bioinformatics Institute, Cambridge (UK), Le Novère lab
- Jan–Dec **MSc research**, *Characterisation and genetic mapping of zebrafish skin mutations*.
2004 Max Planck Institute for Developmental Biology, Tübingen (DE), Nüsslein-Volhard lab

Academic Qualifications

- PhD **Molecular Biology/Bioinformatics**, 2009, EMBL-EBI and Clare College, Cambridge.
- MSc **Genetics**, 2005, University of Salzburg, with distinction.
- MSc **Mathematics**, 2012, The Open University (UK).

Research Interests

Modelling neuronal signalling pathways.

intellectual disabilities/autism spectrum disorders; multi-scale models
Calcium dynamics and calmodulin regulation; function and regulation of CaMKII

Theoretical and computational biochemistry.

allostery; cooperativity; multi-state modelling; sharing of models and techniques

Learning and memory in the classroom.

use of data from educational platforms; self-directed learning

Research Funding

- 2017 **RS Macdonald Seedcorn Grant**, *Edinburgh Neuroscience*.
- 2014 **SPARK grant**, *Harvard Initiative for Teaching and Learning*.
- 2010–2012 **Long-term post-doctoral fellowship**, *EMBO*.
- 2010 **Short-term post-doctoral fellowship**, *Japan Society for the Promotion of Science*.
- 2009–2010 **Short-term post-doctoral fellowship**, *EMBL*.
- 2005–2009 **Pre-doctoral fellowship**, *EMBL*.

2004 **Diploma student fellowship**, *Max-Planck society*.

Awards and Fellowships

2017 **Leadership Academy**, *German Scholars Organisation*.

2017 **Nominated for Best Research or Dissertation Supervisor Award**, *Edinburgh University Student Association*.

2016 **Leadership and Development Programme**, *Scottish Crucible*.

since 2104 **Chartered Biologist**, *Society of Biology*.

2014–2016 **Fellowship in Medical Education Research**, *Harvard Medical School Academy*.

2013–2016 **NeXXt fellow**, *New York Academy of Sciences*.

2011–2013 **Fast Track Fellow**, *Robert Bosch Foundation*.

2011 **Travel grant**, *EMBL/EMBO Science and Society Summer School*.

2009 **Christian Doppler Prize for biology**, *State of Salzburg, Austria*.

2006 **Student project prize**, *Okinawa Computational Neuroscience Course*.

2003 **Student participant**, *Lindau Meeting of Nobel Laureates*.

2002 **Excellence award for mathematics**, *University of Salzburg*.

Research student supervision

PhD Richard Fitzpatrick (2016-, UoE)

MSc Tara O’Driscoll (2017, UoE), Salvador Garcia Gonzalez (2017, UoE), Zale Cao (2016-, UoE), Kadri Pajo (2016, UoE), Yubin Xie (2015-2016, UoE)

BSc Susana Roman Garcia (2017, UoE), Jana Finzgar (2017, UoE), David Tolnay (2011-2013, CalTech), David Marshall (2007, EBI)

High School Isla Smith (2017, UoE), Lewis Strachan (2017, UoE), Excellence Ogunbayo (2016, UoE)

Selected Teaching

2017– **Introduction to Cellular and Molecular Biology 1**, University of Edinburgh/Zhejiang University, Course organiser.

2016– **Integrative Biomedical Sciences 1**, University of Edinburgh/Zhejiang University, Lecturer.

2015-2016 **Biomedical Sciences 3**, University of Edinburgh, Tutor.

2015, 2016 **Collaborative International Undergraduate Workshop**, Okinawa Institute of Science and Technology, Instructor.

2014 **Molecular Biology of the Cell**, Harvard Medical School, Instructor, Computational Modelling Workshop.

2013-2014 **Technologies for Data Analysis for Experimental Biologists**, Harvard Medical School, Instructor.

2013-2014 **Boot Camp in Quantitative Methods**, Harvard Medical School, Curriculum Fellow.

2013-2014 **Quant Bio Club**, Harvard Medical School, Initiator, Leader.

2013 **Molecular and Cellular Basis of Medicine**, Harvard Medical School, Tutor.

Editorial work and reviewing

since 2010 **Reviewer**, *BMC Systems Biology*, *BMC Genomics*, *Journal of Mathematical Biology*, *Journal of Theoretical Biology*, *Journal of Mathematical Biology*, *PLoS Computational Biology*, *Theoretical Biology and Medical Modelling*.

- 2010 **Postdoc Journal keeper**, *Nature Jobs*.
2001–2007 **Editorial board**, *Kriterion: Journal of Philosophy*.

Conference organisation and committee service

- since 2017 **MSc by Research Integrative Neuroscience**, *University of Edinburgh*, Board of Examiners.
since 2016 **BSc Integrative Biomedical Sciences**, *University of Edinburgh*, *Zhejiang University*, Board of Examiners.
since 2015 **EMBL Interdisciplinary Postdoctoral Programme**, *EMBL*, Selection Panel.
2012–2013 **Caltech Women Mentoring Women**, *California Institute of Technology*, Mentor.
2008 **European Science and Society Summer School. Deconstructing and reconstructing life: From classification to design**, *Heidelberg*, Organising committee.
2008 **EMBL-EBI Science and Society Symposium. The personal genome**, *Cambridge*, Organising committee.
2007–2008 **Clare College MCR**, *Cambridge*, Webmaster.
2007 **EMBL-EBI Science and Society Symposium. Biology and language**, *Cambridge*, Organising committee.
2006–2008 **EMBL science and society committee**, EBI representative.
2006 **EMBL International PhD Student Symposium. Biology of disease**, *Heidelberg*, Organising committee.

Memberships

- | | | | |
|------------|--|------------|---|
| since 2015 | Biochemical Society | since 2014 | Academy at Harvard Medical School |
| since 2013 | New York Academy of Sciences | since 2012 | Society of Biology |
| since 2011 | International Neuroinformatics Coordinating Facility | since 2011 | Austrian Scientists and Scholars in North America |

Publications

Submitted

K. Pajo and **M.I. Stefan**. Methods for simulating actin filament dynamics in MCell, *submitted, 2017*.

In press

K. Bonham and **M. I. Stefan**. Women are underrepresented in computational biology: an analysis of the scholarly literature in biology, computer science and computational biology. *PloS Comput Biol*, *In press*; preprint available on <http://biorxiv.org/content/early/2016/09/09/070631>.

Published

R. Dutta Roy, C. Rosenmund and M. I. Stefan. Cooperative binding mitigates the high-dose hook effect. *BMC Systems Biology*, 11(1):74, 2017.

M. I. Stefan. Cooperativity: a competition of definitions. *Journal of mathematical biology*, 74:1679–1681, 2017.

N. Rodriguez, J.-B. Pettit, P. Dalle Pezze, L. Li, A. Henry, M. P. van Iersel, G. Jalowicki, M. Kutmon, K. N. Natarajan, D. Tolnay, **M. I. Stefan**, C. T. Evelo and N. Le Novère. The systems biology format converter. *BMC Bioinformatics*, 17(1), 2016.

M. I. Stefan, J. L. Gutlerner, R. T. Born and M. Springer. The quantitative methods boot

- camp: teaching quantitative thinking and computing skills to graduate students in the life sciences. *PLoS Comput Biol*, 11(4):e1004208, 2015.
- R. Dutta Roy, **M. I. Stefan** and C. Rosenmund. Biophysical properties of presynaptic short-term plasticity in hippocampal neurons: insights from electrophysiology, imaging and mechanistic models. *Front Cell Neurosci*, 8:141, 2014.
- J. Marino, **M. I. Stefan** and S. Blackford. Ten simple rules for finishing your PhD. *PLoS Comput Biol*, 10(12):e1003954, 2014.
- M. I. Stefan**, T. M. Bartol, T. J. Sejnowski and M. B. Kennedy. Multi-state modeling of biomolecules. *PLoS Comput Biol*, 10(9):e1003844, 2014.
- M. I. Stefan** and N. Le Novère. Cooperative binding. *PLoS Comput Biol*, 9(6):e1003106, 2013.
- L. Endler, **M. I. Stefan**, S. Edelstein and N. Le Novère. *Using chemical kinetics to model neuronal signalling pathways. In: Computational Systems Neurobiology, N. Le Novère (ed).* Springer, 2012.
- L. Li, **M. I. Stefan** and N. Le Novère. Calcium input frequency, duration and amplitude differentially modulate the relative activation of calcineurin and CaMKII. *PLoS One*, 7(9):e43810, 2012.
- M. I. Stefan**, D. P. Marshall and N. Le Novère. Structural Analysis and Stochastic Modelling Suggest a Mechanism for Calmodulin Trapping by CaMKII. *PLoS One*, 7(1):e29406, 2012.
- G. M. Dall’Olio, J. Marino, M. Schubert, K. L. Keys, **M. I. Stefan**, C. S. Gillespie, P. Poulain, K. Shameer, R. Sugar, B. M. Invergo, L. J. Jensen, J. Bertranpetit and H. Laayouni. Ten simple rules for getting help from online scientific communities. *PloS Comput Biol*, 7(9):e1002202, 2011.
- M.I. Stefan**, S. Pepke, S. Mihalas, T. Bartol, T. Sejnowski and M. Kennedy. Multi-stage modeling of the kinetics of activation of CaMKII. *Front Neuroinform*, Conference Abstract: 4th INCF Congress of Neuroinformatics, 2011.
- S. Edelstein, **M. I. Stefan** and N. Le Novère. Ligand depletion in vivo modulates the dynamic range and cooperativity of signal transduction. *PLoS One*, 5(1):e8449, 2010.
- C. Li, M. Donizelli, N. Rodriguez, H. Dharuri, L. Endler, V. Chelliah, L. Li, E. He, A. Henry, **M. I. Stefan**, J. L. Snoep, M. Hucka, N. Le Novère and C. Laibe. Biomodels database: An enhanced, curated and annotated resource for published quantitative kinetic models. *BMC Syst Biol*, 4:92, 2010.
- M. I. Stefan**. A CV of failures. *Nature*, 468(7322):467, 2010.
- M. I. Stefan**, S. J. Edelstein and N. Le Novère. Computing phenomenologic Adair-Klotz constants from microscopic MWC parameters. *BMC Syst Biol*, 3(1):68, 2009.
- M. I. Stefan**, S. J. Edelstein and N. Le Novère. An allosteric model of calmodulin explains differential activation of PP2B and CaMKII. *Proc Natl Acad Sci USA*, 105(31):10768–10773, 2008.
- M. I. Stefan** and N. Le Novère. Molecules for memory: modelling CaMKII. *BMC Systems Biology*, 1(Suppl 1):P40, 2007.
- A. Anglberger, P. Brössel and **M.I. Stefan**. Rezension: Argumentation in Theorie und Praxis. *Kriterion*, 20:37–41, 2006.

A. Anglberger, P. Brössel, N. Furlan, F. Greinecker, M. Karlegger, N. Pfeiffer, **M.I. Stefan** and A. Ungar. Rezension: Was wir Karl R. Popper und seiner Philosophie verdanken. *Kriterion*, 17:23–27, 2003.

Presentations

Posters

R. Fitzpatrick, U. S. Bhalla and **M. I. Stefan**. Towards a maximalist alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor- centric biochemical model of the synapse and its application in neurodevelopmental disease research. *Neuroscience, Washington DC (US)*, 2017.

M. C. Pharris, T. L. Kinzer-Ursem and **M.I. Stefan**. A rule-based, multi-state model of the CaMKII holoenzyme. *Neuroscience, Washington DC (USA)*, 2017.

M. C. Pharris, **M. I. Stefan** and T. L. Kinzer-Ursem. A rule-based model of the CaMKII holoenzyme. *Biomedical Engineering Society (BMES) Annual Meeting, Phoenix (USA)*, 2017.

L. Ferrington, **M. I. Stefan**, S.-H. Wang, J. McCluskey and K. Meyer. Using educational digital games to improve the engagement and performance of applied pharmacology students in an undergraduate cell biology course. *Creativity in Science Teaching, Society for Experimental Biology, London (UK)*, 2016.

L. Ferrington, **M. I. Stefan**, S.-H. Wang, J. McCluskey and K. Meyer. Using educational digital games to improve the engagement and performance of applied pharmacology students in an undergraduate cell biology course. *Pharmacology, London (UK)*, 2016.

K. Meyer, L. Ferrington, **M.I. Stefan** and S.-H. Wang. ENGAGE: Using educational digital games to improve student engagement and performance in an undergraduate cell biology course. *Scottish Crucible Forum, Glasgow (UK)*, 2016.

M. I. Stefan, C. McMullen, S.-H. Wang, C. Etchells and L. Ferrington. Can optional online quizzes increase student engagement, retention and performance in an undergraduate cell biology and physiology course? *Creativity in Science Teaching, Society for Experimental Biology, London (UK)*, 2016.

Y. Xie, B. Graham, M. Dutia and **M. I. Stefan**. Multi-scale modelling of hyperpolarisation mediated synaptic plasticity. *Wellcome Trust Advanced Course: In Silico Systems Biology, Hinxton (UK)*, 2016.

H. Besche, **M. I. Stefan**, Y. Liu, R. King and S. A. Assessing item quality in open-book online readiness assessment exercises using student feedback and item response time. *HMS Academy Medical Education Day, Boston (US)*, 2015.

A. Ahuja, K. Dillon, **M.I. Stefan**, Y. Liu, J. Gutlerner and D. V. Vactor. Characterizing statistics understanding and attitudes in graduate students and postdocs in the life sciences. *HMS Academy Medical Education Day, Boston (US)*, 2014.

A. Ahuja, K. Dillon, **M.I. Stefan**, Y. Liu, J. Gutlerner and D. V. Vactor. Characterizing statistics understanding and attitudes in graduate students and postdocs in the life sciences. *SABER National meeting, Twin Cities (US)*, 2014.

M. I. Stefan, S. Pepke, S. Mihalas, T. Bartol, T. Sejnowski and M. Kennedy. Modelling Ca²⁺-dependent proteins in the spine - challenges and solutions. *INCF Neuroinformatics, Munich (DE)*, 2012.

M.I. Stefan, S. Pepke, S. Mihalas, T. Bartol, T. Sejnowski and M. Kennedy. Multi-stage modelling of the kinetics of CaMKII activation. *INCF Neuroinformatics, Boston (US)*, 2011.

- M.I. Stefan** and N. Le Novère. Models of a memory device – understanding CaMKII. *Sanger-Cambridge PhD Symposium, Cambridge (UK)*, 2009.
- M.I. Stefan**, D. Marshall and N. Le Novère. Stochastic modelling of CaMKII regulation. *The Tenth International Conference on Systems Biology, Stanford (US)*, 2009.
- M.I. Stefan**, S. Edelstein and N. Le Novère. An allosteric model of calmodulin. *Sanger-Cambridge PhD Symposium, Hinxton (UK)*, 2008.
- M.I. Stefan**, S. Edelstein and N. Le Novère. An allosteric model of calmodulin explains differential activation of PP2B and CaMKII. *Sixth FENS Forum of European Neuroscience, Geneva (CH)*, 2008.
- M.I. Stefan**, S. Edelstein and N. L. Novère. An allosteric model of calmodulin explains differential activation of PP2B and CaMKII. *The Ninth International Conference on Systems Biology, Göteborg (SE)*, 2008.
- C. Li, M. Donizelli, N. Le Novère, H. Dharuri, E. He, L. Li, B. Shapiro, **M.I. Stefan**, R. Machne, C. Laibe, D. Tolle, R. Schiappa and M. Hucka. BioModels Database, a curated and annotated resource of published quantitative kinetic models. *The Eighth International Conference on Systems Biology, Long Beach (US)*, 2007.
- M.I. Stefan** and N. Le Novère. A StochSim model for CaMKII regulation. *Synthetic Biology, Systems Biology and Bioinformatics, Manchester (UK)*, 2007.
- M.I. Stefan** and N. Le Novère. A StochSim model for CaMKII regulation. *The Seventh International Conference on Systems Biology, Yokohama (JP)*, 2006.
- M.I. Stefan** and N. Le Novère. Molecules for memory. *Okinawa Computational Neuroscience Course, Okinawa (JP)*, 2006.
- [Talks](#)
- Computational models of neuronal biochemistry. *Scottish Neuroscience Group Meeting, Aberdeen (UK)*, 2017.
- Computational models of postsynaptic signalling. *School of Informatics, University of Edinburgh (UK)*, 2017.
- A CV of failures. *Wellcome Trust Careers Panel, London (UK)*, 2017.
- A CV of failures. *PhDay, Spanish National Center for Cardiovascular Research, Madrid (ES)*, 2017.
- Generally fine: Lessons learnt from year 1 of delivering a biomedical sciences course in china. *Biomedical Teaching Organisation, University of Edinburgh (UK)*, 2017.
- Methods for simulating actin filament dynamics in mcell. *V International Conference on Particle-Based Methods, Hannover (DE)*, 2017.
- Computational modelling of synaptic protein signalling. *The 7th BMS Annual Meeting, Zhejiang University, Hangzhou (CN)*, 2016.
- Modelling calcium sensing in neurons: signals, switches and surprises. *Kinetics on the Move, Heidelberg (DE)*, 2016.
- Postdoc to PI: Notes from a small experiment. *George Square Postdoc Society, University of Edinburgh (UK)*, 2016.
- Statistical thinking in context. *ASE Annual Conference, Birmingham (UK)*, 2016.

What can we learn from online learning data? *BMTO Teaching Network, University of Edinburgh (UK)*, 2016.

CaMKII autoregulation: seeing the forest for the trees. *Centres' Symposium, University of Edinburgh (UK)*, 2015.

Understanding learning and memory using computational tools. *Yale-NUS College, Singapore (SG)*, 2015.

10 Simple Rules for Finishing your PhD. *CFP Education Lunch Series, Harvard Medical School, Boston (US)*, 2014.

Recognizing and managing micro-aggression and micro-prejudice in the classroom. *CFP Education Lunch Series, Harvard Medical School, Boston (US)*, 2014.

Multi-state modelling of synaptic proteins. *University of Oxford (UK)*, 2013.

Calcium signalling and memory. *Babraham Institute, Cambridge (UK)*, 2012.

Computermodellierung neuronaler Proteine. *Austrian Scientists and Scholars in North America, Pasadena (US)*, 2012.

Hypothesis testing and the Quant Bio Clinic. *Harvard Medical School, Boston (US)*, 2012.

Multi-state proteins in the brain. *California Institute of Technology, Pasadena (US)*, 2012.

Modelling CaMKII: From StochSim to MCell. *Salk Institute, San Diego (US)*, 2011.

A. Trilling, E. Sünter, **M.I. Stefan** and M. Annoni. New technologies and human identity. *EMBL/EMBO Science and Society Summer School, Heidelberg (DE)*, 2011.

PP2B or PP not to be? *CRG Minisymposium on Systems Biology, Center for Genomic Regulation, Barcelona (ES)*, 2010.

Tales of a travelling postdoc. *Naturejobs Career Fair, London (UK)*, 2010.

An allosteric model of calmodulin explains differential activation of PP2B and CaMKII. *ZBIT-Colloquium, Center for Bioinformatics, Tübingen (DE)*, 2009.

Modelling allosteric devices in synaptic plasticity. *University of Helsinki (FI)*, 2009.

Modelling CaMKII regulation and autoregulation. *CECAM Workshop: Linking Systems Biology and Biomolecular Simulations, Lausanne (CH)*, 2009.

Models of a memory device: Understanding CaMKII. *EBI Predoc Seminar Day, Hinxton (UK)*, 2009.

Stochastic modelling of CaMKII. *California Institute of Technology, Pasadena (US)*, 2009.

An allosteric model of calmodulin. *Cold Spring Harbor Laboratory meeting on Computational Cell Biology, Hinxton (UK)*, 2008.

An allosteric model of calmodulin. *EBI External Seminar, Hinxton (UK)*, 2008.

An allosteric model of calmodulin. *National Institute for Medical Research, London (UK)*, 2008.

An allosteric model of calmodulin. *EMBL Predoc Retreat, Lisbon (PT)*, 2008.

Models and brains. *Clare College Research Symposium, Cambridge (UK)*, 2008.

Model curation for the BioModels Database. *Okinawa Computational Neuroscience Course, Okinawa (JP)*, 2006.

Molecules for memory: NMDA receptors, calmodulin, CaMKII. *Bioinformatics Research and Education Workshop, Hinxton (UK)*, 2006.