

ROMESH GERALD ABEYSURIYA

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Employment

- **Senior Research Officer (2018 –)**
Macfarlane Burnet Institute for Medical Research and Public Health
 - Develop detailed mathematical and economic models of infectious diseases
 - Apply models to public health problems and communicate outcomes to various stakeholders, including epidemiologists, public health experts, government officials, and global health and international aid agencies
 - Lead grant applications to the NHMRC and other competitive funding bodies
 - Produce and contribute to scientific and technical papers
- **Postdoctoral Scientist (2016 – 2018)**
Oxford Centre for Human Brain Activity, Department of Psychiatry, University of Oxford
 - Develop biophysical models and computational methods to simulate and analyze brain activity
 - Write technical documentation and run analysis training workshops
 - Prepare results for publication in leading international journals and present research at national and international conferences
- **Postdoctoral Research Associate (2014 – 2015)**
Brain Dynamics Group, School of Physics, University of Sydney
 - Develop and implement Bayesian model fitting algorithms and biophysical models of brain activity
 - Prepare results for publication in leading international journals and present research at national and international conferences
 - Supervise undergraduate student research projects
 - Manage group software development processes and data management protocols
- **Consultant Developer (epidemiology modelling) (2015 – 2016)**
Kirby Institute, University of New South Wales
 - Design software framework to simulate effect of spending on HIV programs to optimize government resource allocation
 - Work in large team on implementation and rollout of model features
- **Analyst (2014 – 2015)**
Cingulate Consulting
 - Develop software to quantify and compare investment bank analyst performance
 - Work with clients to develop new analyses and design graphics for presentation of outputs

Education

- **PhD (Physics) (2011-2014)**
The University of Sydney (USYD)
Thesis: Physiologically-based brain state modeling
- **BSc (Advanced) (Honours 1) Physics (2010)**
The University of Sydney (USYD)
Project: State Estimation and Parameter Tracking Using a Mean-Field Corticothalamic Model

Publications

1. Stuart RM, Khan O, **Abey Suriya R**, Kryvchun T, Lysak V, Bredikhina A, Durdykulyieva N, Mykhailets V, Kaidashova E, Doroshenko O, Shubber Z, Wilson D, Zhao F, Fraser-Hurt N (2020) *Diabetes care cascade in Ukraine: an analysis of breakpoints and opportunities for improved diabetes outcomes*. BMC Health Services Research 20(1)
2. Becker R, Vidaurre D, Quinn AJ, **Abey Suriya RG**, Parker Jones O, Jbabdi S, Woolrich MW (2020) *Transient spectral events in resting state MEG predict individual task responses*. Neuroimage 215
3. Kedziora DJ, **Abey Suriya R**, Kerr CC, Chadderdon GL, Harbuz VS, Metzger S, Wilson DP, Stuart RM (2019) *The Cascade Analysis Tool: software to analyze and optimize care cascades*. Gates Open Res. [version 2; peer review: 3 approved]
4. Roberts JA, Gollo LL, **Abey Suriya RG**, Roberts G, Mitchell PB, Woolrich MW, Breakspear M (2019) *Metastable brain waves*. Nature Communications 10(1)
5. Tewarie P, **Abey Suriya R**, Byrne Á, O'Neill GC, Sotiropoulos SN, Brookes MJ, and Coombes S (2019) *How do spatially distinct frequency specific MEG networks emerge from one underlying structural connectome? The role of the structural eigenmodes*. Neuroimage 186
6. Quinn AJ, Vidaurre D, **Abey Suriya R**, Becker R, Nobre AC, and Woolrich MW (2018) *Task-Evoked Dynamic Network Analysis Through Hidden Markov Modeling*. Front. Neurosci. 12
7. Sanz-Leon P, Robinson PA, Knock SA, Drysdale PM, **Abey Suriya RG**, Fung PK, Rennie CJ, and Zhao X (2018) *NFTsim: theory and simulation of multiscale neural field dynamics*. PLoS Comp. Biol. 14(8)
8. **Abey Suriya RG**, Lockley SW, Robinson PA, and Postnova S (2018) *A unified model of melatonin, 6-sulfatoxymelatonin, and sleep dynamics*. J. Pineal Res. 64
9. Hadida J, Sotiropoulos SN, **Abey Suriya RG**, Woolrich MW, and Jbabdi S (2018) *Bayesian Optimisation of Large-Scale Biophysical Networks*. NeuroImage 174
10. **Abey Suriya RG**, Hadida J, Sotiropoulos SN, Jbabdi S, Becker R, Hunt BAE, Brookes MJ, and Woolrich MW (2018) *A biophysical model of dynamic balancing of excitation and inhibition in fast oscillatory large-scale networks*. PLoS Comp. Biol. 14(2)
11. Vidaurre D, **Abey Suriya R**, Becker R, Quinn AJ, Alfaro-Almagro F, Smith SM and Woolrich MW (2018) *Discovering dynamic brain networks from big data in rest and task*. NeuroImage 180
12. **Abey Suriya RG** and Robinson PA (2016) *Real-time automated EEG tracking of brain states using neural field theory*. J. Neurosci. Meth. 258
13. **Abey Suriya RG**, Rennie CJ, and Robinson PA (2015) *Physiologically-based arousal state estimation and dynamics*. J. Neurosci. Meth. 253
14. **Abey Suriya RG**, Rennie CJ, Robinson PA, and Kim JW (2014) *Experimental observation of a theoretically predicted nonlinear sleep spindle harmonic in human EEG*. Clin. Neurophysiol. 125
15. **Abey Suriya RG**, Rennie CJ, and Robinson PA (2014) *Prediction and verification of nonlinear sleep spindle harmonic oscillations*. J. Theor. Biol. 344
16. Kedziora DJ, **Abey Suriya RG**, Phillips AJK and Robinson PA (2012) *Physiologically based quantitative modeling of unihemispheric sleep*. J. Theor. Biol. 314
17. Postnova S, Robinson PA, Layden A, Phillips AJK, and **Abey Suriya RG** (2012) *Exploring Sleepiness and Entrainment on Permanent Shift Schedules in a Physiologically Based Model*. J. Biol. Rhythms 27
18. Phillips AJK, Robinson PA, Kedziora DJ, and **Abey Suriya RG** (2010) *Mammalian sleep dynamics: How diverse features arise from a common physiological framework*. PLoS Comp. Biol. 6(6)
19. Hole MJ, Wilson HR, **Abey Suriya R**, and Larson JW (2010) *Ideal MHD Stability of a Spherical Tokamak Power Plant and a Component Test Facility*. Plasma Phys. Control. Fusion 52

Conference proceedings

1. Babaie T, Chawla S, **Abey Suriya R** (2014) *Sleep Analytics and Online Selective Anomaly Detection*. Proc. 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining

Book chapters

1. Kerr CC, Stuart RM, Kedziora DJ, Brown A, **Abey Suriya R**, Chadderdon GL, Nachesa A, Wilson DP (2017) *The not-so-black box: Optima HIV methodology and approach*, in *Tackling the world's fastest-growing HIV epidemic: Gateways to efficient and effective HIV responses in Eastern Europe and Central Asia* (eds. Zhao F, Benedikt C, Wilson D) World Bank, Washington DC
2. Robinson PA, Postnova S, **Abey Suriya RG**, Kim JW, Roberts JA, McKenzie-Sell L, Karanjai A, Kerr CC, Fung F, Anderson R, Breakspear MJ, Drysdale PM, Fulcher BD, Phillips AJK, Rennie CJ, Yin G (2015) *A multiscale "Working Brain" Model*, in *Validating Computational Models in Neurological and Psychiatric Disorders* (eds. Bhattacharya B, Chowdhury F) Springer, NY

Conference presentations

1. **Abey Suriya R**, Kedziora DJ, Harbuz VS, Kerr CC, Chadderdon GL, Stuart RM (2019) *The Cascade Analysis Tool: software to improve technical and allocative efficiencies along the continuum of care*. 7th International Conference on Infectious Disease Dynamics, Charleston, USA.
2. Kedziora DJ, **Abey Suriya R**, Kerr CC, Chadderdon GL, Harbuz VS, Stuart RM (2019) *The Cascade Analysis Tool: Software to improve technical and allocative efficiencies along the continuum of care*. 7th Annual Institute for Disease Modeling Symposium, Seattle, USA.
3. Kerr CC, **Abey Suriya RG** (2018) *Uncertainties in optimal tuberculosis investments*. 6th Annual Institute for Disease Modeling Symposium, Seattle, USA. (Oral presentation)
4. **Abey Suriya RG**, Hadida J, Sotiropoulos S, Jbabdi S, Becker R, Hunt BAE, Brookes MJ, Woolrich MW (2018) *A biophysical model of dynamic balancing of excitation and inhibition in fast oscillatory large-scale networks*. 21st International Conference on Biomagnetism (BIOMAG2018), Philadelphia, USA.
5. Quinn AJ, Vidaurre D, **Abey Suriya R**, Becker R, Nobre A, Woolrich MW (2018) *Task-Evoked Transient Bursting Large-scale Network Dynamics*. 21st International Conference on Biomagnetism (BIOMAG2018), Philadelphia, USA.
6. Hadida J, Sotiropoulos S, **Abey Suriya RG**, Woolrich MW, Jbabdi S (2018) *Bayesian Optimisation of Large-Scale Biophysical Networks*. 21st International Conference on Biomagnetism (BIOMAG2018), Philadelphia, USA.
7. **Abey Suriya RG**, Hadida J, Sotiropoulos S, Jbabdi S, Woolrich MW (2017) *Biophysical modelling of resting brain states and inhibitory synaptic plasticity*. 26th Annual Computational Neuroscience Meeting (CNS-2017), Antwerp, Belgium.
8. **Abey Suriya RG**, Hadida J, Sotiropoulos S, Jbabdi S, Woolrich MW (2017) *Biophysical modeling of transient neural activity and inhibitory synaptic plasticity*. 23rd Annual Meeting of the Organization for Human Brain Mapping (OHBM), Vancouver, Canada.
9. Hadida J, **Abey Suriya RG**, Jbabdi S, Sotiropoulos S, Woolrich MW (2017) *Optimising Structure from Function using Biophysical Simulations*. 23rd Annual Meeting of the Organization for Human Brain Mapping (OHBM), Vancouver, Canada.
10. **Abey Suriya RG**, Hadida J, Sotiropoulos S, Jbabdi S, Woolrich MW (2017) *Biophysical modelling of resting brain states and inhibitory synaptic plasticity*. 11th annual MEG UK Meeting (MEG UK 2017), Oxford, UK.
11. Hadida J, **Abey Suriya RG**, Jbabdi S, Sotiropoulos S, Woolrich MW (2017) *Optimisation of Structure from Function using Large-Scale Biophysical Models*. 11th annual MEG UK Meeting (MEG UK 2017), Oxford, UK.

12. Hadida J, **Abey Suriya RG**, Jbabdi S, Sotiropoulos S, Woolrich MW (York, UK) *Exploring Transient Dynamics in Simulated Large-Scale Neuronal Networks*. 10th annual MEG UK Meeting (MEG UK 2016), .
13. **Abey Suriya RG**, Hadida J, Jbabdi S, Sotiropoulos S, Woolrich MW (2016) *Metastability and transient dynamics in a large-scale biophysical network*. 20th International Conference on Biomagnetism (BIOMAG2016) , Seoul, South Korea.
14. Robinson PA, Sanz-Leon P, Drysdale PM, Fung F, **Abey Suriya RG**, Rennie CJ, Zhao X (2016) *Neurofield: a C++ library for fast simulation of 2D neural field models*. 25th Annual Computational Neuroscience Meeting (CNS-2016), Seogwipo City, South Korea.
15. **Abey Suriya RG**, Robinson PA (2015) *Real-time automated EEG tracking of brain state parameters using neural field theory: Application to brain stability and seizures*. IWSP7: Epilepsy Mechanisms, Models, Prediction and Control, Melbourne, Australia. (Oral presentation)
16. **Abey Suriya RG**, Robinson PA (2015) *Beyond Rechtschaffen-Kales: real-time automated EEG tracking of arousal states using neural field theory*. 7th World Congress of the World Sleep Federation (Worldsleep2015), Istanbul, Turkey.
17. **Abey Suriya RG**, Postnova S, Robinson PA, Rennie CJ (2014) *Physiologically-based brain state estimation and dynamics*. 22nd Congress of the European Sleep Research Society, Tallinn, Estonia. (Oral presentation)
18. **Abey Suriya RG**, Postnova S, Robinson PA, Rennie CJ (2013) *EEG modeling of the sleep wake transition using physiologically based neural field theory*. 19th Annual Meeting of the Organization for Human Brain Mapping (OHBM), Seattle, USA. (Oral presentation + travel award)
19. **Abey Suriya RG**, Rennie CJ, Robinson PA (2012) *Theoretical prediction and experimental observation of a sleep spindle harmonic using mean-field modeling and EEG analysis*. Annual meeting for the Society for Neuroscience, New Orleans, USA.
20. **Abey Suriya RG**, Rennie CJ, Robinson PA (2012) *Sleep spindle harmonic: experimental observation and theoretical explanation*. 21st Congress of the European Sleep Research Society, Paris, France.
21. **Abey Suriya RG**, Rennie CJ, Postnova S, Robinson PA (2012) *Quantifying brain states and their transitions*. 21st Congress of the European Sleep Research Society, Paris, France.
22. **Abey Suriya RG**, Rennie CJ, Postnova S, Robinson PA (2012) *Brain state estimation using physiologically based corticothalamic neural field theory*. 18th Annual Meeting of the Organization for Human Brain Mapping, Beijing, China.
23. **Abey Suriya RG**, Rennie CJ, Postnova S, Robinson PA (2011) *Brain state estimation using a mean field corticothalamic model*. Australian Workshop on Computational Neuroscience, Sydney, Australia.
24. **Abey Suriya RG**, Hole MJ (2010) *Plasma MHD simulations of next step fusion experiments*. 16th Gaseous Electronics Meeting, Murrumarang, Australia. (Oral presentation)

Funding

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|-----------|---|-------------|
| 2021-2022 | Howell J, Abey Suriya R , Anderson D, Bhat P, Pham M, Van Gemert C, Doyle J. <i>Using novel point-of-care diagnostic tests and mathematical modelling to achieve hepatitis B elimination: The Rapid B Study</i> . Australian National Health and Medical Research Council | \$AU381,947 |
| 2018-2021 | Stuart RM, Abey Suriya R . <i>Developing a cascade model</i> . Bill and Melinda Gates Foundation | \$US774,381 |
| 2018 | WA Department of Health Near-Miss Merit Award (declined) | \$AU50,000 |
| 2017-2020 | Kerr CC, Abey Suriya R . <i>Portfolio optimization methods</i> . Bill and Melinda Gates Foundation | \$US175,481 |

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| 2017 | Organization for Computational Neurosciences Travel Award | \$US200 |
| 2016 | Guarantors of Brain Travel Grant | £800 |
| 2015-2016 | Wilson DP, McBryde E, Kerr CC, Marks G, Makrides M, Middleton P, Trauer J, Report I, Ford B, Wood J, Stuart RM, Abey Suriya R , Kedziora D, Killedar M, Petravic J, Kelly S, Shattock A, Lassi Z, Razali K, Grantham K, Hussein A, Scott N, Doan T, Denholm J. <i>Expanding the Optima Model to TB and Health, and for Applying the Model in Different Contexts</i> . World Bank Assignment | \$US583,798 |
| 2015 | Royal Society Newton International Fellowship (declined) <i>Population neural adaptation – from theory to experiment</i> | £65,982 |
| 2015 | IWSP7 Travel Stipend | \$AU500 |
| 2013-2014 | Postnova S, Abey Suriya R , Robinson PA. <i>Sleep Analysis Tools and Training: SleepSim</i> . (seed grant). National Health and Medical Research Council Centre for Integrated Research and Understanding of Sleep | \$AU5120 |
| 2013 | Organization for Human Brain Mapping Trainee Abstract Travel Award | \$US700 |
| | Centre for Integrated Research and Understanding of Sleep (CIRUS) Travel Grant | \$AU2200 |
| 2012 | CIRUS Travel Grant | \$AU2500 |

Scholarships and Prizes

- 2013 **CIRUS Postgraduate Top-up Scholarship**
- 2011 **Australian Postgraduate Award** to support PhD research
University of Sydney Merit Award over PhD duration for academic excellence and outstanding research potential
- 2010 **Julius Sumner Miller Scholarship for Academic Excellence No. 3**
- 2009 **Summer Research Scholarship** at the Plasma Research Laboratory, Australian National University
Science Foundation for Physics Scholarship No. 2
The Slade Prize for Practical Physics
- 2008 **Summer Research Internship** (funded) at the Microphotonics and Photonic Crystals Research Group, University of St Andrews, UK
- 2007 **Summer Research Scholarship** at the Centre for Ultrahigh bandwidth Devices for Optical Systems, USYD

Teaching

- **Guest lecturer** (2017) University of Oxford
Advanced Analysis Course, Oxford Centre for Functional MRI of the Brain
Delivered lecture on analysis methods for dynamic systems.
- **Lecturing** (2012 – 2015) University of Sydney
COSC1003/1903 (Introduction to Computational Science)
COSC1002/1902 (Computational Science in C)
Delivered lectures, coordinated content distribution to students, wrote final exam.
- **Course content development** (2014 – 2014) University of Sydney
PHYS2011/2911 (Physics 2A)
Developed computational lab coursework exercises.

- **Tutoring** (2011 – 2014) University of Sydney
Experimental and computational tutor in First and Second Year undergraduate labs.

Software development

- **Atomica** *Lead developer*
Toolbox for compartment-based dynamic systems with costing and optimization
www.atomica.tools
- **SleepSim** *Lead developer*
Graphical simulation program for sleep clinicians
- **BrainTrak** *Lead developer*
Software implementation of Bayesian parameter estimation for neural field models. Outcomes published in 2 original journal articles
- **NeuroField** *Developer*
Simulation software for differential equation solvers required to simulate neural field and neural mass models. Research results obtained using NeuroField have been published in 8 original journal articles.
- **Optima** *Developer*
Simulation software for analysis of HIV epidemics
www.optimamodel.com

Academic service

- **Public engagement ambassador** (2017) Oxford Centre for Human Brain Activity
Designed and coordinated public engagement activities at the Centre (including the student work experience program and school outreach presentations)
- **Peer review**
International Journal of Environmental Research and Public Health (1 paper), Journal of Theoretical Biology (2 papers), NeuroImage (2 papers), PLoS Computational Biology (1 paper), Journal of Neuroscience Methods (1 paper), Heliyon (1 paper), Journal of Computational Neuroscience (1 paper), Organization for Human Brain Mapping conference abstract submissions (2016-2017, ≈ 25 abstracts per year)
- **Journal club convener** (2015)
Complex Systems Group, University of Sydney

Affiliations

- Burnet Institute (Senior Research Officer)
- Monash University (Adjunct Research Fellow)

National projects

- Romania: TB allocative efficiency study (2019) - modeller
- Ukraine: Diabetes care cascade optimization (2020) - modeller
- Australia: COVID-19 outbreak management (current) - modeller