

Cliff C. Kerr

Phone +1 (917) 328-2229

Email cliff@thekerrlab.com

Web thekerrlab.com

CONTENTS

Biosketch	1
Personal statement.....	2
Academic and industry experience.....	2
Academic qualifications	3
Teaching experience.....	3
Publications	4
Competitive grants.....	16
Personal grants, scholarships, and awards.....	17
IT experience	18
Academic service	18
Music qualifications, awards, and experience.....	19
Personal	20

BIOSKETCH

- ❖ I am currently a Senior Research Scientist at the Institute for Disease Modeling, and a board member of the Optima Consortium for Decision Science.
- ❖ Previously, I was an Australian Research Council Discovery Early Career Research Award Fellow in computational neuroscience at the University of Sydney, working on computation in biologically realistic neuronal networks; a postdoctoral fellow at the State University of New York Downstate Medical Center, working on a neuroprosthetics project for the Defense Advanced Research Projects Agency; and was a founder and co-director of Cingulate Consulting, a data analytics firm.
- ❖ I completed a Ph.D. in theoretical physics at the University of Sydney (2006 – 2010).
- ❖ I have over 60 peer-reviewed papers, including in *Nature Communications* (2021), *Nature Communications Medicine* (2022), *PLOS Computational Biology* (2021), *The Lancet HIV* (2015, 2018), and *The Lancet Global Health* (2014, 2015, 2021); 9 contributed book chapters; 25 technical reports; and over 60 conference presentations, including invited talks on both epidemiology and neuroscience. My publications have over 2500 citations, and my *h*-index is 24.
- ❖ I have been an investigator on eight competitive grants (totaling over US\$10 million), including a fellowship grant, a teaching grant, and six research grants.
- ❖ I have been the lecturer and course coordinator for the *Introduction to Computational Science* and *Electricity and Magnetism* units at the University of Sydney (2012, 2015, 2016, and 2018), and have taught at numerous workshops on both neuroscience and HIV. My supervisory experience includes two Ph.D. students and seven undergraduate research students.
- ❖ Further details are available from my website (thekerrlab.com).

PERSONAL STATEMENT

I am interested in using detailed, large-scale models to expand our understanding of how complex systems behave. In epidemiology, it involves using models of COVID, HIV, and other diseases to estimate infection patterns and how to optimally allocate resources for prevention and treatment. In neuroscience, this entails using biomimetic network models to explain the computations performed by the sensorimotor system. In addition to modeling, I am interested in developing new mathematical and computational methods, such as optimization algorithms.

ACADEMIC AND INDUSTRY EXPERIENCE

- ❖ **Senior Research Scientist, Institute for Disease Modeling (2019 – present)**
 - My responsibilities include extending the team’s modeling capabilities to include COVID and family planning, and developing efficient methods for calibrating large stochastic simulation models to data.
- ❖ **Board Member and Team Leader, Optima Consortium for Decision Science (2016 – present); Senior Research Associate, Burnet Institute (2016 – 2019) and Kirby Institute (2010 – 2015)**
 - I was the lead software developer for the group, responsible for overseeing the development of models of HIV transmission and disease progression, new statistical methodologies, and software for health economic analyses. The deliverables of these projects typically consist of reports and graphical software interfaces designed to client specifications. Current and past clients include the World Health Organization, the World Bank, UNAIDS, UNDP, PEPFAR, CDC, and national ministries of health across Africa, Europe, Asia, and South America. Further details are available from optimamodel.com.
- ❖ **Discovery Early Career Research Fellow, University of Sydney School of Physics (2014 – 2019)**
 - I was investigating how large-scale brain rhythms influence and facilitate information processing, particularly motor control, among small networks of individual neurons. The research questions were addressed by combining detailed computer simulations with data-driven analyses of empirical human and monkey brain dynamics. The aim of this project was to provide a richer understanding of how our brains encode and process information, leading to practical benefits such as improved control of artificial limbs. Further details are available from thekerrlab.com.
- ❖ **Co-Director and Analyst, Cingulate Consulting (2011 – 2015)**
 - I founded Cingulate Consulting to analyze private-sector datasets using detailed process models, data mining approaches, and advanced statistical methods. Our clients have included several major Australian universities, retailers, and finance companies. In addition to data analysis and report writing, I managed a team of five other analysts. Further details are available from cingulate.com.au.
- ❖ **Postdoctoral Fellow, Neurosimulation Laboratory, State University of New York Downstate Medical Center (2010 – 2014)**
 - I worked on large-scale spiking neuron models as part of the Defense Advanced Research Projects Agency’s \$15 million “Reorganization and Plasticity to Accelerate Injury Recovery” (REPAIR) project. I collaborated with experimentalists in primate electrophysiology and optogenetics, whose data were used to both build the model and test its predictions. The overall aim was to create a functional human neuroprosthesis: a computer model of the sensorimotor system that engages in bidirectional communication with the brain, thereby restoring lost function. Further details are available from neurosimplab.org.

- ❖ **Research Associate, Complex Systems Group, University of Sydney School of Physics (2010 – 2014)**
 - This position involved research student supervision and the application of neural field models to human EEG data, including the analysis of age trends and evoked potentials. It was a continuation of my doctoral work.
- ❖ **Scientific Consultant, Brain Resource Ltd. (2010)**
 - For this project, I analyzed a large dataset of structural, physiological, and behavioral measures of age trends in human subjects. It culminated in the design and production of two summary posters that have since been used in demonstrations of Brain Resource’s capabilities to prospective clients.

ACADEMIC QUALIFICATIONS

- ❖ **Doctor of Philosophy** in Complex Systems, School of Physics, University of Sydney (2006–2010)
 - Thesis title: “Modeling and Quantification of Auditory Evoked Potentials”.
- ❖ **Bachelor of Science in Physics with Honours (First Class)**, University of Sydney (2005)
 - Thesis title: “Physiology-Based Modeling of Evoked Response Potentials”.
- ❖ **Bachelor of Science in Neuroscience/Biophysics**, University of Queensland (2002–2004)

TEACHING EXPERIENCE

- ❖ Lecturer, University of Sydney: *Introduction to Computational Science* (COSCI003/1903; 2012, 2015, and 2016) and *Electricity and Magnetism* (PHYS1003; 2018)
 - Example student comments: “Cliff is a fantastic lecturer – very clear & easy to follow.”; “Supremely clear, intuitive explanations. Connected content to genuine applications, made the material seem relevant and interesting. Showed a genuine interest in the material himself. These are the best lectures I’ve yet attended, I can’t think of what to improve.”
- ❖ Ph.D. student co-supervision:
 - Salim Zobaer, University of Sydney, in neuroscience (2014–2018)
 - Amy Kwon, University of New South Wales, in epidemiology (2011–2014)
- ❖ *NEURON* software and neuroscience project tutor:
 - *OIST Computational Neuroscience Course*, Okinawa, Japan (2019)
 - *Computational Neuroscience* conference tutorial, Quebec City, Canada (2014)
 - *Advanced Course in Computational Neuroscience*, Będlewo, Poland (2013)
- ❖ *Optima* tutor and lecturer, *Improving Efficiency in Health* conference, Washington D.C. (2016); and *World Bank Skills Building Program: Big Data, Artificial Intelligence and Decision Science in Health and Nutrition* workshop, Pretoria, South Africa (2018)
- ❖ Talented Student Program supervisor, University of Sydney, in neuroscience (2015–present)
- ❖ Faculty of Science mentor for new tutors, University of Sydney (2011–2013)
- ❖ Honours (fourth-year) student co-supervisor, University of Sydney, in neuroscience (2012)
- ❖ Guest lecturer, *Neurodynamics* Honours course, University of Sydney (2011)
- ❖ Instructor for postgraduate *Computation and Image Processing* lab, University of Sydney (2010)
- ❖ Supervisor for first-year physics tutorials, University of Sydney (2006–2010)
- ❖ Demonstrator for second-year physics labs, University of Sydney (2006–2010)
- ❖ Supervisor for first-year physics labs, University of Sydney (2008)
- ❖ Tutor for first-year physics tutorials, University of Sydney (2005–2006)
- ❖ Tutor for first-year biology, biochemistry, and physics, University of Queensland (2003–2004)

PUBLICATIONS

PEER-REVIEWED PAPERS

1. Abeysuriya RG, Delpont D, Stuart RM, Sacks-Davis R, **Kerr CC**, Mistry D, Klein DJ, Hellard M, Scott N (2022). Preventing a cluster from becoming a new wave in settings with zero community COVID-19 cases. *BMC Infectious Disease* **22**(1):232.
2. Sanz-Leon P, Hamilton LHW, Raison SJ, Pan AJX, Stevenson NJ, Stuart RM, Abeysuriya RG, **Kerr CC**, Lambert SB, Roberts JA (2022). Modelling herd immunity requirements in Queensland: impact of vaccination effectiveness, hesitancy and variants of SARS-CoV-2. *Philosophical Transactions of the Royal Society A* **380**(2233):20210311.
3. Anwar H, Caby S, Dura-Bernal S, D'Onofrio D, Hasegan D, Deible M, Grunblatt S, Chadderdon GL, **Kerr CC**, Lakatos P, Lytton WW, Hazan H, Neymotin SA (2022). Training a spiking neuronal network model of visual-motor cortex to play a virtual racket-ball game using reinforcement learning. *PLoS One* **17**(5):e0265808.
4. Modelling to Inform HIV Programmes in sub-Saharan Africa (MIHPSA) Working Group (2022). Perspectives on the use of modelling and economic analysis to guide HIV programmes in sub-Saharan Africa. *Lancet HIV* **9**(7):e517-e520.
5. Sanz-Leon P, Stevenson NJ, Stuart RM, Abeysuriya RG, Pang JC, Lambert SB, **Kerr CC**, Roberts JA (2022). Risk of sustained SARS-CoV-2 transmission in Queensland, Australia. *Nature Scientific Reports* **12**(1):6309.
6. Banho CA, Sacchetto L, Campos GRF, Bittar C, Possebon FS, Ullmann LS, Marques BC, da Silva GCD, Moraes MM, Parra MCP, Negri AF, Boldrin AC, Barcelos MD, Dos Santos TMIL, Milhim BHGA, Rocha LC, Dourado FS, Dos Santos AL, Ciconi VB, Patuto C, Versiani AF, da Silva RA, de Oliveira Lobl EE, Hernandez VM, Zini N, Pacca CC, Estofolete CF, Ferreira HL, Rahal P, Araújo JP Jr, Cohen JA, **Kerr CC**, Althouse BM, Vasilakis N, Nogueira ML (2022). Impact of SARS-CoV-2 Gamma lineage introduction and COVID-19 vaccination on the epidemiological landscape of a Brazilian city. *Nature Communications Medicine* **2**:41.
7. Panovska-Griffiths J, Stuart RM, **Kerr CC**, Rosenfield K, Mistry D, Waites W, Klein DJ, Bonell C, Viner RM (2022). Modelling the impact of reopening schools in the UK in early 2021 in the presence of the alpha variant and with roll-out of vaccination against SARS-CoV-2. *Journal of Mathematical Analysis and Applications* **514**(2):126050.
8. Krivorotko O, Sosnovskaia M, Vashchenko I, **Kerr CC**, Lesnic D (2022). Agent-based modeling of COVID-19 outbreaks for New York State and UK: Parameter identification algorithm. *Infectious Disease Modeling* **7**(1):30-44.
9. Goscé L, Abou Jaoude GJ, Kedziora DJ, Benedikt C, Hussain A, Jarvis S, Skrahina A, Klimuk D, Hurevich H, Zhao F, Fraser-Hurt N, Cheikh N, Gorgens M, Wilson DJ, Abeysuriya R, Martin-Hughes R, Kelly SL, Roberts A, Stuart RM, Palmer T, Panovska-Griffiths J, **Kerr CC**, Wilson DP, Haghparast-Bidgoli H, Skordis J, Abubakar I. Optima TB: A tool to help optimally allocate tuberculosis spending (2021). *PLoS Computational Biology* **17**(9):e1009255.
10. **Kerr CC**, Stuart RM, Mistry D, Abeysuriya RG, Rosenfeld K, Hart GR, Núñez RC, Cohen JA, Selvaraj P, Hagedorn B, George L, Jastrzębski M, Izzo AS, Fowler G, Palmer A, Delpont D, Scott N, Kelly SL, Bennette CS, Wagner BG, Chang ST, Oron AP, Wenger EA, Panovska-Griffiths J, Famulare M, Klein DJ (2021). Covasim: An agent-based model of COVID-19 dynamics and interventions. *PLoS Computational Biology* **17**(7):e1009149.
11. Pham QD, Stuart RM, Nguyen TV, Luong QC, Tran QD, Pham TQ, Phan LT, Dang TQ, Tran DN, Do HT, Mistry D, Klein DJ, Abeysuriya RG, Oron AP, **Kerr CC**. Estimating and

- mitigating the risk of COVID-19 epidemic rebound associated with reopening of international borders in Vietnam: a modelling study (2021). *Lancet Global Health* **9**(7):e916-e924.
12. **Kerr CC**, Mistry D, Stuart RM, Rosenfeld K, Hart GR, Núñez RC, Cohen JA, Selvaraj P, Abeysuriya RG, Jastrzębski M, George L, Hagedorn B, Panovska-Griffiths J, Fagalde M, Duchin J, Famulare M, Klein DJ (2021). Controlling COVID-19 via test-trace-quarantine. *Nature Communications* **12**(1):2993.
 13. Panovska-Griffiths J, **Kerr CC**, Waites W, Stuart RM, Mistry D, Foster D, Klein DJ, Viner RM, Bonell C. Modelling the potential impact of mask use in schools and society on COVID-19 control in the UK (2021). *Nature Scientific Reports* **11**(1):8747.
 14. Stuart RM, Abeysuriya RG, **Kerr CC**, Mistry D, Klein DJ, Gray RT, Hellard M, Scott N. Role of masks, testing and contact tracing in preventing COVID-19 resurgences: a case study from New South Wales, Australia (2021). *BMJ Open* **11**(4):e045941.
 15. Scott N, Palmer A, Delport D, Abeysuriya R, Stuart RM, **Kerr CC**, Mistry D, Klein DJ, Sacks-Davis R, Heath K, Hainsworth SW, Pedrana A, Stooze M, Wilson D, Hellard ME. Modelling the impact of relaxing COVID-19 control measures during a period of low viral transmission. *Med J Aust* 2021 **214**(2):79-83.
 16. Panovska-Griffiths J, **Kerr CC**, Stuart RM, Mistry D, Klein DJ, Viner RM, Bonell C. Determining the optimal strategy for reopening schools, the impact of test and trace interventions, and the risk of occurrence of a second COVID-19 epidemic wave in the UK: a modelling study. *Lancet Child Adolescent Health* 2020 **4**(11):817-827.
 17. Phillips AN, Cambiano V, Nakagawa F, Bansi-Matharu L, Wilson D, Jani I, Apollo T, Sculpher M, Hallett T, **Kerr CC**, van Oosterhout JJ. Cost-per-diagnosis as a metric for monitoring cost-effectiveness of HIV testing programmes in low-income settings in southern Africa: health economic and modelling analysis. *Journal of the International AIDS Society* 2019 **22**(7):e25325.
 18. Stuart RM, Kelly SL, **Kerr CC**, Martin-Hughes R, Wilson DP. The influence of constraints on the efficient allocation of resources for HIV prevention. *AIDS* 2019 **33**(12):1949–50.
 19. Kedziora DJ, Abeysuriya R, **Kerr CC**, Chadderdon GL, Harbuz VŞ, Metzger S, Wilson DP, Stuart RM. The Cascade Analysis Tool: software to analyze and optimize care cascades. *Gates Open Research* 2019 **3**:1488.
 20. Dura-Bernal S, Suter BA, Gleeson P, Cantarelli M, Quintana A, Rodriguez F, Kedziora DJ, Chadderdon GL, **Kerr CC**, Neymotin SA, McDougal RA, Hines M, Shepherd GMG, Lytton WW (2019). NetPyNE, a tool for data-driven multiscale modeling of brain circuits. *eLife* 2019 **8**:e44494.
 21. **Kerr CC**. Is epidemiology ready for Big Software? *Pathogens and Disease* 2019 **77**(1):ftz006.
 22. Stuart RM, Haghparast-Bidgoli H, Panovska-Griffiths J, Grobicki L, Skordis J, **Kerr CC**, Kedziora DJ, Martin-Hughes R, Kelly SL, Wilson DP. Applying the “no-one worse off” criterion to design Pareto efficient HIV responses in Sudan and Togo. *AIDS* 2019 **33**(7):1247–52.
 23. Pearson R, Killedar M, Petravic J, Kakietek JJ, Scott N, Grantham KL, Stuart RM, Kedziora DJ, **Kerr CC**, Skordis-Worrall J, Shekhar M, Wilson DP. Optima Nutrition: an allocative efficiency tool to reduce childhood stunting by better targeting of nutrition-related interventions. *BMC Public Health* 2018 **18**(1):384.
 24. Zobaer MS, Robinson PA, **Kerr CC**. Physiology-based ERPs in normal and abnormal states. *Biological Cybernetics* 2018 **112**(5):465–482.
 25. Buchin A, **Kerr CC**, Huberfeld G, Miles R, Gutkin B. Adaptation and Inhibition Control Pathological Synchronization in a Model of Focal Epileptic Seizure. *eNeuro* 2018 **5**(5):ENEURO.0019-18.2018.

26. Phillips A, Cambiano V, Bansi-Matharu L, Nakagawa F, Wilson D, Jani I, Apollo T, Sculpher M, Hallett T, **Kerr CC**, van Oosterhout J. Cost-of-testing-per-new-HIV-diagnosis as a metric for monitoring cost-effectiveness of testing programmes in low income settings in Southern Africa: health economic modelling analysis. *Journal of the International AIDS Society* 2018 **21**:27–28.
27. Estill J, **Kerr CC**, Blaser N, Salazar-Vizcaya L, Tenthani L, Wilson DP, Keiser O. The Effect of Monitoring Viral Load and Tracing Patients Lost to Follow-up on the Course of the HIV Epidemic in Malawi: A Mathematical Model. *Open Forum Infectious Diseases* 2018 **5**(5):ofy092.
28. Stuart RM, Grobicki L, Haghparast-Bidgoli H, Panovska-Griffiths J, Skordis J, Keiser O, Estill J, Baranczuk Z, Kelly SL, Reporter I, Kedziora DJ, Shattock AJ, Petravic J, Hussain SA, Grantham KL, Gray RT, Yap XF, Martin-Hughes R, Benedikt CJ, Fraser-Hurt N, Masaki E, Wilson DJ, Gorgens M, Mziray E, Cheikh N, Shubber Z, **Kerr CC**, Wilson DP. How should HIV resources be allocated? Lessons learnt from applying Optima HIV in 23 countries. *Journal of the International AIDS Society* 2018 **21**(4):e25097.
29. Kelly SL, Martin-Hughes R, Stuart RM, Yap XF, Kedziora DJ, Grantham KL, Hussain SA, Reporter I, Shattock AJ, Grobicki L, Haghparast-Bidgoli H, Skordis-Worrall J, Baranczuk Z, Keiser O, Estill J, Petravic J, Gray RT, Benedikt C, Fraser N, Gorgens M, M, Wilson D, **Kerr CC**, Wilson DP. The global Optima HIV allocative efficiency model: targeting resources in efforts to end AIDS. *The Lancet HIV* 2018 **5**(4):e190-8.
30. **Kerr CC**, Dura-Bernal S, Smolinski TG, Chadderdon GL, Wilson DP. Optimization by adaptive stochastic descent. *PLoS ONE* 2018 **13**(3):e0192944.
31. Wilson DP, Gorgens M, Wilson DJ, **Optima HIV Study Team**. Optima attempts to objectively and pragmatically assist countries meet their targets most efficiently and effectively. *Journal of the International AIDS Society* 2018 **21**(10):e25190.
32. Stuart RM, Fraser-Hurt N, **Kerr CC**, Mabusela E, Madi V, Mkhwanazi F, Pillay Y, Barron P, Muzah B, Matsebula T, Gorgens M, Wilson DP. The City of Johannesburg can end AIDS by 2030: modelling the impact of achieving the Fast-Track targets and what it will take to get there. *Journal of the International AIDS Society* 2018 **21**(1).
33. Zobaer MS, Anderson RM, **Kerr CC**, Robinson PA, Wong KK, D'Rozario AL. K-complexes, spindles, and ERPs as impulse responses: unification via neural field theory. *Biological Cybernetics* 2017 **111**(2):149–64.
34. Shattock AJ, Benedikt C, Bokazhanova A, Đurić P, Petrenko I, Ganina L, Kelly SL, Stuart RM, **Kerr CC**, Vinichenko T, Zhang S, Hamelmann C, Manova M, Masaki E, Wilson DP, Gray RT. Kazakhstan can achieve ambitious HIV targets despite expected donor withdrawal by combining improved ART procurement mechanisms with allocative and implementation efficiencies. *PLoS ONE* 2017 **12**(2):e0169530.
35. Stuart RM, **Kerr CC**, Haghparast-Bidgoli H, Estill J, Grobicki L, Baranczuk Z, Prieto L, Montañez V, Reporter I, Gray RT, Skordis-Worrall J, Keiser O, Cheikh N, Boonto K, Osornprasop S, Lavadenz F, Benedikt CJ, Martin-Hughes R, Hussain SA, Kelly SL, Kedziora DJ, Wilson DP. Getting it right when budgets are tight: Using optimal expansion pathways to prioritize responses to concentrated and mixed HIV epidemics. *PLoS ONE* 2017 **12**(10):e0185077.
36. Scott N, Hussain SA, Martin-Hughes R, Fowkes FJI, **Kerr CC**, Pearson R, Kedziora DJ, Killedar M, Stuart RM, Wilson DP. Maximizing the impact of malaria funding through allocative efficiency: using the right interventions in the right locations. *Malaria Journal* 2017 **16**(1):368.
37. Dura-Bernal S, Neymotin SA, **Kerr CC**, Sivagnanam S, Majumdar A, Francis JT, Lytton WW. Evolutionary algorithm optimization of biological learning parameters in a biomimetic neuroprosthesis. *IBM Journal of Research and Development* 2017 **61**(2/3).

38. Benedikt C, Kelly SL, Wilson D, Wilson DP, **Optima Consortium**. Allocative and implementation efficiency in HIV prevention and treatment for people who inject drugs. *International Journal of Drug Policy* 2016 **38**:73–80.
39. Grantham KL, **Kerr CC**, Wilson DP. Local responses to local epidemics for national impact need advanced spatially explicit tools. *AIDS* 2016 **30**(9):1481–2.
40. Kelly SL, Shattock AJ, **Kerr CC**, Stuart RM, Papoyan A, Grigoryan T, Hovhannisyan R, Grigoryan S, Benedikt C, Wilson DP. Optimizing HIV/AIDS resources in Armenia: increasing ART investment and examining HIV programmes for seasonal migrant labourers. *Journal of the International AIDS Society* 2016 **19**(1):20772.
41. Shattock AJ, **Kerr CC**, Stuart RM, Masaki E, Fraser N, Benedikt C, Gorgens M, Wilson DP, Gray RT. In the interests of time: improving HIV allocative efficiency modelling via optimal time-varying allocations. *Journal of the International AIDS Society* 2016 **19**(1):20627.
42. Wilson DW, **Kerr CC**. Can we know in advance whether models will 'get it right'? *The Lancet Global Health* 2015 **3**(10): e577–8.
43. Pham QD, Wilson DP, **Kerr CC**, Shattock AJ, Do HM, Duong AT, Nguyen LT, Zhang L. Estimating the cost-effectiveness of HIV prevention programmes in Vietnam, 2006-2010: A modelling study. *PLOS ONE* 2015 **10**:e0133171.
44. Jansson J, **Kerr CC**, Mallitt K-A, Wu J, Gray RT, Wilson DP. Inferring HIV incidence from case surveillance with CD4 counts. *AIDS* 2015 **29**(12):1517–25.
45. Zhang L, Phanuphak N, Henderson H, Nonenoy S, Srikaew S, Shattock A, **Kerr CC**, Omune B, van Griensven F, Osornprasop S, Oelrichs R, Ananworanich J, Wilson DP. Scaling up HIV treatment for MSM in Bangkok: what does it take? — a modelling and costing study. *The Lancet HIV* 2015 **2**(5):e200–7.
46. **Kerr CC**, Stuart RM, Gray RT, Shattock A, Fraser-Hurt N, Benedikt C, Haacker M, Berdnikov M, Mahmood AM, Jaber SA, Gorgens M, Wilson DP. Optima: a model for HIV epidemic analysis, program prioritization, and resource optimization. *Journal of Acquired Immune Deficiency Syndromes* 2015 **69**(3):365–76.
47. Fraser N, **Kerr CC**, Harouna Z, Alhousseini Z, Cheikh N, Gray RT, Shattock A, Wilson DP, Haacker M, Shubber Z, Masaki E, Karamoko D, Gorgens M. Reorienting the HIV response in Niger towards sex work interventions: from better evidence to targeted and expanded practice. *Journal of Acquired Immune Deficiency Syndromes* 2015 **68**:S213–20.
48. Lytton WW, Neymotin SA, **Kerr CC**. Multiscale modeling for clinical translation in neuropsychiatric disease. *Journal of Computational Surgery* 2014 **1**:7.
49. Chadderdon GL, Mohan A, Suter BA, Neymotin SA, **Kerr CC**, Francis JT, Shepherd GMG, Lytton WW. Motor cortex microcircuit simulation based on brain activity mapping. *Neural Computation* 2014 **26**(7): 1239–62.
50. Jansson JA, **Kerr CC**, Wilson DP. Predicting the population impact of increased HIV testing and treatment in Australia. *Sexual Health* 2014 **11**(2):146–154. [NB: discussed in *Science* **345** (6193):157.]
51. Eaton JW, Menzies NA, Stover J, Cambiano V, Chindelevitch L, Cori A, Hontelez JAC, Humair S, **Kerr CC**, Klein DJ, Mishra S, Mitchell KM, Nichols BE, Vickerman P, Bärnighausen T, Bershteyn A, Bloom DE, Boily M-C, Chang ST, Cohen T, Dodd PJ, Fraser C, Gopalappa C, Lundgren J, Martin NK, Mountain E, Pham QD, Pickles M, Phillips A, Platt L, Pretorius C, Prudden HJ, Salomon JA, van de Vijver DAMC, Wagner BG, White RG, Wilson DP, Zhang L, Bandford J, Meyer-Rath G, Remme M, Revill P, Sangrujee N, Terris-Prestholt F, Doherty M, Easterbrook P, Hirschall G, Hallett TB. Health benefits, costs, and cost-effectiveness of earlier

- eligibility for adult antiretroviral therapy and expanded treatment coverage: a combined analysis of 12 mathematical models. *The Lancet Global Health* 2014 2:e23–34.
52. Neymotin SA, Chadderdon GL, **Kerr CC**, Francis JT, Lytton WW. Reinforcement learning of 2-joint virtual arm reaching in a computer model of sensorimotor cortex. *Neural Computation* 2013 25(12):3263–93.
 53. **Kerr CC**, van Albada SJ, Neymotin SA, Chadderdon GL, Robinson PA, Lytton WW. Cortical information flow in Parkinson’s disease: a composite network/field model. *Frontiers in Computational Neuroscience* 2013 7(39):1–14.
 54. Song W, **Kerr CC**, Lytton WW, Francis JT. Cortical plasticity induced by spike-triggered microstimulation in primate somatosensory cortex. *PLOS ONE* 2013 8(3):e57453.
 55. Kwon JA, Anderson J, **Kerr CC**, Thein H-H, Zhang L, Iversen J, Dore GJ, Kaldor JM, Law MG, Maher L, Wilson DP. Estimating the cost-effectiveness of needle-syringe programs in Australia. *AIDS* 2012 26(17):2201–10.
 56. Chadderdon GL, Neymotin SA, **Kerr CC**, Lytton WW. Reinforcement learning of targeted movement in a spiking neuronal model of motor cortex. *PLOS ONE* 2012 7(10):e47251.
 57. **Kerr CC**, Neymotin SA, Chadderdon GL, Fietkiewicz CT, Francis JT, Lytton WW. Electrostimulation as a prosthesis for repair of information flow in a computer model of neocortex. *IEEE Transactions on Neural Systems & Rehabilitation Engineering* 2012 20(2):153–60.
 58. Neymotin SA, **Kerr CC**, Francis JT, Lytton WW. Training oscillatory dynamics with spike-timing-dependent plasticity in a computer model of neocortex. *IEEE Signal Processing in Medicine and Biology Symposium* 2011 1–6.
 59. Schneider K, **Kerr CC**, Hoare A, Wilson DP. Expected epidemiological impacts of introducing an HIV vaccine in Thailand: a model-based analysis. *Vaccine* 2011 29(36): 6086–91.
 60. Chiang AK, Rennie CJ, Robinson PA, van Albada SJ, **Kerr CC**. Age trends and sex differences of alpha rhythms including split alpha peaks. *Clinical Neurophysiology* 2011 122(8):1505–17.
 61. **Kerr CC**, Rennie CJ, Robinson PA. Model-based analysis and quantification of auditory evoked potential age trends. *Clinical Neurophysiology* 2011 122(1):134–47.
 62. **Kerr CC**, Kemp AH, Rennie CJ, Robinson PA. Thalamocortical changes in clinical depression probed by deconvolution and physiology-based modeling. *NeuroImage* 2011 54(4):2672–82.
 63. **Kerr CC**, van Albada SJ, Rennie CJ, Robinson PA. Age trends in auditory evoked potentials via component scoring and deconvolution. *Clinical Neurophysiology* 2010 121(6):962–76.
 64. Van Albada SJ, **Kerr CC**, Chiang AK, Rennie CJ, Robinson PA. Neurophysiological changes with age probed by inverse modeling of EEG spectra. *Clinical Neurophysiology* 2010 121(1):21–38.
 65. **Kerr CC**, Rennie CJ, Robinson PA. Deconvolution analysis of target evoked potentials. *Journal of Neuroscience Methods* 2009 179(1):101–110.
 66. Clearwater JC, **Kerr CC**, Rennie CJ, Robinson PA. The neural mechanisms of ERP change: combining insights from electrophysiology and mathematical modeling. *Journal of Integrative Neuroscience* 2008 7(4):529–50.
 67. **Kerr CC**, Rennie CJ, Robinson PA. Physiology-based modeling of cortical auditory evoked potentials. *Biological Cybernetics* 2008 98(2):171–84.

BOOKS AND BOOK CHAPTERS

1. Panovska-Griffiths J, **Kerr CC**, Waites W, Stuart RM (2021). Mathematical modeling as a tool for policy decision making: Applications to the COVID-19 pandemic. *Handbook of Statistics*. Elsevier.
2. **Kerr CC**, Stuart RM, Kedziora DJ, Brown A, Abey Suriya R, Chadderdon GL, Nachesa A, Wilson DP (2021). 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*. Washington DC: The World Bank Group.
3. Stvilia K, Khonelidze I, Haghparast-Bidgoli H, **Kerr CC**, Zhao F, Görgens M (2021). Georgia: An HIV Epidemic among Men Who Have Sex with Men. In *Tackling the world's fastest growing HIV epidemic: Gateways to efficient and effective HIV responses in Eastern Europe and Central Asia*. Washington DC: The World Bank Group.
4. Kuzin I, Sharapka K, Hvazdziova E, **Kerr CC**, Stuart RM, Zhao F, Masaki E (2021). Ukraine: HIV Treatment in a Time of Crisis. In *Tackling the world's fastest growing HIV epidemic: Gateways to efficient and effective HIV responses in Eastern Europe and Central Asia*. Washington DC: The World Bank Group.
5. **Kerr CC**, Sarkar S (2017). Reverberations: Architectural Practice through the Lens of Multiscale Dynamical Fractal Systems Theory. In Schnabel MD (ed.), *Back to the Future: The Next 50 Years* (51st International Conference of the Architectural Science Association) 85–94.
6. Robinson PA, Posnotva S, Abey Suriya RG, Kim JW, Roberts JA, McKenzie-Sell L, Karanjai A, **Kerr CC**, Fung F, Anderson R, Breakspear MJ, Drysdale PM, Fulcher B, Phillips AJK, Rennie CJ, Yin G (2015). A Multiscale “Working Brain” Model. In Brette R, Destexhe A (eds.), *Springer Series in Computational Neuroscience*. Berlin: Springer Verlag.
7. Lytton WW, **Kerr CC** (2013). Computational neuroscience of synapses and neurons. In Pfaff D (ed.), *Neuroscience in the 21st Century*. Berlin: Springer Verlag.
8. Neymotin SA, Mathew A, **Kerr CC**, Lytton WW (2013). Computational neuroscience of neural networks. In Pfaff D (ed.), *Neuroscience in the 21st Century*. Berlin: Springer Verlag.
9. Wilson DP, Riono P, **Kerr CC**, Kwon JA, Zhang L, Kaldor J, Sutrisna A, Farid MN, Hadi N (2011). *The HIV in Indonesia Model (HIM)*. Jakarta: University of Indonesia Press.

TECHNICAL REPORTS

1. Hou X, Abou Jaoude G, Gosce L, Shamu S, Sisimayi CN, Lannes L, Wilkinson TD, **Kerr CC**, Haghparast-Bidgoli H, Skorids J (2021). *Improving Allocative Efficiency in Zimbabwe's Health Sector*. The World Bank Group.
2. Gutierrez C, Stuart RM, Wilson DP, Lavadenz F, Reporter I, **Kerr CC** (2018) *Optimizando la Inversión del Plan de Respuesta de Colombia al VIH*. The World Bank Group.
3. University College London, **Optima Consortium for Decision Science**, Burnet Institute (2017). *Optimizing investments in Belarus' tuberculosis response*. The World Bank Group for the Government of Belarus.
4. **Optima Consortium for Decision Science**, the University of Bern, the University of New South Wales, and the Burnet Institute, UNAIDS, Myanmar Ministry of Health and Sports, the World Bank Group (2017). *Allocating HIV Funding Efficiently in Myanmar : Analyses Using the Optima HIV Model*. The World Bank Group.

5. University of Bern, University of New South Wales, **Burnet Institute**, The World Bank (2016). *HIV Investment in Cote d'Ivoire: Optimized allocation of HIV resources for a sustainable and efficient HIV response*. The World Bank Group.
6. Government of Senegal, UNAIDS, **Optima Consortium for Decision Science**, University of Bern, University of New South Wales, Kirby Institute, Burnet Institute (2016). *Optimizing Investments for a Sustainable and Efficient HIV Response in Senegal: Findings from an HIV Allocative Efficiency Study*. The World Bank Group.
7. Burnet Institute, **Optima Consortium for Decision Science** (2016). *Ending AIDS in Johannesburg: An analysis of the status and scale-up towards HIV treatment and prevention targets*. The World Bank Group for the Gauteng Province Department of Health and South African Department of Health.
8. Atroshchanka O, Fisenka A, Ilyenkova V, Đurić P, Gray R, Benedikt C, Masaki E, Obst M, Kokiashvili D, Maxim C, Sakvarelidze G, Zhang S, Hailevich R, Manova M, Hamelmann C, **Kerr CC**, Stuart R, Wilson D.P, Görgens M, Nguyen SN, Wilson DP (2016). *Optimizing investments in Belarus for the National HIV Response*. The World Bank Group.
9. Maitieva V, Ianbukhtina L, Mambetov T, Bashmakova L, Sarybaeva M, Đurić P, Shattock A, Benedikt C, Masaki E, Obst M, Soorombaeva D, Abarbekova A, Kazizova M, Irbe S, Kokiashvili D, Mdivani N, Zhang S, Hailevich R, Manova M, Scutelnicuic O, Hamelmann C, Macauley J, Stuart R, **Kerr CC**, Wilson DP, Patel R, Nguyen SN, Görgens M (2016). *Optimizing Investments in the Kyrgyz Republic's HIV Response*. The World Bank Group.
10. Kuzin I, Sharapka K, Gvozdeva E, **Kerr CC**, Stuart R, Masaki E, Goroshko A, Benedikt C, Nizova N, Wilson D, Boyko J, Belli P, Görgens M, Wilson DP, Manova M, Hailevich R, Tyszko J, Đurić P, Hamelmann C, Zhang S, Sakvarelidze G, Görgens M, Belli P, Doroshenko O, Fraser N, Garcia R, Shubber Z (2016). *Value for money in Ukraine's HIV response: strategic investment and improved efficiency*. The World Bank Group.
11. Asatiani A, Baliashvili D, Khonelidze I, Ruadze E, Stvilia K, Tsereteli M, Chokoshvili O, Haghparast-Bidgoli H, Grobicki L, Panovska-Griffiths J, Skordis-Worrall J, Benedikt C, **Kerr CC**, Stuart R, Wilson DP, Görgens M, Masaki E, Hailevic R, Manova M, Kokiashvili D, Loncar D, Sakanyan T, Zhang S, Đurić P, Hamelmann C (2016). *Optimizing Investments in Georgia's HIV Response*. The World Bank Group.
12. Grigoryan S, Grigoryan T, Hovhannisyan R, Papoyan A, Kelly S, Benedikt C, Cuadros DF, Masaki E, Obst M, Grishechkina V, Kokiashvili D, Zhang S, Hailevich R, Manova M, Đurić P, Hamelmann C, **Kerr CC**, Stuart R, Wilson DP, Nguyen SN, Görgens M, Heard W (2016). *Optimizing HIV Investments in Armenia*. The World Bank Group.
13. Baiserkin BS, Bokazhanova A, Ganina LU, Kalinich NF, Kazimova AA, Petrenko I.I, Yelizarieva AV, Đurić P, Shattock A, Benedikt C, Masaki E, Obst M, Farcy N, Kokiashvili D, Vinichenko T, Zhang S, Hailevich R, Manova M, Scutelnicuic O, Hamelmann C, **Kerr CC**, Stuart RM, Wilson DP, Nguyen SN, Görgens M, Wilson D, Patel R, Bortman M, Zhumadil B (2016). *Optimizing investments in Kazakhstan's HIV response*. The World Bank Group.
14. Kelly S, Shattock A, **Kerr CC**, Gama T, Nhlabatsi N, Zagatti G, Harimurti P, Wilson DP, Gorgens M (2015). *HIV mathematical modelling to support Swaziland's development of its HIV investment case*. The World Bank Group.
15. Masaki E, Fraser N, Haacker M, Obst M, Wootton R, Sunkutu R, Gorgens M, Gray RT, Shattock A, **Kerr CC**, Wilson DP (2015). *Zambia's HIV response: Prioritised and strategic allocation of HIV resources for impact and sustainability*. The World Bank Group.

16. Fraser N, Benedikt C, Obst M, Masaki E, Gorgens M, Stuart R, Shattock A, Gray RT, **Kerr CC**, Wilson DP (2014). *Sudan's HIV Response: Value for Money in a Low-Level HIV Epidemic*. The World Bank Group.
17. Fraser N, Cheikh N, Haacker M, Masaki E, Karamoko D, Gorgens M, Frescura L, Konan C, **Kerr CC**, Gray RT, Shattock A, Wilson DP (2014). *Niger's HIV Response: Targeted Investments for a Healthy Future*. The World Bank Group.
18. Naning H, **Kerr CC**, Kamarulzaman, Dahlui AM, Ng CW, Wilson DP (2014). *Return on Investment and Cost-Effectiveness of Harm Reduction Programmes in Malaysia*. The World Bank Group.
19. **Kerr CC**, Wilson DP. (2014). *HIV Investment in Armenia: Analysis & Recommendations*. UNAIDS.
20. Đurić P, Hammelmann C, Wilson DP, **Kerr CC** (2014). *HIV Resource Needs, Efficient Allocation and Resource Mobilization for Uzbekistan*. UNDP.
21. Đurić P, Hammelmann C, Wilson DP, **Kerr CC** (2014). *HIV Resource Needs, Efficient Allocation and Resource Mobilization for Tajikistan*. UNDP.
22. Wilson DP, Yakusik A, **Kerr CC**, Avila C (2013). *HIV Resource Needs, Efficient Allocation and Resource Mobilization for the Republic of Belarus*. UNAIDS.
23. Wilson DP, Reyes J, **Kerr CC**, Gray RT (2013). *Return on Investment of Needle-Syringe Programs in the Philippines*. The World Bank Group.
24. Zhang L, Pham QD, Do MH, **Kerr CC**, Wilson DP (2012). *Return on Investment of HIV Prevention in Vietnam: Technical Report*. The World Bank/Vietnam Administration for AIDS Control.
25. Wilson DP, Gray RT, Razali K, Hoare A, Cheah J, **Kerr CC**, Jamaludin A (2012). *Determining Cost-Effective and Efficient Allocation of HIV Resources for the Republic of Armenia*. The World Bank Group.
26. Wilson DP, Zhang L, **Kerr CC**, Uusküla A, Kwon JA, Hoare A, Sharapka AK, Balabayev T, Yakusik A, Gvozdeva E, Ionascu G, Otiashvili GD, Grigoryan T, Soliev A, Williams-Sherlock M, Avila C (2012). *The Cost-Effectiveness of Needle-Syringe Exchange Programs in Eastern Europe and Central Asia: Costing, Data Synthesis, Modeling and Economics for Eight Case Study Countries*. UNAIDS.

CONFERENCES AND CONFERENCE PROCEEDINGS

1. **Kerr CC**, Stuart RM, Mistry D, Abey Suriya RG, Cohen JA, George L, Klein DJ (2022). Python vs. the pandemic: a case study in high-stakes software development. *SciPy* (talk).
2. **Kerr CC**, Mistry D, Stuart RM, Abey Suriya RG, Cohen JA, Rosenfeld K, Klein DJ (2022). Using mathematical modeling to inform COVID-19 policy: Lessons and opportunities. *Pasteur Institute Annual Conference* (talk).
3. **Kerr CC**, Mistry D, Stuart RM, Cohen JA, Rosenfeld K, Hart GR, Núñez RC, Abey Suriya RG, Jastrzębski M, Famulare M, Klein DJ (2021). Agent-based modeling of COVID-19 transmission and prevention. *Networks* (talk).
4. **Kerr CC**, Mistry D, Stuart RM, Rosenfeld K, Hart GR, Núñez RC, Selvaraj P, Cohen JA, Abey Suriya RG, George L, Hagedorn B, Jastrzębski M, Fagalde M, Duchin J, Famulare M, Klein DJ (2020). Controlling COVID-19 via test-trace-quarantine. *COVID-19 Dynamics and Evolution* (talk).

5. Dura-Bernal S, **Kerr CC**, Kedziora D, Suter BA, Quintana A, Cantarelli M, Gleeson P, Neymotin SA, Hines M, Shepherd GM, Lytton WW (2018). NetPyNE: a tool to develop, simulate and analyze data-driven multiscale biophysically-detailed network models. *NeuroEng: Australasian Workshop on Neuro-Engineering and Computational Neuroscience* (featured oral, presenting speaker).
6. **Kerr CC**, Sarkar S (2017). Reverberations: Architectural Practice through the Lens of Multiscale Dynamical Fractal Systems Theory. *51st International Conference of the Architectural Science Association* (talk).
7. **Kerr CC** (2017). The forest and the trees: How the dynamical environment influences small-scale network computations. *Bernstein Conference*, “Multiscale modeling and simulation” workshop (invited talk).
8. Stuart RM, Turner KF, **Kerr CC** (2017). Function follows form: estimating the dependency structure of the brain resource international database. *Systems & Computational Neuroscience Down Under* (poster).
9. Li LW, Lizier J, Sanz-Leon P, **Kerr CC** (2017). Network analysis of task-oriented neuroimaging data via multivariate information-theoretic measures. *Computational Neuroscience* (poster).
10. **Kerr CC**, Dura-Bernal S, Menzies RJ, McLauchlan C, van Albada SJ, Kedziora DJ, Neymotin S, Lytton WW (2016). Computational capacity as a function of network size. *Society for Neuroscience* (poster).
11. McLauchlan C, Kedziora DJ, Menzies R, Dura-Bernal S, **Kerr CC** (2016). Effect of network size on task learning performance. *NeuroEng: Australasian Workshop on Neuro-Engineering and Computational Neuroscience* (poster).
12. Sweeney Z, Kedziora DJ, Dura-Bernal S, **Kerr CC** (2016). Influence of microstimulation on firing rate variability within asynchronous neural networks. *NeuroEng: Australasian Workshop on Neuro-Engineering and Computational Neuroscience* (poster).
13. Dura-Bernal S, Menzies R, McLauchlan C, van Albada SJ, Kedziora D, Neymotin S, Lytton WW, **Kerr CC** (2016). Effect of network size on computational capacity. *Computational Neuroscience* (poster).
14. Dura-Bernal S, Suter BA, Neymotin S, **Kerr CC**, Quintana A, Gleeson P, Shepherd GM, Lytton WW (2016). NetPyNE: a Python package for NEURON to facilitate development and parallel simulation of biological neuronal networks. *Computational Neuroscience* (poster).
15. Zobaer MS, **Kerr CC**, Robinson PA (2015). Modeling K-complexes and sleep spindles as evoked responses using physiologically based neural field theory. *Worldsleep* (poster).
16. Stuart RM, Turner KF, **Kerr CC** (2015). Function follows form: Relating brain anatomy and physiology to cognition and psychology. *Society for Neuroscience* (poster).
17. **Kerr CC**, Stuart RM, Shattock AT, Kelly SL, Reporter I, Fraser N, Benedikt C, Gorgens M, Wilson DP (2015). Achieving maximal health impact with available resources: balancing the science, economics, and politics of HIV. *World STI & HIV Congress* (talk).
18. Kelly SL, Shattock AJ, **Kerr CC**, Wilson DP, Gama T, Ceesay N, Gorgens M (2015). Optimization HIV investment in Swaziland: Modelling high-impact interventions. *World STI & HIV Congress* (poster).
19. Choi JS, Menzies R, Dura-Bernal S, Francis JT, Lytton WW, **Kerr CC** (2015). Spiking network modeling of neuronal dynamics in individual rats. *Computational Neuroscience* (poster).

20. Dura-Bernal S, **Kerr CC**, Neymotin SA, Suter B, Shepherd G (2015). Large-scale MI microcircuit model with plastic input connections from biological PMd neurons used for prosthetic arm control. *Computational Neuroscience* (poster).
21. **Kerr CC**, Choi JS, Dura-Bernal S, Francis JT, Lytton WW (2014). One size does not fit all: calibrating microstimulation to individual subjects using spiking network models. *Society for Neuroscience* (poster).
22. Dura-Bernal S, Li K, Brockmeier A, **Kerr CC**, Neymotin SA, Principe JC, Francis JT, Lytton WW (2014). Repairing lesions via microstimulation in a spiking network model driving a virtual arm. *Society for Neuroscience* (poster).
23. **Kerr CC**, Choi JS, Dura-Bernal S, Francis JT, Lytton WW (2014). One size does not fit all: calibrating microstimulation to individual subjects using spiking network models. *Interagency Modeling and Analysis Group Multiscale Modeling Consortium Meeting* (poster).
24. **Kerr CC**, O'Shea DJ, Goo W, Dura-Bernal S, Francis JT, Diester I, Kalanithi P, Deisseroth K, Shenoy K, Lytton WW (2014). Network-level effects of optogenetic stimulation in a computer model of macaque primary motor cortex. *Computational Neuroscience* (poster).
25. **Kerr CC**, Wilson DP, Yakusik A, Avila C (2014). HIV resource needs case studies: Belarus and Armenia. *UNAIDS Induction Workshop on the Investment Approach and Investment Cases for National AIDS Responses in Central Asia and Eastern Europe* (**invited talk**).
26. **Kerr CC**, Wilson DP (2014). Using Optima to optimize resource allocations. *UNAIDS Induction Workshop on the Investment Approach and Investment Cases for National AIDS Responses in Central Asia and Eastern Europe* (**invited talk**).
27. **Kerr CC**, O'Shea DJ, Goo W, Dura-Bernal S, Francis JT, Diester I, Kalanithi P, Deisseroth K, Shenoy K, Lytton WW (2014). Information flow in optogenetically stimulated macaque motor cortex: simulation and experiment. *Neural Control of Movement* (talk).
28. Francis JT, Iordanou J, **Kerr CC**, Lytton WW, von Kraus L (2014). Erasing sensorimotor memories II: The role of PKMzeta dependent LTP in S1 receptive fields and behavior in the experimentally naive rat and primate. *Neural Control of Movement* (talk).
29. **Kerr CC**, O'Shea DJ, Goo W, Dura-Bernal S, Francis JT, Diester I, Kalanithi P, Deisseroth K, Shenoy K, Lytton WW (2014). Network-level effects of optogenetic stimulation: experiment and simulation. *SUNY Downstate Medical Center Research Day* (talk).
30. **Kerr CC**, Pachitariu M, Iordanou J, Francis J, Sahani M, Lytton WW (2014). Low-dimensional dynamics of somatosensory cortex: experiment and simulation. *Computational and Systems Neuroscience* (poster).
31. Dura-Bernal S, Fox C, de Kamps M, Neymotin SA, **Kerr CC**, Francis JT, Shepherd GMG, Lytton WW (2014). Multiscale modeling of cortical microcircuits. *Intelligence Advanced Research Projects Agency (IARPA) Machine Intelligence from Cortical Networks (MICrONS)*.
32. **Kerr CC**, von Kraus L, Iordanou I, Neymotin SA, Francis JT, Lytton WW (2013). Receptive field formation and erasure in somatosensory cortex. *Society for Neuroscience* (poster).
33. **Kerr CC**, van Albada SJ, Neymotin SA, Chadderdon G, Robinson PA, Lytton WW (2013). Multiscale modeling of cortical information flow in Parkinson's disease. *Computational Neuroscience*.
34. Naning H, **Kerr CC**, Kamarulzaman A, Dahlui M, Ng CW, Wilson DP (2013). Return on Investment of HIV Harm Reduction Programmes for Injecting Drug Users in Malaysia. *International AIDS Society*.

35. Eaton JW, Menzies NA, Stover J, Cambiano V, Chindelevitch L, Cori A, Hontelez JAC, Humair S, **Kerr CC**, Klein DJ, Mishra S, Mitchell KM, Nichols BE, Vickerman P, Bärnighausen T, Bershteyn A, Bloom DE, Boily M-C, Chang ST, Cohen T, Dodd PJ, Fraser C, Gopalappa C, Lundgren J, Martin NK, Mountain E, Pham QD, Pickles M, Phillips A, Platt L, Pretorius C, Prudden HJ, Salomon JA, van de Vijver DAMC, Wagner BG, White RG, Wilson DP, Zhang L, Bandford J, Meyer-Rath G, Remme M, Revill P, Sangrujee N, Terris-Prestholt F, Doherty M, Easterbrook P, Hirschall G, Hallett TB, on behalf of the HIV Modelling Consortium ART Eligibility Guidelines Working Group (2013). The epidemiological impact and cost-effectiveness of expanded eligibility for and access to adult antiretroviral therapy in South Africa, Zambia, India, and Vietnam: a twelve model analysis. *International AIDS Society*.
36. **Kerr CC**, van Albada SJ, Neymotin SA, Chadderdon G, Robinson PA, Lytton WW (2013). Multiscale modeling of cortical information flow in Parkinson's disease. *Information Processing in Cognition* (**invited talk**).
37. **Kerr CC**, van Albada SJ, Neymotin SA, Chadderdon G, Robinson PA, Lytton WW (2013). How Parkinson's disease affects cortical information flow: a multiscale model. *NeuroEng: Australian Workshop on Computational Neuroscience* (talk).
38. **Kerr CC**, van Albada SJ, Neymotin SA, Chadderdon G, Robinson PA, Lytton WW (2012). Wrong on so many levels: Parkinsonism in a multiscale network/field model. *BrainModes* (**invited talk**).
39. Jansson J, **Kerr CC**, Mallitt KA, Wu J, Gray RT, Wilson DP (2012). Inferring HIV incidence from CD4 at diagnosis: filling the surveillance gap. *Australasian Society for HIV Medicine* (talk).
40. Hoare A, Gray RT, Razali K, **Kerr CC**, Wilson DP (2012). Optimizing HIV budgets to maximize the impact of HIV prevention programs in an era of reduced funding. *Australasian Society for HIV Medicine* (talk).
41. Popovic G, Ward J, Wilson DP, **Kerr CC**, Gray RT (2012). An escalating HIV epidemic in Aboriginal and Torres Strait Islander people is unlikely, but vigilance is required. *Australasian Society for HIV Medicine* (talk).
42. **Kerr CC**, van Albada SJ, Neymotin SA, Chadderdon G, Robinson PA, Lytton WW (2012). Effects of basal ganglia on cortical computation: a hybrid network/neural field model. *Society for Neuroscience* (poster).
43. Neymotin SA, Chadderdon G, **Kerr CC**, Francis JT, Lytton WW (2012). Reinforcement learning of 2-joint virtual arm reaching in computer model of sensory and motor cortex. *Society for Neuroscience* (poster).
44. Chadderdon G, Neymotin SA, **Kerr CC**, Francis JT, Lytton WW (2012). Dopamine-based reinforcement learning of virtual arm reaching task in a spiking model of motor cortex. *Society for Neuroscience* (poster).
45. Neymotin SA, Chadderdon G, **Kerr CC**, Francis JT, Lytton WW (2012). Reinforcement learning of 2-joint virtual arm reaching in motor cortex simulation. *Computational Neuroscience* (poster).
46. Wilson DP, Zhang L, **Kerr CC**, Uusküla A, Kwon JA, Hoare A, et al. (2012). The cost-effectiveness of needle-syringe exchange programs in Eastern Europe and Central Asia: costing, data synthesis, modelling and economics for eight case study countries. *AIDS* (talk).
47. Kwon JA, Anderson J, **Kerr CC**, Thein H-H, Zhang L, Iversen J, Dore GJ, Kaldor JM, Law MG, Maher L, Wilson DP (2012). Estimating the cost-effectiveness of needle-syringe programs in Australia. *AIDS* (poster).

48. Kwon JA, **Kerr CC**, Zhang L, Riono P, Farid MN, Sutrisna A, Hadi N, Wilson DP (2012). Estimating the population benefits of achieving universal coverage of antiretroviral therapy (ART) in Indonesia. *AIDS* (poster).
49. Chadderdon GL, Neymotin SA, **Kerr CC**, Francis JT, Lytton WW (2012). Dopamine-based reinforcement learning of virtual arm reaching task in a spiking model of motor cortex. *International Conference on Cognitive and Neural Systems 16* (poster).
50. Lytton WW, Neymotin SA, Chadderdon GL, **Kerr CC**, Francis JT (2012). Reinforcement learning of 2-joint virtual arm reaching in detailed cortex simulation. *Neural Control of Movement* (poster).
51. Schneider K, **Kerr CC**, Hoare A, Wilson DP (2011). Expected epidemiological impacts of introducing an HIV vaccine in Thailand: a model-based analysis. *Australasian Society for HIV Medicine* (poster).
52. **Kerr CC**, Neymotin SA, Mo J, Schroeder CE, Ding M, Lytton WW (2011). Interlaminar feedback connections dominate in macaque inferotemporal cortex: in vivo and in silico studies. *Society for Neuroscience* (poster).
53. Neymotin SA, **Kerr CC**, Francis JT, Lytton WW (2011). Attentional modulation of receptive fields in a computer model of the thalamocortical system. *Society for Neuroscience* (poster).
54. Neymotin SA, **Kerr CC**, Chadderdon G, Francis JT, Lytton WW (2011). Restoring physiological oscillations using neuroprosthetic spike-timing-dependent plasticity in computer model of neocortex. *Society for Neuroscience* (poster).
55. Schneider K, Hoare A, **Kerr CC**, Wilson DP (2011). Expected epidemiological impacts of introducing an HIV vaccine in Thailand: a model-based analysis. *10th International Congress on AIDS in Asia and the Pacific* (poster).
56. Neymotin SA, **Kerr CC**, Fietkiewicz CT, Chadderdon GL, Lytton WW (2011). Spike-timing-dependent plasticity and subcortical waves enhance alpha oscillations in a computer model of neocortex. *Neuroinformatics* (poster).
57. **Kerr CC**, Mo J, Neymotin SA, Ding M, Lytton WW (2011). Interlaminar Granger causality and alpha oscillations in a model of macaque cortex. *Computational Neuroscience* (poster).
58. **Kerr CC**, Fietkiewicz C, Chadderdon G, Neymotin SA, Lytton WW (2010). Development of In Silico Brain for DARPA REPAIR project. *DARPA Neural Science, Engineering, and Technology Meeting* (poster).
59. Robinson PA, Kim JW, **Kerr CC** (2010). Spatiotemporal characteristics of brain activity in attention-deficit hyperactivity children. *Human Brain Mapping* (poster).
60. **Kerr CC**, Kemp AH, Rennie CJ, Robinson PA (2010). Modeling evoked potentials in clinical depression. *Human Brain Mapping* (poster).
61. **Kerr CC**, Kemp AH, Rennie CJ, Robinson PA (2010). Thalamocortical changes in clinical depression probed by deconvolution and physiology-based modeling. *Computational and Systems Neuroscience* (poster)
62. **Kerr CC**, Rennie CJ, Robinson PA, Clearwater JC (2008). Physiology-based modeling and analysis of auditory evoked potentials. *Forum for European Neuroscience* (poster).
63. **Kerr CC** (2007). A novel method for analyzing target evoked potentials. *University of Sydney MedPhys* (talk).
64. **Kerr CC** (2006). Biophysical modeling of auditory evoked potentials. *University of Sydney MedPhys* (invited talk).

65. **Kerr CC**, Rennie CJ, Robinson PA (2006). Biophysical modeling of auditory evoked potentials. *Kolling Institute Annual Scientific Research Meeting* (poster).
66. **Kerr CC**, Rennie CJ, Robinson PA (2006). Physiology-based modeling and quantification of evoked response potentials. *Queensland Brain Institute Workshop on Mathematical and Computational Neuroscience* (poster).

NON-CONFERENCE INVITED TALKS

1. MIDAS COVID-19 Webinar (January 2021)
2. School of Physics, University of Sydney (“Colloquium”, May 2016)
3. Kirby Institute, University of New South Wales (“Seminar Series”, February 2012)
4. Woolcock Institute of Medical Research (July 2010)
5. School of Physics, University of Sydney (“Complex Systems Seminar”, June 2010)
6. University of Sydney High Achievers’ Afternoon Tea (January 2010)
7. Brain Dynamics Centre, Westmead Hospital (June 2007, April 2008)
8. School of Physics, University of Sydney (“Colloquium”, August 2007)

COMPETITIVE GRANTS

1. **Kerr CC** (2014–2020). *The forest and the trees: How global brain rhythms facilitate local information processing*. Australian Research Council (ARC) Discovery Early Career Research Fellowship DE140101375 (AU\$570,360 total, including AU\$395,220 from the ARC and AU\$175,140 from the University of Sydney).
 - This is the most competitive support scheme for early-career researchers in Australia, with a success rate of 13.6%; it has been described by one Australian academic as “some of the toughest money to win – worldwide” (<http://theconversation.com/centuries-wasted-applying-for-grants-13111>).
2. **Kerr CC**, Abeysuriya R (2017–2018). *Portfolio optimization methods*. Bill and Melinda Gates Foundation (US\$155,480).
 - This grant leverages the optimization methods developed in previous work to identify optimal spending portfolios for investments made by the Bill and Melinda Gates Foundation, with particular focus on emerging medical technologies.
3. Skordis J, **Kerr CC**, Gosce L, Haghparast-Bidgoli H, Abou-Jaoude G, Rahman T (2017–2018). *Creating an interface for accessing and using publicly available data on universal health coverage*. Bill and Melinda Gates Foundation (US\$632,226).
 - This project aims to synthesize the information contained in the Disease Control Priorities and Global Burden of Disease databases to provide countries with a flexible tool for health service prioritization. I am responsible for leading technical methods and software development.
4. Murphy T, Wheatland M, O’Byrne J, **Kerr CC** (2016–2017). *Introduction to Numerical Computing: Stock market crashes, rocket explosions and other catastrophes*. University of Sydney Open Learning Environment Strategic Education Grant 16042 (AU\$11,600).
 - The aim of this small grant is to develop a new online teaching module for the University of Sydney. As the current course coordinator for COSC1003 *Introduction to Computational Science*, I advised on the content of this teaching module and will help guide its development.

5. Wilson DP, Gray RT, Zhang L, **Kerr CC** (2015–2017). *Optimizing the allocation of resources in response to HIV/AIDS epidemics*. National Health and Medical Research Council (NHMRC) Project Grant APP1086540 (AU\$702,353).
 - I developed the software and optimization algorithm that together form the technical basis of this project; my role is to provide the technical guidance for this project.
6. Wilson DP, McBryde E, **Kerr CC**, Marks G, Makrides M, Middleton P, Trauer J, Reporter I, Ford B, Wood J, Stuart RM, Abeysuriya 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 (2015-2016). *Expanding the Optima Model to TB and Health, and for Applying the Model in Different Contexts*. World Bank Assignment (US\$583,798).
 - I led the technical and modeling component of this grant application, which is an extension of the previous World Bank contract (see below).
7. Wilson DP, Zhang L, Gray RT, **Kerr CC**, Hoare A, Reyes J, Schneider K, Pham Q, Razali K, Chow E, Kwon JA, Anh D, Heymer K, Zhuang X, Farr C, Tapia M (2011–2015). *Cost-effectiveness of HIV prevention responses in Asia*. World Bank Assignment 1045478 (US\$3,488,404).
 - I had the lead role developing the modeling component of this contract (roughly 30% of the total).
8. State University of New York Downstate Medical Center (2012–2014). *Creating the synthetic brain through hybrid computational and biological systems: repairing and replacing neural networks*. Defense Advanced Research Projects Agency (DARPA) Contract N66001-10-C-2008 Phase II (US\$6,063,148).
 - No investigators were explicitly named on this contract, but I had the lead role in developing and writing the biomimetic modeling component (roughly 10% of the total), so I would likely have been listed as a co-investigator if any had been named.

PERSONAL GRANTS, SCHOLARSHIPS, AND AWARDS

- ❖ Winner, BRAINnet Challenge (2010)
 - Prize awarded for “the most innovative or pragmatic analysis method for evoked potential data from subjects with attention-deficit hyperactivity disorder”; the method received national media attention, including from the *Sydney Morning Herald* and Channel Ten’s *7PM Project*.
- ❖ Westmead Millennium Foundation Stipend Enhancement Grant (2008–2009)
- ❖ Forum for European Neuroscience Travel Grant (2008)
- ❖ Denison Award (2008)
- ❖ Postgraduate Research Support Scheme Travel Grant (2006, 2008)
- ❖ Australian Postgraduate Award (2006–2009)
- ❖ University of Queensland Dean’s Commendation for Academic Excellence for every semester (i.e., semesters 1 and 2 of 2002, 2003, and 2004)
- ❖ International House Academic Achievement Award (2003)

IT EXPERIENCE

- ❖ Lead developer, *Covasim* (2020–present)
 - Agent-based model for COVID-19 dynamics and interventions, which has been used for research and policy decisions in more than a dozen countries; further information from covasim.org.
- ❖ Lead developer, *Sciris* (2017–present)
 - Flexible, open-source software package for building interactive scientific models using Python and JavaScript; further details available from sciris.org.
- ❖ Lead developer, *Health Interventions Prioritization Tool* (2017–2020)
 - Python and JavaScript-based software package for prioritizing investments across the entire health system, by leveraging data from the Global Burden of Disease and Disease Control Priorities databases; further information available from hiptool.org.
- ❖ Co-developer, *Optima TB* and *Optima Nutrition* (2017–2019)
 - Python and JavaScript-based software packages for optimizing resource investments for tuberculosis and child and maternal nutrition, respectively; further details available from optimamodel.com.
- ❖ Lead developer, *Optima HIV* (2014–2017)
 - Python- and JavaScript-based software package for forecasting and analyzing HIV epidemics, along with optimally allocating HIV resources; further details available from optimamodel.com.
- ❖ Lead developer, *HIV in Indonesia Model* (2010–2012), *Cambodian HIV Evaluation Model* (2011), and *Prevtool* (2012–2014)
 - Interactive, MATLAB-based software packages for analyzing, forecasting, and visualizing HIV epidemics in Indonesia, Cambodia, and Eurasia, respectively.
- ❖ Languages: Python (including parallel computing and graphical user interface design in each); R, MATLAB, and C/C++ (familiar, but not expert level), NEURON, IDL, shell scripting
- ❖ Web design and hosting: JavaScript, HTML, and CSS (example designs include cliffkerr.com, thekerrlab.com, cingulate.com.au, optimamodel.com, hiptool.org, and sciris.org); Apache, NGINX, Twisted, and FTP server setup and administration
- ❖ Databases: Redis, SQL
- ❖ Operating systems: Linux and Windows (basic familiarity with Apple)
- ❖ Programs: Version control (Git, Mercurial), LaTeX, GSuite/Microsoft Office, image and sound editing software (Photoshop, Illustrator, Inkscape, Goldwave, and others)

ACADEMIC SERVICE

- ❖ Program Committee member, *Organization for Computational Neuroscience* (2016–2019)
- ❖ Member, *BiasWatchNeuro* (2016–2019)
- ❖ Reviewer for the Australian Research Council (2015–present)
- ❖ Member, Physics Equity and Access Committee, University of Sydney (2014–2019)
- ❖ Abstract reviewer for the *Computational Neuroscience* conference (2013–present)
- ❖ Reviewer for the Wellcome Trust (2016–2018)

- ❖ Program Committee member, *Workshop on Information Processing in Cognition*, Sydney (2013)
- ❖ Reviewer for the following journals: *AIDS*, *Brain Research*, *Communications in Nonlinear Science and Numerical Simulation*, *Epilepsy Research*, *Journal of Neural Engineering*, *Journal of the International AIDS Society*, *Journal of Neurophysiology*, *Journal of Neuroscience Methods*, *The Lancet Global Health*, *Mathematical Biosciences*, *Nature Communications*, *Nature Communications Medicine*, *Neuroinformatics*, *Pathogens and Disease*, *Physical Review E*, *PLOS Computational Biology*, *PLOS ONE*

MUSIC QUALIFICATIONS, AWARDS, AND EXPERIENCE

Recordings, scores, and further information available from cliffkerr.com.

QUALIFICATIONS

- ❖ **Diploma of Arts in Music** (with merit), Sydney Conservatorium of Music (2006–2008)
 - Courses included composition, classical and jazz piano performance, and conducting; teachers included Winsome Evans, Anne Boyd, and Damien Ricketson.
 - I received the highest possible mark (99/99) for Anne Boyd’s course MUSC2614, “Composition Workshop”; to my knowledge, this was the first time that mark was given.
- ❖ **Licentiate Diploma of Music** (piano), Australian Music Examinations Board (2003)
 - This is the second-highest qualification awarded by the Australian Music Examinations Board, and is considered to be roughly equivalent to a master’s degree in piano performance.
- ❖ **Associate Diploma of Music** (piano), Australian Music Examinations Board (2001)

AWARDS

- ❖ Highly commended, Queensland Piano Competition (2003)
- ❖ First prize, Miriam Hyde Composer-Pianist Award (2002)
- ❖ Pi Beta Phi Award, Mackay Eisteddfod (2001)

EXPERIENCE

- ❖ Composer, *Consciousness*, Ligeti Quartet, London, England (2019)
 - I was commissioned to compose a piece for string quartet and EEG headsets, where the score is generated in real time from machine learning algorithms applied to the performers’ brain activity during the performance.
- ❖ Composer and pianist, *Skulptoriui Vincui Grybui 125 metai*, Jurbarkas, Lithuania (2015)
 - I performed a program of my works and other contemporary music with the cellist Harry Buckoke at a conference held to celebrate the 125th anniversary of the birth of Vincas Grybas, Lithuania’s most famous sculptor, who was my great-great uncle.
- ❖ Composer and pianist, *Spectrum Concert Series*, New York City (2014)
 - I was invited to perform a full-length concert of my compositions at Spectrum – according to the *New York Times*, “Next to Carnegie Hall, perhaps, there might be no finer public space in which to hear a piano recital in New York than Spectrum.”
- ❖ Artistic Director, Birubi Concert (2011–2013)
 - This position involved concert planning for a new organization dedicated to showcasing young classical performers; see birubiconcert.org for more information.

- ❖ Composer, *When the Poet Met Music*, The Independent Theatre, Sydney (2013)
- ❖ Composer-in-Residence, Sydney Camerata Chamber Orchestra (2010)
 - For this position, I wrote a large-scale new work that was performed and later recorded by an 18-member string orchestra.
- ❖ Composer and pianist, *Cliff Kerr in Recital*; Sydney, Brisbane, and Mackay (2009–2010)
 - I performed a series of five piano recitals to raise money for various charitable causes, including the Cancer Council and World Animal Protection.
- ❖ Accompanist, Australian Youth Choir Performing Arts School, Sydney (2006–2007, 2010)
- ❖ Chorister and bass soloist, *John Dowland: Our Contemporary*, University of Sydney (two performances in 2010)
- ❖ Pianist and composer, *Music and the Cosmos*, Sydney Conservatorium of Music (2007) and the University of Sydney (2009)
- ❖ Conductor and composer, *Music Talks Peace*, University of Sydney (2006, 2008)
- ❖ President and conductor, Sydney University Madrigal Society (2007)
 - This position involved directing all financial, administrative, and artistic decisions, as well as conducting rehearsals and performances, for a choir of about 40 members.

PERSONAL

- ❖ Notable media appearances and interviews:
 - *Star Nieuws* (for organizing a Women’s March in Paramaribo; published 22/01/2017, URL: www.starnieuws.com/index.php/welcome/index/nieuwsitem/39493)
 - *University of Sydney World: USA and Canada* magazine (inaugural issue, 02/2011, p. 25)
 - Channel 10’s *7PM Project* (national Australian TV; aired 30/06/2010)
 - *Sydney Morning Herald* (New South Wales’ leading newspaper; 03/06/2010, p. 19)
 - *University of Sydney UniNews* (21/09/2007, cover story)
 - Channel 7’s *Today Tonight* (national Australian TV; aired 02/07/2007)
- ❖ Acknowledged in the following papers:
 - Chiu C, Johnson LF, Jamieson L, Larson BA, Meyer-Rath G. Designing an optimal HIV programme for South Africa: Does the optimal package change when diminishing returns are considered? *BMC Public Health* 2017 **17**(1):143.
 - Blumson B (2018). Distance and Dissimilarity. *Philosophical Papers* DOI:10.1080/05568641.2018.1463103.
 - Dura-Bernal S, Li K, Neymotin SA, Francis JT, Principe JC and Lytton WW (2016). Restoring behavior via inverse neurocontroller in a lesioned cortical spiking model driving a virtual arm. *Frontiers in Neuroscience (Neuroprosthetics)* **10**:28.
 - Dura-Bernal S, Zhou X, Neymotin SA, Przekwas A, Francis JT, Lytton WW (2015). Cortical spiking network interfaced with virtual musculoskeletal arm and robotic arm. *Frontiers in Neurobotics* **9**:13.
 - Blumson B (2015). Story size. *Philosophical Papers* **44**(2):121–137.
 - Blumson B (2014). A Never-Ending Story. *Croatian Journal of Philosophy* **16**:111–120.
 - Aquino KM, Robinson PA, Schira MM, Breakspear M (2014). Deconvolution of neural dynamics from fMRI data using a spatiotemporal hemodynamic response function, *NeuroImage* **14**:203–215.

- Neymotin SA, Lee H, Park E, Fenton AA, Lytton WW (2011). Emergence of physiological oscillation frequencies in a computer model of neocortex. *Frontiers in Computational Neuroscience* 5:19.
- ❖ Dual Australian-American citizen
- ❖ Extremely elementary knowledge of Spanish, Russian, French, and Lithuanian
- ❖ Black belt in martial arts (Yun Jung Do)
- ❖ Erdős-Bacon number: 8 (me → Bill Lytton → Henry Markram → Wolfgang Maass → Noga Alon → Paul Erdős = 5; me → Andrew Rochford → Dave Hughes → Kevin Bacon = 3)

Last updated: September 1st, 2022