Ramón Nartallo-Kaluarachchi

DPhil (PhD) Candidate at Mathematical Institute, University of Oxford

PROFILE

Ramón is an applied mathematician and computational scientist who is currently a second year DPhil candidate in Mathematics at the University of Oxford researching complex systems and computational neuroscience.

Email: ramon.nartallo-kaluarachchi@maths.ox.ac.uk

Website: https://rnartallo.github.io/

EDUCATION

University of Oxford, Oxford - DPhil in Mathematics, 2022-26

Research student in Mathematical Brain Modelling group in OCIAM and Centre for Eudaimonia and Human Flourishing. Member of St Catherine's College.

University of Warwick, Coventry - MMath in Mathematics, 2018-22

First class honours (85% average)

Universidad Complutense de Madrid, Madrid - Study abroad / Erasmus, 2021

PUBLICATONS/PREPRINTS

Nartallo-Kaluarachchi R, Asllani M, Deco G, Kringelbach M.L, Goriely A and Lambiotte R (2024) Broken detailed balance and entropy production in directed networks. *arXiv.2402.19157* (in review: Physical Review X)

Gatti A*, Nartallo-Kaluarachchi R*, Uppal A* and Benedusi P (2024) Computational Modeling of Ephaptic coupling in Myelinated and Unmyelinated Axon Bundles Using the EMI Framework. *Computational Physiology: Simula Summer School 2023– Student Reports, 19-37*

*joint first authorship

RESEARCH INTERESTS

My current research is on non-equilibrium dynamics of the human brain using network and complex systems science as well as time-series analysis. My current active projects involve:

- Modelling human neuroimaging data with network dynamical systems
- Developing data science techniques for analysing multivariate neuroimaging time-series

EXPERIENCE

Software Developer, Softwire, London - 2021

Summer internship as full stack develop working with Typescript and React to develop a content management system for an insurance company. Worked with APIs, UX design, containerisation and version control.

Global Data Analyst, Bloomberg, London (remote) - 2020

Summer internship at data analyst in the Corporate Actions team processing entity metadata. Automated the processing of data for MTF stock exchanges and analysed the IPO database to find newsworthy trends.

Accounting Assistant, Sargent & Co., Caterham - 2016, 2018
Work experience then full-time role during the summer providing accounting services for small firms.

SKILLS
Computational skills

Programming languages

Python, R, Matlab, Type/Javascript

Numerical analysis and scientific computing

Numerical solutions of partial/stochastic/ordinary differential equations

Machine learning: deep learning and graph neural networks

Time-series analysis

Version control

Language skills

English (Native)

Spanish (Native / C1)

TEACHING EXPERIENCE
Teaching Assistant, University of Oxford, 2022-23
Teaching assistant for Stochastic Modelling of Biological Processes, Networks, Numerical Solutions of PDEs and Nonlinear Systems.

Mentor - Oxford Mfano Africa Programme, University of Oxford, 2023
Supervisor and mentor for a project for predoctoral students from African countries.

Teaching Assistant, University of Warwick, 2022-23
Teaching assistant for 10 first year students in all core courses.

INVITED TALKS
Machine Learning & Data Science Graduate Seminar, Department of Mathematics, Florida State University
March 2024, Invited by Dr. Malbor Asllani

'Non-equilibrium dynamics in the human brain and other complex networks'

Networks Seminar, Mathematical Institute, University of Oxford
February 2024, Invited by Dr. Timothy LaRock

'Time-irreversibility of complex network dynamics'

Centre for Eudaimonia and Human Flourishing Seminar, Linacre College, University of Oxford
February 2024, Invited by Prof. Morten Kringelbach

'From dynamics to thermodynamics in the brain and beyond'

Industrial Applied Mathematics Seminar, Mathematical Institute, University of Oxford
February 2024, Invited by Dr. Andrea Giudici

'Non-equilibrium dynamics in the human brain' (Short talk)

CONFERENCES & WORKSHOPS

(CONTRIBUTED TALKS/PARTICIPATION)
NetSciX, Venice, 2024
Three contributed conference talks on 'Broken detailed balance and entropy production in directed networks', 'Multilevel irreversibility higher order non-equilibrium interactions in human brain dynamics' and 'Lattice-embedded network dynamical systems'.

C3: Complexity, Computers and Consciousness, London, 2023
Contributed conference talk on 'Multilevel irreversibility reveals higher order organisation of non-equilibrium interactions in human brain dynamics during long-term memory'.

Simula Summer School in Computational Physiology, Oslo/San Diego, 2023
Summer school on computational modelling of the heart and brain at Simula Research Laboratory and UCSD. Our project focused on modelling ephaptic coupling in myelinated neurons.

Data Natives, London, 2023
Contributed conference talk on 'Network methods for analysing time-series from complex interacting systems'.

British Applied Mathematics Colloquium, Bristol, 2023
Contributed conference talk on 'Network methods for analysing time-series from complex interacting systems'

AWARDS AND SCHOLARSHIPS
EPSRC DPhil Scholarship, University of Oxford, 2022-26
Four year full scholarship for DPhil in Mathematics at University of Oxford

Matrícula de honor (4), Universidad Complutense de Madrid, 2021
Award/scholarship for highest performing student in module, in: Numerical Analysis, Numerical Analysis of PDEs, Galois theory and Stochastic Processes & Simulation.

REFEREES
Professor Alain Goriely FRS
DPhil Main Supervisor - goriely@maths.ox.ac.uk

Professor Renaud Lambiotte
DPhil Co-Supervisor - renaud.lambiotte@maths.ox.ac.uk

Professor Morten Kringelbach
DPhil Co-Supervisor - morten.kringelbach@psych.ox.ac.uk

FURTHER INFORMATION
Reviewer for Brain Multiphysics 2022, Associate Member of Institute of Mathematics and its Applications
Oxford Basketball Men's Team 2022-24, Warwick Basketball Men's Team 2019-22, Surrey Basketball U15,17 Team 2015,2017