INDRANIL GHOSH

School of Mathematical and Computational Sciences • Massey University • Palmerston North, 4442
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WORK EXPERIENCE

PDF, Applied Mathematics — Feb 2024 – Present
Massey University — Palmerston North, New Zealand-4442

EDUCATION

Ph.D., Applied Mathematics — Jan 2021 – May 2024
Massey University — Palmerston North, New Zealand-4442

M.Sc., Physics — 2018 – 2020
Jadavpur University — Kolkata, India-700032

B.Sc., Physics — 2015 – 2018
Jadavpur University — Kolkata, India-700032

AWARDS & HONORS

1. Postdoctoral fellowship contract (Marsden project) MAU2209, managed by Royal Society Te Apārangi, New Zealand [2024-2025].
2. Highly Commended Student Presentation award, NSW ANZIAM Mid Year Meeting [2023].
3. KiwiPycon Student Travel & Accomodation Grant [2023].
4. Prestigious Red Sock award for the best poster presentation, SIAM Conference on Applications of Dynamical Systems (DS23) [2023].
5. KiwiPycon Student Travel Grant [2022].
6. Marsden Ph.D. Grant contract MAU1809, managed by Royal Society Te Apārangi, New Zealand [2021-2023].
7. "Top 40" new CRAN packages under the category Computational Methods for the `R` package QGameTheory [June 2020]

THESIS

[**T1**] ***Indranil Ghosh***, **Robust chaos in piecewise-linear maps.** *Ph.D. Thesis, 2024.* `https://mro.massey.ac.nz/handle/10179/69704`

JOURNAL PUBLICATIONS

[**J1**] ***Indranil Ghosh****, Anjana S. Nair, Hammed Olawale Fatoyinbo, and Sishu Shankar Muni, **Dynamical properties of a small heterogeneous chain network of neurons in discrete time.** *Eur. Phys. J. Plus, 139:545, 2024.* `https://doi.org/10.1140/epjp/s13360-024-05363-0`

[**J2**] ***Indranil Ghosh****, Robert I. McLachlan, and David J.W. Simpson, **The bifurcation structure within robust chaos for two-dimensional piecewise-linear maps.** *Commun. Nonlinear Sci. Numer. Simul., 134, 2024.* `https://doi.org/10.1016/j.cnsns.2024.108025`

[**J3**] ***Indranil Ghosh****, Sishu Shankar Muni, and Hammed Olawale Fatoyinbo, **On the analysis of a heterogeneous coupled network of memristive Chialvo neurons.** *Nonlinear Dyn., 111:17499–17518, 2023.* `https://doi.org/10.1007/s11071-023-08717-y`

[**J4**] ***Indranil Ghosh***, and David J. W. Simpson*, **Renormalisation of the two-dimensional border-collision normal form.** *Int. J. Bifurcation Chaos 32(12):2250181, 2022.* https://doi.org/10.1142/S0218127422501814

[**J5**] Sishu Shankar Muni*, Hammed Olawale Fatoyinbo, and ***Indranil Ghosh***, **Dynamical effects of electromagnetic flux on Chialvo neuron map: nodal and network behaviors.** *Int. J. Bifurcation Chaos 32(09):2230020, 2022.* https://doi.org/10.1142/S0218127422300208

[**J6**] ***Indranil Ghosh***, and David J. W. Simpson*, **Robust Devaney chaos in the two-dimensional border-collision normal form.** *Chaos 32, 043120 (2022).* https://doi.org/10.1063/5.0079807

[**J7**] ***Indranil Ghosh****, **Quantum Game Theory - I.** *Resonance 26, 671–684 (2021).* https://doi.org/10.1007/s12045-021-1168-2 . **Quantum Game Theory - II.** *Resonance 26, 791–812 (2021).* https://doi.org/10.1007/s12045-021-1180-6. **Quantum Game Theory - III.** *Resonance 26, 939–951 (2021).* https://doi.org/10.1007/s12045-021-1193-1.

PUBLICATIONS IN CONFERENCE PROCEEDINGS

[**C1**] Hammed Olawale Fatoyinbo*, Sishu Shankar Muni, ***Indranil Ghosh***, Ibrahim Olatunji Sarumi, and Afeez Abidemi, **Numerical bifurcation analysis of improved denatured Morris-Lecar neuron model.** *2022 International Conference on Decision Aid Sciences and Applications (DASA).* https://doi.org/10.1109/DASA54658.2022.9765094

[**C2**] Sarath Babu*, ***Indranil Ghosh***, and B. S. Manoj, **Effort: A New Metric for Roadside Unit Placement in 5G Enabled Vehicular Networks.** *5GWF'2020 Proceedings.* https://doi.org/10.1109/5GWF49715.2020.9221228

PREPRINTS

[**P1**] ***Indranil Ghosh****, Robert I. McLachlan, and David J.W. Simpson, **Robust chaos in orientation-reversing and non-invertible two-dimensional piecewise-linear maps.** https://arxiv.org/abs/2307.05144

[**P2**] Costas J. Efthimiou*, Gregory DeCamillis, and ***Indranil Ghosh***, **A physics-driven study of dominance space in soccer.** https://arxiv.org/abs/2202.00414

SOFTWARES

[**S1**] ***Indranil Ghosh***, **QGameTheory: Quantum Game Theory Simulator (v0.1.2).** *CRAN Repository, 2020.* https://cran.r-project.org/web/packages/QGameTheory/index.html

BLOGS

Indranil Ghosh, **Introduction to Mathematical Optimiztion (with Python).** https://indrag49.github.io/Numerical-Optimization/

Indranil Ghosh, **Introductory Football Data Analysis.** https://realsoccerexpand.netlify.app/

PAST WORK EXPERIENCE

Sirpi Products and Services Pvt. Ltd., Bangalore, India August 2020-December 2020.
Research Lead and SHEAR Project Lead (Remote)

Indian Institute of Space Science and Technology, Kerala, India. May 2019-June 2019.
Computer Science Intern

CONFERENCE PRESENTATIONS

Understanding the Topology of Chaotic Attractors for Piecewise-Linear Maps using Renormalisation. December 2023
New Zealand Mathematical Society Colloquium, 2023 *Talk*

Bifurcation structure of robust chaos in a generalised setting of piecewise-linear maps. December 2023
New Zealand Mathematical Society Colloquium, 2023 *Poster*

Understanding the Topology of Chaotic Attractors for Piecewise-Linear Maps using Renormalisation. December 2023
New Zealand Mathematics and Statistics Postgraduate Conference, 2023 *Talk*

Chaos, Robust Chaos and Applications. October 2023
Café Scientifique *Talk*

Python: A career changing/shaping language. October 2023
PyGotham TV, 2023 *Talk*

Python: from the perspective of an applied mathematician. September 2023
Kiwi Pycon XII, 2023 *Talk*

Understanding the bifurcation structure of robust chaos in piecewise-linear maps using renormalisation. July 2023
ICDEA 2023 *Talk*

The Bifurcation Structure Within Robust Chaos of Piecewise-Linear Maps May 2023
SIAM Conference on Applications of Dynamical Systems (DS23) *Poster*

Introduction to mathematical optimization using Python February 2023
Python Delhi User Group Meetup, 2023 *Tutorial*

Bifurcation structure of robust chaos in two-dimensional piecewise-linear maps December 2022
New Zealand Mathematical Society Colloquium, 2022 *Talk*

Bifurcation structure of robust chaos in 2D piecewise-linear maps November 2022
Dynamical Systems in NZ - Castaways, 2022 *Invited Talk (E-poster)*

Unconstrained Numerical Optimization using Python August 2022
Kiwi Pycon XI, 2022 *Tutorial*

Dynamical Effects of Electromagnetic Flux on Chialvo Neuron Map: Nodal and Network Behaviors July 2022
SIAM Conference on the Life Sciences, 2022 *Talk*

Renormalisation of the Two-Dimensional Border-Collision Normal Form July 2022
SIAM Annual Meeting, 2022 *Talk*

Renormalisation of the Two-Dimensional Border-Collision Normal Form July 2022
NSW ANZIAM 2022 Mid-Year Conference, 2022 *Talk*

Dynamical effects of electromagnetic flux on Chialvo neuron map: nodal and network behaviors April 2022
BAMC, 2022 *Talk*

Renormalisation of the Two-Dimensional Border-Collision Normal Form February 2022
ANZIAM Annual Conference, 2022 *Talk*

Learn Football Data Analysis with Python December 2021
PyCode Conference, 2021 *Talk*

Football (soccer) data analysis: A Pedagogic introduction October 2021
PyCon Taiwan, 2021 *Talk*

An introduction to hands-on football data analysis in Python October 2021
PyCon Espana, 2021 *Talk*

Football (soccer) data analysis: A pedagogic introduction September 2021
PyConline AU, 2021 *Talk*

Introduction to Soccer Pass Network Analysis with Python July 2021
PyOhio, 2021 *Thunder Talk*

Introducing a blog: Introductory Football Data Analysis July 2021
EuroPython Conference, 2021 *Lightning Talk*

Using Python to start learning Unconstrained Numerical Optimization Algorithms June 2021
Pycon Colombia, 2021 *Talk*

QGameTheory: An R package for teaching quantum computing and quantum game theory to students April 2021
International Series of Online Research Software Events (SORSE) *Poster + Talk*

QGameTheory: A Quantum Game Theory Simulator written in R for teaching quantum computing and game theory to starting programmers and undergraduate students March 2021
APS March Meeting 2021 *Poster*

Develop and Document Your First R Package December 2020
Sirpi Products and Services Pvt. Ltd. *Talk*

Learn Lambda Calculus with Python December 2020
Pycode Conference 2020 *Talk*

Teaching quantum computing and game theory with QGameTheory package September 2020
Why R? 2020 Conference *Talk*

Introducing Lambda Calculus with Python September 2020
Pycon Australia *Talk*

Quantum Game Theory with Julia: A computational analysis July 2020
JuliaCon *Poster*

Build Your Own Quantum Simulator With R June 2020
The European R Users Meeting *Lightning talk*

A Computational Study of Sequential Deposition: A Dynamic Monte Carlo Process in Statistical Physics September 2019
Flatlands and beyond (2019) – A meet on 2D materials *Poster*

A Python implementation of Quantum Evolutionarily Stable Strategy Game, an interdisciplinary study of Quantum Computation and Game Theory in population biology
February 2019
SLAS Conference *Poster*

Analysis of Quantum Game Theoretic Models with a Python Simulator December 2018
SciPy India *Talk*

Analysis of Chaos Game Simulator in Pygame October 2018
International Conference on Complex Dynamical Networks, 2018 *Poster*

Computation of Analytic Structure Factor for Macromolecules June 2018
Research Topic of Statistical Physics to young Physicists, 2018 *Poster*

TUTORING/MARKING

Tutor for Engineering Mathematics.
Marking assistant for Calculus.
Marking assistant for Linear Algebra.

JOURNAL REFEREE

- Chaos: An Interdisciplinary Journal of Nonlinear Science
- Nonlinear Dynamics: An International Journal of Nonlinear Dynamics and Chaos in Engineering Systems
- Communications in Theoretical Physics
- IEEE Transactions on Cybernetics
- Scientific Reports

SKILLS

Softwares	Expert: R, Python, Fortran, git, LaTeX, HTML, Markdown
Social	Twitter: **@indraghosh314**,
	Github: `https://github.com/indrag49`,

REFERENCES

[R1] ***David J. W. Simpson*** **(Ph.D. Supervisor, Postdoc host).** *Email: d.j.w.simpson@massey.ac.nz*
`https://www.massey.ac.nz/~djwsimps`

[R3] ***Tammy Lynch*** **(PDF Manager, Deputy Head of the School of Mathematical and Computational Sciences).** *Email: t.a.lynch@massey.ac.nz*