INDRANIL GHOSH

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

PDF, Computational Physics — **Feb 2024-Present**
Massey University — **Palmerston North, New Zealand-4442**

EDUCATION

Ph.D., Applied Mathematics — **2021-Present**
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]**

JOURNAL PUBLICATIONS

[J1] *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

[J2] *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

[J3] 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

[J4] *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

[J5] *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, The bifurcation structure within robust chaos for two-dimensional piecewise-linear maps https://arxiv.org/abs/2402.05393

[P2] *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

[P3] 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 Presentation + 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 Presentation***

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 presentation***

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 ***SNBNCBS, Kolkata, India***

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 ***Washington D. C, USA***

Analysis of Quantum Game Theoretic Models with a Python Simulator **December 2018**
SciPy India ***IIT-B, Mumbai***

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

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

TUTORING/MARKING

Marking assistant for Calculus. (2021–2023)
Marking assistant for Linear Algebra. (2021–2023)

SERVICE

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**

SKILLS

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

REFERENCES

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

[R2] ***Robert McLachlan*** **(Ph.D. Co-supervisor).** ***Email: r.mclachlan@massey.ac.nz*** `https://www.massey.ac.nz/~rmclachl/`

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