

# INDRANIL GHOSH

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## EDUCATION

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Ph.D., Applied Mathematics Massey University	2021-Present Palmerston North, 4442
M.Sc., Physics Jadavpur University	2018-2020 Kolkata-700032
B.Sc., Physics Jadavpur University	2015-2018 Kolkata-700032

## JOURNAL PUBLICATIONS

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- [J1] *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://www.worldscientific.com/doi/10.1142/S0218127422501814>
- [J2] 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://www.worldscientific.com/doi/10.1142/S0218127422300208>
- [J3] *Indranil Ghosh*, and David J. W. Simpson, **Robust Devaney chaos in the two-dimensional border-collision normal form**. *Chaos* 32, 043120 (2022). <https://aip.scitation.org/doi/10.1063/5.0079807>
- [J4] *Indranil Ghosh*, **Quantum Game Theory: A comprehensive study**. {Part I <https://link.springer.com/article/10.1007/s12045-021-1168-2>} {Part II <https://link.springer.com/article/10.1007/s12045-021-1180-6>} {Part III <https://link.springer.com/article/10.1007/s12045-021-1193-1>} *Resonance* (2021).

## PUBLICATIONS IN CONFERENCE PROCEEDINGS

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- [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://ieeexplore.ieee.org/document/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://ieeexplore.ieee.org/document/9221228>

## PREPRINTS

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- [P1] *Indranil Ghosh*, Sishu Shankar Muni, and Hammed Olawale Fatoyinbo, **On the analysis of a time varying noise-modulated heterogeneous coupled network of Chialvo neurons under the influence of electromagnetic flux** <https://arxiv.org/abs/2206.04234>
- [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

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[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

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

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

## RESEARCH AND WORK EXPERIENCE

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**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

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

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

**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*

<b>Learn Football Data Analysis with Python</b> PyCode Conference, 2021	December 2021 <i>Talk</i>
<b>Football (soccer) data analysis: A Pedagogic introduction</b> PyCon Taiwan, 2021	October 2021 <i>Talk</i>
<b>An introduction to hands-on football data analysis in Python</b> PyCon Espana, 2021	October 2021 <i>Talk</i>
<b>Football (soccer) data analysis: A pedagogic introduction</b> PyConline AU, 2021	September 2021 <i>Talk</i>
<b>Introduction to Soccer Pass Network Analysis with Python</b> PyOhio, 2021	July 2021 <i>Thunder Talk</i>
<b>Introducing a blog: Introductory Football Data Analysis</b> EuroPython Conference, 2021	July 2021 <i>Lightning Talk</i>
<b>Using Python to start learning Unconstrained Numerical Optimization Algorithms</b> Pycon Colombia, 2021	June 2021 <i>Talk</i>
<b>QGameTheory: An R package for teaching quantum computing and quantum game theory to students</b> International Series of Online Research Software Events (SORSE)	April 2021 <i>Poster Presentation + Talk</i>
<b>QGameTheory: A Quantum Game Theory Simulator written in R for teaching quantum computing and game theory to starting programmers and undergraduate students</b> APS March Meeting 2021	March 2021 <i>Poster Presentation</i>
<b>Develop and Document Your First R Package</b> Sirpi Products and Services Pvt. Ltd.	December 2020 <i>Talk</i>
<b>Learn Lambda Calculus with Python</b> Pycode Conference 2020	December 2020 <i>Talk</i>
<b>Teaching quantum computing and game theory with QGameTheory package</b> Why R? 2020 Conference	September 2020 <i>Talk</i>
<b>Introducing Lambda Calculus with Python</b> Pycon Australia	September 2020 <i>Talk</i>
<b>Quantum Game Theory with Julia: A computational analysis</b> JuliaCon	July 2020 <i>Poster presentation</i>
<b>Build Your Own Quantum Simulator With R</b> The European R Users Meeting	June 2020 <i>Lightning talk</i>
<b>A Computational Study of Sequential Deposition: A Dynamic Monte Carlo Process in Statistical Physics</b> Flatlands and beyond (2019) – A meet on 2D materials	September 2019 <i>SNBNCBS, Kolkata, India</i>

**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

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Marking assistant for 160.101 (Calculus).  
Marking assistant for 160.102 (Linear Algebra).

## SERVICE

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### Journal Referee

Chaos: An Interdisciplinary Journal of Nonlinear Science

## SKILLS

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**Softwares** Expert: R, Python, Fortran, git, L<sup>A</sup>T<sub>E</sub>X, HTML, Markdown  
**Social** Twitter: @indraghosh314,  
Github: <https://github.com/indrag49>,

## REFERENCES

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- [R1] *David J. W. Simpson* (Ph.D. Supervisor). Email: [d.j.w.simpson@massey.ac.nz](mailto: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](mailto:r.mclachlan@massey.ac.nz) <https://www.massey.ac.nz/~rmclachl/>
- [R3] *Avijit Mukherjee* (M.Sc. Supervisor). Email: [avijit00@gmail.com](mailto:avijit00@gmail.com)