

# INDRANIL GHOSH

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## RESEARCH INTERESTS

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Computational Physics, Quantum Computing, Game Theory, Numerical Methods, Dynamical systems and Open Source Software Projects.

## EDUCATION

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M.Sc., Physics	2020
Jadavpur University	Kolkata-700032
B.Sc., Physics	2018
Jadavpur University	Kolkata-700032

## PEER-REVIEWED PUBLICATIONS

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**Ghosh, I. Study on Quantum Genetic Algorithms: A Theoretical Introduction.** *Resonance Journal of Science Education*, ISSN 0971-8044 (print). (accepted, to appear)

Babu, S., **Ghosh, I.**, Manoj, B. S., **Effort: A New Metric for Roadside Unit Placement in 5G Enabled Vehicular Networks.** *5GWF'2020 Proceedings*. (accepted, to appear September 2020)

**Ghosh, I. Quantum Game Theory: A comprehensive study.** *Resonance Journal of Science Education*, ISSN 0971-8044 (print). (accepted, to appear)

## UNDER REVIEW

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**Ghosh, I. From Lattice Theory to Quantum Logic: Part II, An Introduction to Quantum Logic.** *Resonance Journal of Science Education*, ISSN 0971-8044 (print).

**Ghosh, I. From Lattice Theory to Quantum Logic: Part I, An Introduction to Lattice Theory.** *Resonance Journal of Science Education*, ISSN 0971-8044 (print).

## SOFTWARES

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

## RESEARCH AND WORK EXPERIENCE

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**Sirpi Products and Services Pvt. Ltd.**, Bangalore, India August 2020-Present.  
*Computational Physics Research (Remote)*

I have joined as the research team lead of the company, focusing on project developments related to computational physics and data visualizations. I am also working as a pre-ex manager in the company.

**Quantum Computacao**, Indian Institute of Technology, Chennai, India November 2019-April 2020.  
*Quantum Computing Intern (Remote)*

Quantum Computacao, a startup aims towards researches on Quantum Computing. I have been involved as an intern, with the theoretical research on Quantum computations and algorithms.

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

May

Worked with Dr. B. S. Manoj on Complexity Analysis of Road Networks and Quantum Machine Learning. We analysed complex road networks from the perspective of road types in order to find out optimal locations for deploying buffer nodes for software defined vehicular networks. In addition, a real world mobility model involving pedestrians and vehicles is designed which can be used to measure performance of vehicular networks. A simple protocol for message transfer between vehicles and buffer nodes was also designed. Grade : 9.4/10.

## SUMMER SCHOOLS ATTENDED

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**Topic: Research Topic of Statistical Physics to young Physicists, 2018**,Satyendra Nath Bose  
National Centre for Basic Sciences, Kolkata, India June 2018

National and International Speakers of repute delivered talks and hand on workshops on Non-equilibrium Systems, Statistical Physics of Fracture and Breakdown, Dynamics of Glass Transition, Self-organized Criticality, Statistical Biology Physics, Hydrodynamics of Turbulence, Granular Systems, Percolation, Phase Transitions in Polymers, Computational Studies with Fortran and Quantum Entanglement. Presented a poster on computation of analytic structure factor of macromolecules and delivered a Talk on applications of Pygame in simulations of scientific systems.

**Title: Dynamics of Complex Systems, 2018**, International Centre for Theoretical Sciences, Bangalore, India June 2018

The theme for the program was non-smooth dynamical systems and complex networks with speakers of national and international reputes. Hands on introduction to theoretical and computational aspects of complex networks and introduction to Anaconda and NetworkX were provided. I was the youngest participant to get selected and was awarded travel, food and lodging.

**Title: TEQIP Short Term Course on Basic Physics,2016** Indian Institute of Technology, Kanpur, India June 2016

This workshop was designed for 2<sup>nd</sup> year undergraduate students to motivate them to pick up different research topics of physics and interdisciplinary studies. Speakers of national reputes delivered talks and workshops.

## CONFERENCE PRESENTATIONS

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**Teaching quantum computing and game theory with QGameTheory package** September 2020

Why R? 2020 Conference

*to virtually deliver a talk*

**Introducing Lambda Calculus with Python**

September 2020

Pycon Australia

*virtual talk*

**Quantum Game Theory with Julia: A computational analysis**

July 2020

JuliaCon

*virtual poster presentation*

**Build Your Own Quantum Simulator With R**

June 2020

The European R Users Meeting

*online 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*

## SKILLS

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**Languages** Expert: R, Python, Fortran, git, L<sup>A</sup>T<sub>E</sub>X, HTML, Markdown

Intermediate: Julia, Matlab, C

**Social**

Twitter: [@indraghosh314](https://twitter.com/indraghosh314),

Github: <https://github.com/indrag49>,

LinkedIn: <https://www.linkedin.com/in/indranil-ghosh-b999b2135/>