Jared Wogan

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"The best that most of us can hope to achieve in physics is simply to misunderstand at a deeper level." - Wolfgang Pauli

I am a Master's student at the University of Western Ontario, studying physics with a scientific computing specialization. I am actively involved in research in loop quantum gravity with a focus on numerical calculations. I have written a Python package for general relativity, RelativiPy, and a research project on wormhole time machines and multiple histories. I am passionate about cryptography and cybersecurity, data science, physics, high performance computing, and software development.

Education

Western University
M.Sc in Physics, Scientific Computing Specialization — *September 2022 – Present*

- Cumulative average of 91%

Compute Ontario
Compute Ontario Summer School — *June 2023 – September 2023*

- Data Preparation
- Data Security and Secure Data Sharing
- Machine Learning
- High Performance Julia
- GPU Programming
- Object Oriented Programming in C++

Compute Ontario
Compute Ontario Summer School — *June 2022 – September 2022*

- Data Visualization
- Machine Learning
- High Performance Python
- GPU Programming
- C/C++, MPI, and OpenMP

Brock University, University of Guelph
B.Sc in Physics (Honours), Minor in Mathematics — *2017 – 2022*

- Cumulative average of 82%
- Major average of 92%
- Upper level course average of 93%

Welland Centennial Secondary School
Ontario Secondary School Diploma — *2013 – 2017*

- Grade 12 average of 94.3%
- French immersion

Certifications

Microsoft Azure Security Engineer
Microsoft *In progress*
To be completed by August

Cybersecurity Modules
Cyber Security Ontario *In progress*
To be completed by August

Introduction to Cybersecurity
Cisco *March 2023*
Badge

Introduction to Cybersecurity
Cisco *March 2023*
Badge

Introduction to Data Science
Cisco *March 2023*
Badge

Data Science Orientation
Coursera *February 2023*
Badge

Introduction to Cybersecurity Tools & Cyber Attacks
Coursera *February 2023*
Badge

Microsoft Office Specialist: Word 2013
Microsoft3 *March 2016*
Badge

Microsoft Office Specialist: Word 2013
Microsoft *March 2016*
Badge

Microsoft Office Specialist: Word 2013
Microsoft *April 2016*
Badge

Work Experience

Canadian Niagara Power **Fort Erie, ON**
Stores Intern / Coop Student *April 2023 – Present*

- Stock management using SAP
- Building and yard maintenance
- Independent and collaborative work

Canadian Niagara Power **Fort Erie, ON**
Stores Intern / Coop Student *May 2022 – September 2022*

- Stock management using SAP
- Building and yard maintenance
- Order picking and inventory counting

Canadian Niagara Power **Fort Erie, ON**
IT Intern / Coop Student *May 2018 – September 2018*

- Computer maintenance and deployment
- Asset management and documentation
- Troubleshooting and debugging technical issues
- Server backup tape preparation and storage

McDonalds Canada **Fonthill, ON**
Line Cook, Customer Service *March 2019 – Present*

- Providing excellent customer service
- Communicating with customers and coworkers to ensure prompt service
- Working as a team towards common goals
- Training and guiding new employees
- Shipping and receiving

Hard Rock Cafe **Niagara Falls, ON**
Dishwasher, Line Cook *June 2015 - September 2017*

- Working and collaborating with team members
- Working in a stressful, fast paced, and time sensitive environment

Research Experience

Master's Thesis

GFlowNets in Spinfoams — **University of Western Ontario**
Advisor: Francesca Vidotto — *September 2022 – Present*

- Machine learning techniques applied to loop quantum gravity calculations
- Novel approach to sampling high dimensional probability distributions in an attempt to replace MCMC methods

Spinfoam Refinement — **University of Western Ontario**
Advisor: Francesca Vidotto — *September 2022 – Present*

- Numerical study of spinfoam graph refinements in loop quantum gravity

Undergraduate Thesis

RelativiPy — **Brock University**
Advisor: Barak Shoshany — *September 2021 – April 2022*

- A Python Object-Oriented General Relativity package
  - Performs tensor calculus and differential geometry calculations symbolically
  - Open source, pre-release version available here.

Research Projects

Wormhole Time Machines and Multiple Histories — **Brock University**
Advisor: Professor Barak Shoshany — *April 2021 – September 2021*

- Studying Time Travel Paradoxes and Causality
  - Created a simulation of paradoxes within Mathematica
  - Updated existing paradox model to use temperature instead of colours for the particles
  - Replaced model TDP space with a wormhole metric using general relativity to calculate geodesics that produce paradoxes

Publications

GFlowNets in Spinfoams
Jared Wogan, Joseph Bunao, Athanasios Kogios, Pietropaul Frisoni — *In Preperation*

Wormhole Time Machines and Multiple Histories
Jared Wogan, Barak Shoshany — *October 2021*
DOI: 10.1007/s10714-023-03094-8
arXiv:2110.02448

Scholarships, Awards & Honours

Returning Scholars Award
Brock University, $1,500 *2021*

- Returning student with an average of 94.9% the previous year

Match of Minds
Brock University, $5,000 *2021*

- Research Grant

Dean's Honour List
Brock University *2021*

- Average of 80%+ for academic year of 2020 - 2021

Entrance Scholarship
University of Guelph, $7,000 *2017*

- Outstanding admissions average

Ontario Scholar
Welland Centennial Secondary School *2017*

- Obtained an average of 80% or higher in any six Grade 12 courses

Euclid Test
University of Waterloo *2017*

- School champion

Mathematics Scholarship
Welland Centennial Secondary School, $150 *2017*

- Presented to the student with the highest GPA in grade 12 Mathematics

Physics Scholarship
Welland Centennial Secondary School, $150 *2017*

- Presented to the student with the highest GPA in grade 12 Physics

Fermat Test
University of Waterloo *2016*

- Certificate of Distinction for ranking top 25% of contestants

Conference Posters

The Quantum Information Structure of Spacetime
Western University, Ontario, Canada *June 2022*

- RelativiPy: A Python Object-Oriented General Relativity package

Media Appearances

New Brock research explores time travel paradoxes
Brock University, Ontario, Canada *December, 2021*

Teaching Experience

Private Tutor
Independent Private Tutor *January 2020 – Present*

- Work one-on-one with individual students at the High school level
- Specialize in intermediate and senior level math, calculus, data management, and physics

Independent Peer Tutor
Brock University *2020*

- Organized and taught a student study group for Electromagnetism
- Held review and one-on-one sessions with students in need of assistance

Mathematics PAL
Welland Centennial Secondary School *2017*

- Teaching assistant and tutor for a grade 9 french mathematics course
- Worked one-on-one and motivated students
- Marked and wrote problems for tests

Relevant Coursework

- **Computer Science:** Data Visualization, Data Structures, Algorithms, Machine Learning, Data Science, MPI, GPU Programming, Distributed Systems, Cybersecurity, Object Oriented Programming, Functional Programming
- **Physics:** Classical Mechanics, Electromagnetism, Quantum Mechanics, Statistical Mechanics and Thermal Physics, Optics, General & Special Relativity
- **Mathematics:** Calculus, Differential Equations, Linear Algebra, Statistics, Complex & Real Analysis, Differential Geometry

Technical & Personal Skills

- **Programming Languages:** Python, C++, R, Julia, Rust, SQL, Javascript, Markdown, HTML, CSS, Physica
- **Software:** Git, Mathematica, Maple, LaTeX
- **Operating Systems:** Mac OS, Linux, Windows
- **Personal Skills:** Passionate, Hard Working, Collaborative, Time Management, Organization, Planning, Leadership, Curious