

# Aaron Trowbridge

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## Education

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### Syracuse University

Sep 2015 – May 2021

- B.S. in Physics, with distinction (3.6 GPA); B.S. in Mathematics (3.8 GPA)
- Masters in Physics (unfinished - one semester as GTA) (4.0 GPA), coursework: Quantum Field Theory I; Lie groups, Lie algebras, and Representation Theory

## Experience

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### Private Tutor

Mar 2021 – Present

- Subjects include: physics, statistics, calculus, and programming in python

### Teaching Assistant (Syracuse Physics Department)

Jan 2019 – May 2021

- One semester as graduate TA: introductory mechanics, under Prof. Walter Freeman
- Four semesters as undergrad TA: astronomy, mechanics, E & M, computational physics

### Research Assistant (Syracuse Physics Department)

- Lattice quantum gravity group, under Prof. Jack Laiho May 2020 – May 2021
- Plourde Research Lab (superconducting quantum devices), under Prof. Britton Plourde May 2018 – Dec 2020

## Research & Projects

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### Personal Website and Blog

- Learning about static web development, including HTML, CSS, Markdown, Liquid, and (just a little) JavaScript.
- I have written blog posts about mathematical methods in quantum field theory and quantitative finance, as well as other topics, and plan on writing more about data science and machine learning in the near future.

### Gauge Theory and Topological Quantum Gravity

- As a final project for my QFT course I gave a talk on the theoretical aspects of quantizing gravity – discussing the graviton propagator, gauge theory, topological field theory, and Chern-Simons gravity.

### Monte Carlo Methods for the Ising Model and Lattice Quantum Gravity

- Worked with the lattice gravity group to develop, implement, and test a novel rejection free variant of the Metropolis algorithm.
- A recorded talk I gave can be found on youtube by clicking [here](#) and a github repo can be found [here](#).

### Classical Simulation of a Quantum Computer

- As final project for a quantum information theory course, I implemented a custom quantum gate programming language and virtual quantum processor, in Julia. A github repo can be found [here](#).

### Barnes-Hut Tree Algorithm for Gravitational $n$ -body Simulation

- Implemented, in Julia, this  $O(n \log n)$  tree-based approximation scheme. Code found [here](#).

### Numerical Methods for Quantum Mechanics

- Under the supervision of Prof. Walter Freeman, I implemented and experimented with three methods for simulating quantum mechanical systems and solving the Schrödinger equation. Code found [here](#).

## Additional Information

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**Programming Languages:** Julia, Python, C, C++, Haskell, Bash, Git, HTML, CSS, Markdown,  $\text{\LaTeX}$

**Operating Systems:** Linux (Arch, Manjaro i3), MacOS, Windows 10, Arduino

**Hobbies:** Reading, Chess, Snowboarding, Surfing, Skateboarding, Horseback Riding, Hiking