Aaron Trowbridge

(610) 955-1580 · aaron.j.trowbridge@gmail.com · aarontrowbridge.github.io

Education

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

Private Tutor   Mar 2021 – Present
- Subjects include: physics, statistics, calculus, and programming in python

Teaching Assistant (Syracuse Physics Department)
- One semester as graduate TA: introductory mechanics - under Prof. Walter Freeman   Jan 2021 – May 2021
- Four semesters as undergrad TA: astronomy, mechanics, E & M, computational physics   Jan 2019 – Dec 2020

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

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

Programming Languages:	Julia, Python, C, C++, Haskell, Bash, Git, HTML, CSS, Markdown, LaTeX
Operating Systems:	Linux (Arch, Manjaro i3), MacOS, Windows 10, Arduino
Hobbies:	Reading, Chess, Snowboarding, Surfing, Skateboarding, Horseback Riding, Hiking