Andrew Valentini

651-307-0509 | avalentini@carthage.edu | linkedin/andrew-valentini | github.com/AndrewValentini

Education

Carthage College — Kenosha, WI
Bachelor of Arts in Physics and Mathematics, GPA - 3.985/4.0 — *2021 – 2025*

Research Experience

Research Experience for Undergraduates (REU) — May 2023 – August 2023
Mentored by Dr. Gabriela González — *Louisiana State University*

- Developed a method to determine casual probability of gravitational wave triggers by glitch type with the goal of improving detection confidence and accuracy

Faculty-Directed Research in Gravitational Waves — Sep. 2018 – Present
Mentored by Dr. Jean Quashnock — *Carthage College*

- Have begun examining population differences between LIGO's observing runs through the use of machine learning algorithms and traditional data science techniques
- Analyzed the dependence of overtones on the merger remnant's mass and spin and confirmed that the first overtone dominates the waveform of an event
- Developed models to visualize the infall of merger events using the math governing gravitational wave emission
- Created plots that compare a binary system's component masses and final merger mass to demonstrate the system's radiated energy in the form of gravitational waves

Modal Propellant Gauging-Fiber Optic Sensing System — June 2022 – Present
Funded by NASA's T2U Program and the WSGC, Mentored by Dr. Kevin Crosby — *Carthage College*

- Developed software that translates data packets received from an optical interrogator to be interpreted by the Modal Propellant Gauging framework
- Designed experiments to test the validity of implementing FOSS into MPG framework

Magneto-Active Slosh Control — September 2021 – May 2022
Funded by the WSGC, Mentored by Dr. Kevin Crosby — *Carthage College*

- Ran CAD simulations to demonstrate the inefficiency of perpendicularly-positioned coils on a propellant tank's wall in suppressing microgravity slosh
- Designed CAD models that were used in the mechanical setup of the experiment

Relevant Coursework

Physics: Electricity and Magnetism (Spring 2024), Astrophysics, Thermal Physics, Optics and Waves, Modern Physics, Experimental Physics (J-Term 2024)
Mathematics: Complex Variables, Mathematics for Scientists and Engineers, Statistics (Spring 2024), Linear Algebra, Differential Equations, Multivariate Calculus, Discrete Structures
Data Science: Data Analysis for Scientists and Engineers (Spring 2024), Data Science 1

Presentations

[1] **Analyzing Causes of Gravitational Wave False Alarms** | *St. Norbert's College* — November 2023
Pi Mu Epsilon Annual Undergraduate Regional Math Conference - Oral Presentation

[2] **Analyzing Causes of Gravitational Wave False Alarms** | *University of Chicago* — November 2023
Midstates Consortium for Math and Science Undergraduate Research Symposium - Poster Presentation

[3] **Analyzing Causes of Gravitational Wave False Alarms** | *Virtual* — August 2023
APS National Physics REU Poster Symposium - Poster Presentation

[4] **Analyzing Causes of Gravitational Wave False Alarms** | *Louisiana State University* — August 2023
Summer Undergraduate Research Forum - Poster Presentation

[5] **Measuring Quasinormal Modes of Simulated Binary Black Hole Mergers in the SXS Catalog** | *Carthage College* — May 2023
Celebration of Scholars - Poster Presentation

[6] **Modelling Binary Compact Object Merger Events Detected by the LIGO and Virgo Gravitational Wave Observatories** | *Argonne National Laboratory* January 2023
CUWiP - Poster Presentation

[7] **Modelling Binary Compact Object Merger Events Detected by the LIGO and Virgo Gravitational Wave Observatories** | *Washington University* November 2022
Midstates Consortium for Math and Science Undergraduate Research Symposium - Poster Presentation

[8] **Carthage Space Sciences: MPG-FOSS** | *Washington, D.C.* October 2022
Society of Physics Students Physcon - Poster Presentation

[9] **Carthage Space Sciences: MPG-FOSS** | *Carthage College* September 2022
Fall Research Presentation - Poster Presentation

[10] **Modal Propellant Gauging Projects Overview** | *Carroll University* August 2022
Wisconsin Space Grant Conference - Oral Presentation

[11] **Carthage Space Sciences: MPG-FOSS** | *Carroll University* August 2022
Wisconsin Space Grant Conference - Poster Presentation

[12] **Modal Propellant Gauging: An Overview** | *University of Texas at Austin (Virtual)* July 2022
NASA SEES - Oral Presentation

[13] **Determining the Masses of Black Holes and Neutron Stars Seen in LIGO and Virgo Merger Events** | *Carthage College* April 2022
Celebration of Scholars - Poster Presentation

[14] **The Bible as Interpreted through Jean-Jacques Rousseau's Second Discourse** | *Carthage College* April 2022
Celebration of Scholars - Poster Presentation

Technical Skills

Languages: Python, MATLAB, HTML/CSS, R
Tools: Mathematica, LaTeX, Fusion 360, Qiskit, Inventor

Honors and Awards

[1] **2022 Atlas Shrugged Essay Competition** | *Semifinalist* April 2023
Ayn Rand Institute – Received for my essay entitled "Hank Rearden and the Exaltation of the Individual"

[2] **Intellectual Foundations Scholarship** | *First Place* April 2022
Carthage College – Received for my essay entitled "The Bible as Interpreted through Jean-Jacques Rousseau's Second Discourse"

[3] **Minnesota State History Day** | *Fourth Place* May 2021
Received for my poster entitled "Carl Sagan and the Communication of Scientific Knowledge"

[4] **Minnesota State History Day** | *Sixth Place* May 2020
Received for my poster entitled "The Dark Lady of DNA-Rosalind Franklin"

Extracurricular

Philosophy Club Vice President | *Carthage College* September 2022 – May 2023
I conducted the reading and research on philosophical topics necessary to lead our club's weekly meetings and construct slideshows to facilitate the group's discussion

Brainard Writing Center Fellow | *Carthage College* January 2022 – Present
I assist students from various disciplines by discussing the texts their papers are often based on and suggest how to develop the arguments presented throughout them.

Certifications

[1] The Complete Quantum Computing Course | August 2023
[2] Linux Command Line Bootcamp | July 2022
[3] Fusion 360 Beginners Course | June 2022
[4] Gravitational Wave Open Data Workshop #5 | May 2022

Independent Study

[1] **General Relativity** | September 2023 - Present
A First Course in General Relativity - Bernard F. Schutz

[2] **Quantum Field Theory** | December 2023 - Present
Quantum Field Theory for the Gifted Amateur - Stephen Blundell and Tom Lancaster