

# Andrew Valentini

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## EDUCATION

### Carthage College

*Bachelors in Physics and Mathematics, GPA - 3.985/4.0*

Kenosha, WI

2021 – 2025

## RESEARCH EXPERIENCE

### Research Experience for Undergraduates (REU)

*Mentored by Dr. Gabriela González*

May 2023 – August 2023

*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

*Mentored by Dr. Jean Quashnock*

January 2022 – Present

*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

*Funded by NASA's T2U Program and the WSGC, Mentored by Dr. Kevin Crosby*

June 2022 – Present

*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

*Funded by the WSGC, Mentored by Dr. Kevin Crosby*

September 2021 – May 2022

*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

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**Languages:** Python, MATLAB, HTML/CSS, R  
**Tools:** Mathematica, L<sup>A</sup>T<sub>E</sub>X, Fusion 360, Qiskit, Inventor

## HONORS AND AWARDS

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- [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

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**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

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- [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

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