Andrew Valentini

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EDUCATION

Carthage College   Kenosha, WI
Bachelors 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 the causal probability of gravitational wave triggers by glitch type with the goal of improving detection confidence and accuracy

Theoretical Gravitational Wave Physics and Data Analysis Research   January 2022 – 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, Astrophysics, Computational Physics (Fall 2025), Thermal Physics, Mechanics (Fall 2025), Optics and Waves, Modern Physics, Experimental Physics
Mathematics: Real Analysis, Complex Variables, Abstract Algebra (Fall 2025), Senior Research (Fall 2025), Mathematics for Scientists and Engineers, Statistics, Linear Algebra, Differential Equations, Multivariate Calculus, Discrete Structures

INDEPENDENT STUDY

[1]   **General Relativity** | September 2023 - March 2024
      A First Course in General Relativity - Bernard F. Schutz

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