

Zachary Stomski

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Education

Worcester State University, BS in Computer Science with minor in Physics Aug 2023 – Exp. May 2026

- GPA: 3.966/4.0
- Coursework: AP Calculus BC, AP Statistics, Discrete Structures, Data Structures & Algorithms, Unix Systems, Networking & Security, Database Management, Software Process Management, Calculus-based Physics I (Mechanics), Calculus-based Physics II (Electromagnetism & Optics), Observational Astronomy
- Member of Sheehan Honors Program: Commonwealth Honors Scholar

Projects

Astrochemical Neural Network Parameter Optimization Dec 2024 – Present

- Worked with Dr. Burkhardt & Dr. Ali Al-Faris to optimize parameters in NAUTILUS, a gas-grain astrochemical model, using a neural network in order to fit molecular abundance outputs to match GOTHAM survey data
- Visualized aspects such as L2 norm, loss per molecule, and parameters through epochs

Data Analysis & Visualization of OMC-1 Light Polarization  GitHub Sep 2024 – May 2025

- Worked with Dr. Ian Stephens to analyze ALMA and JCMT telescope data of the Orion Molecular Cloud (OMC-1)
- Reverse engineered magnetism smoothing algorithm used in Pattle 2017 paper
- Used data and values from smoothing algorithm to calculate spectral flux density, magnetic field strength, mass, among other things in order to find the normalized mass-to-flux ratio, which tells whether a source is undergoing gravitational collapse

Modifying Astrochemical Model to Simulate Shock Chemistry May 2024 – Aug 2024

- Worked with Dr. Andrew Burkhardt to improve NAUTILUS by better emulating shock induced chemistry while maintaining runtime efficiency through multithreading
- Was able to properly emulate this chemistry and yielded interesting results from the produced data

Astrochemical Monte Carlo Simulations for Source Age Estimation Dec 2023 – May 2024

- Worked with Dr. Burkhardt to estimate best fit age source for TMC-1 through Monte Carlo simulations of NAUTILUS
- Fit of a source age was determined through its loss relative to observed molecular abundance data

2D N-Body Simulator  GitHub Nov 2024 – Dec 2024

- Simulated elastic collisions and Newton's law of universal gravitation among objects in a 2D vacuum with real-time visuals
- Quadtree was implemented in order to improve runtime of updating objects from $\Theta(n^2)$ to $\Theta(n \log n)$
- Simulation handled 6,000 objects on a standard machine before performance degradation began

Awards

- Received award for second best honors project among STEM fields at WSU, qualifying to become a Commonwealth Honors Scholar (2025)
- Received Aisiku STEM Center Research Award in 2024 & 2025, allowing entry to summer research fellowships
- Presented research in 2024 & 2025 at Worcester State's Celebration of Scholarship and Creativity, as well as at UMass Amherst's MassURC

Technologies

Languages: Python (proficient), Java (proficient), Fortran (familiar), C/C++ (familiar), C# (familiar), SQL (novice)

Technologies: Git, GitHub, Docker, VS Code, Visual Studio, WSL, Ubuntu, SQL Workbench, \LaTeX

Libraries: NumPy, SciPy, Matplotlib, AstroPy, PyTorch, scikit-learn, Java.util, Java.FX, Java.math, System.Collections, Avalonia, stdio.h, stdlib.h, iostream, OpenMP