Brady Elster

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Education

Auburn University — Auburn, AL
Doctor of Philosophy in Physics — *May 2024 – Present*
Master of Science in Physics — *Aug. 2022 – May 2024*

Ithaca College — Ithaca, NY
Bachelor of Science in Physics, Minor in Mathematics — *Aug. 2018 – May 2022*

Experience

Graduate Research Assistant — June 2020 – Present
Auburn University — *Auburn, AL*

- Conducting research on the stability of linear tearing modes in plasma, focusing on two-fluid effects
- Acquiring and applying advanced knowledge in numerical methods for solving stiff differential equations and eigenvalue problems
- Developing a computational code that integrates discretization and shooting methods to solve stiff eigenvalue differential equations

Graduate Teaching Assistant — Aug. 2022 – May 2024
Auburn University — *Auburn, AL*

- Instructed the laboratory sections of introductory algebra and calculus-based physics courses
- Designed a semester-long curriculum of student activities informed by evidence-based physics education research
- Provided weekly tutoring to introductory physics students in the department's *Physics Resource Room*

Undergraduate Research Assistant — June 2020 – May 2022
Ithaca College — *Ithaca, NY*

- Examined and characterized the stellar spectra of select Herbig Ae/Be stars in the Small Magellanic Cloud (SMC)
- Measured stellar temperatures from spectral data using curve fitting tools in Python
- Identified a relationship between accretion luminosity and Balmer Jump discontinuity using data denoising and interpolation techniques

Projects

TwoFluidTearing.jl | *Julia, Git, Docker* — January 2023 – Present

- Developed a Julia code to numerically solve the tearing mode equations with two-fluid effects
- Utilized a combination of matrix eigenvalue and shooting methods for efficient solving
- Implemented parallel programming techniques in many functions to improve performance and extend the functionality and generalizability of the code
- Currently benchmarking the code against theoretical predictions to check the reliability of the solutions

SMCppd.py | *Python, Git* — June 2020 – May 2022

- Contributed essential Python code for stellar temperature calculation
- Measured differences in stellar atmosphere models compared to experimental spectral data
- Created an algorithm to read data files, denoise and smooth data, and take numerical measurements

Technical Skills

Languages: Julia, Python, FORTRAN, R, Mojo
Software: Git, VSCode, MATLAB, Mathematica
Libraries: PyTorch, NumPy, Matplotlib, SciPy, AstroPy, pandas, Makie, chebfun, ggplot
Frameworks: Dedalus (Python), SciML (Julia)