

ROBERT CADDY

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EDUCATION

University of Pittsburgh, PA <i>Ph.D. Physics</i>	2018 - 2024
Bowling Green State University, OH <i>M.S. Physics</i>	2016 - 2018
Purdue University, IN <i>B.S. Honors Physics Major, Astronomy Minor</i>	2012 - 2016

TECHNICAL & PROFESSIONAL SKILLS

Programming Languages:	C++, Python, Fortran, Bash
Packages & APIs:	CUDA, HIP, GoogleTest, MPI, OpenMP, Numpy, Pandas, Scipy, Matplotlib
Software Tools:	Clang Tools, Make, HDF5, HSI, Slurm, Jenkins, Doxygen, Docker
HPC Systems Used:	OLCF: Frontier, Summit, Andes, & Crusher. ALCF: Theta. University Clusters

EXPERIENCE

Research Software Engineer II <i>Princeton University, Princeton, NJ</i>	2024 - Present
<ul style="list-style-type: none">– Developed and optimized scientific codes in collaboration with Astrophysics research groups, specializing GPU accelerate codes in computational Astrophysics.– Worked with researchers to expand the capabilities of Iseult, a visualization code for Particle-in-Cell simulations. Added several key new features and updated the code to comply with best practices.– Performed a proof-of-concept port of the hydrodynamics code Ramses to GPUs. Demonstrated a 20-30x speedup, several times higher than initially expected.– Developed the PegasusTools python package for analyzing data from the Pegasus++ PIC code. I achieved 15-150x speedups in standard analysis workflows.	
Ph.D. Candidate <i>University of Pittsburgh, Pittsburgh, PA</i>	2018 - 2024
<ul style="list-style-type: none">– Expanded Cholla, a massively parallel GPU-accelerated code for simulating astrophysical fluid dynamics to include magnetic fields (magnetohydrodynamics/MHD) using state of the art methods.– Collaborated with the Frontier Center for Accelerated Application Readiness (CAAR) program to optimize Cholla to run on exascale supercomputers, namely Frontier.– Established and executed a robust testing framework for Cholla, employing GoogleTest with custom extensions to ensure software reliability and quality.– Led multiple initiatives to promote scientific software best practices within the Cholla development team, fostering excellence in software engineering standards.	
Masters Student <i>Bowling Green State University, Bowling Green, OH</i>	2016 - 2018
<ul style="list-style-type: none">– Conducted original thesis research into the properties of symbiotic star V1835 Aql, and other stars in the same field, with Professor Andrew Layden as advisor.– Determined the properties of variable star systems through image and data analysis in Python.	
Undergraduate Research Assistant <i>Purdue University, West Lafayette, IN</i>	2015 - 2016
<ul style="list-style-type: none">– Built an experimental optics system to observe the effect of various chemotherapy drugs on cancer tumors.– Reduced experimental data analysis and archiving time from ~10 hours to ~30 minutes.	

HONORS & AWARDS

- **Spot Award**, Princeton University, 2025.
- **Learning Beyond the Classroom Certificate**, Purdue University, 2016.
 - Required work experience, volunteer time, career training, and one significant activity – bicycling across the U.S. with Bike & Build to raise money and awareness for affordable housing.
- **Presidential Scholarship**, Purdue University, 2012.
- **Ascarelli Fellow**, Purdue University Department of Physics and Astronomy, 2012.
- **Eagle Scout**, 2012. Project: Designed and built sheds designed to withstand ice falling from nearby building.

SERVICE

Tutorials

2021 - 2023

Developed and delivered tutorials ranging from 1 hour to half day.

- *Introduction to Python Data Types*, University of Pittsburgh, 2023
- *Scientific Software Best Practices*, University of Pittsburgh 2022, 2023
- *Introduction to Git, GitHub, and Git Workflows*, University of Pittsburgh, 2022
- *Organizing Your Dotfiles*, University of Pittsburgh, 2021

Teaching

2013 - 2020

- Graduate Teaching Assistant for introductory physics labs, *University of Pittsburgh*, 2018-2020
- Graduate Teaching Assistant for introductory physics labs, *Bowling Green State University*, 2016-2018
- Undergraduate Teaching Assistant for introductory physics courses, *Purdue University*, 2013-2016

President, Purdue Society of Physics Students (SPS)

2015 - 2016

Purdue University, West Lafayette, IN

- Tripled the number of active members and increased profits of the club store by ~5x.
- Coordinated biweekly events and activities such as designing and constructing a weather balloon payload with SPS National funding, inviting guest speakers for special colloquia, and visiting Argonne National Lab.

PUBLICATIONS & SELECTED TALKS

- **Caddy, R.** “Getting Scientist buy-in on best practices: A Case Study.” 2nd Annual Conference of the US Research Software Engineer Association (US-RSE’24), October 2024, Rapid Access Microtalk (RAM)
- *Cholla-MHD: An Exascale-capable Magnetohydrodynamic Extension to the Cholla Astrophysical Simulation Code* **Caddy, R** & Schneider, E. 2024. The Astrophysical Journal, Volume 970 DOI: [10.3847/1538-4357/ad464a](https://doi.org/10.3847/1538-4357/ad464a), arXiv:[2402.05240](https://arxiv.org/abs/2402.05240)
- **Caddy, R.** “Exascale MHD Simulations with Cholla.” Santa Cruz Organization for Outreach in Physics (SCOOP), November 2023, University of California Santa Cruz. *Invited Talk*
- **Caddy, R.** “Exascale MHD Simulations with Cholla.” Seminar, November 2023, NASA Goddard. *Invited Talk*
- **Caddy, R.** “Exascale MHD Simulations with Cholla.” Center for Theory and Computation (CTC) Seminar, November 2023, University of Maryland. *Invited Talk*
- *Optical Time-series Photometry of the Symbiotic Nova V1835 Aquilae* **Caddy, R.**, Layden, A., et al. 2022. Publications of the Astronomical Society of the Pacific, Volume 134, Number 1039 DOI: [10.1088/1538-3873/ac8f6f](https://doi.org/10.1088/1538-3873/ac8f6f), arXiv:[2209.11251](https://arxiv.org/abs/2209.11251)

CONTINUING EDUCATION

- **ACM/IEEE Supercomputing (SC24)**, Conference 2024
- **2nd Annual Conference of the US Research Software Engineer Association (US-RSE’24)**, Conference 2024
- **ACM/IEEE Supercomputing (SC23)**, Conference 2023
- **1st Annual Conference of the US Research Software Engineer Association (US-RSE’23)**, Conference 2023
- **Practice and Experience in Advanced Research Computing (PEARC)**, Conference 2023
- **Platform for Advanced Scientific Computing (PASC)**, Conference 2023
- **Argonne Training Program for Extreme Scale Computing (ATPESC)** 2022
- **International High Performance Computing Summer School (IHPCSS)** 2022, Second place in the programming challenge