

MATTHEW

PORTMAN

CONTACT

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GitHub <https://github.com/MatthewPortman/>

EDUCATION AND RESEARCH

University of California, Irvine & San Diego State University 2019-2024

Ph.D. in Computational Science | Advised by Dr. Wayne Hayes

Awarded May 2024

- Develop a parallelized framework to pipe results from computer vision algorithm, [SpArcFiRe](#), into observational fitting algorithm, [GALFIT](#), to automate morphological parameterization of spiral galaxies.
- [SpArcFiRe GitHub Repo](#).

Dark Energy Spectroscopic Instrument (DESI) Collaboration 2021-2023

URA Visiting Scholar and Collaborator | Supervised by Dr. Antonella Palmese

- Developed a pipeline to identify transients from multi-messenger sources using [DESI](#) Legacy Survey observations and correlate to confidence intervals of gravitational wave localization maps.
- [DESIhub Time Domain GitHub Repo](#)

Lawrence Livermore National Lab 2021, 2022

Graduate Research Intern | Advised by Drs. Peter Anninos & Rob Hoffman

- Developed a simulation test bed to simulate hyper-accretion inflow onto the surface of neutron stars from a companion star using [COSMOS++](#) to predict observational signature.

San Diego State University 2017-2019

Ph.D. Candidate | Advised by Dr. Fridolin Weber

(joint with University of California, Irvine)

- Developed Fortran90 code to simulate hyperdense matter inside Neutron Stars.

Rochester Institute of Technology 2015

Research Experience for Undergraduates | Advised by Dr. Benjamin Sargent

- Analyzed photometry of AGB stars in the Large and Small Magellanic Clouds.

University of Texas at Dallas 2012-2016

B.S. Physics

- Specialization in Astrophysics with supplemental experience in pedagogical instruction.

EMPLOYMENT

Teaching Assistant <i>University of California, Irvine</i> Irvine, CA	2019-Present
<ul style="list-style-type: none">- ICS33 Intermediate Programming with Python- ICS31 Intro to Programming (Python)- ICS6b Boolean Algebra & Logic- ICS139W Critical Writing	
Graduate Research Intern <i>Lawrence Livermore National Lab</i> Livermore, CA	2021, 2022
URA Visiting Scholar <i>Fermilab</i> Batavia, IL	2021-2022
Graduate Research Assistant <i>San Diego State University</i> San Diego, CA	2017-2019
Adjunct Faculty <i>Collin County Community College</i> McKinney, TX	2017
<ul style="list-style-type: none">- MATH 0405 Math Foundations	

ADDITIONAL PROJECTS

GalfitModule <i>Research</i> <i>University of California, Irvine</i>	2023-Present
<ul style="list-style-type: none">- An object oriented framework to handle GALFIT input and output.- Integrate this framework into parallelized pipeline to automate multi-component fitting of light models to observations of spiral galaxies with SpARcFiRe.- Incorporate machine learning methods, specifically regression via XGBoost, to improve input to GALFIT and classify results.- GitHub Repo.	
Galaxy Music <i>Hack Day, LSST-DA DSFP Session 18.</i> <i>University of Washington</i>	2023
<ul style="list-style-type: none">- Parameterize galactic structure by music to create realistic galaxy models.- GitHub Repo.	
Visualizing Karaoke Statistics <i>Hack Day, LSST-DA DSFP Session 17.</i> <i>Texas A&M</i>	2023
<ul style="list-style-type: none">- Develop interactive visualization using Plotly to creatively display popular karaoke music statistics.- Use a slime mold algorithm Polyphorm to create traces of musical waveforms.	
Core Mass Fraction Inference <i>Hack Day, LSST-DA DSFP Session 16.</i> <i>Northwestern University</i>	2022
<ul style="list-style-type: none">- Infer core mass fraction of the moon using gravitation data via statistical inference.- GitHub Repo.	
Simple SPH Star Model <i>Hack Day, LSST-DA DSFP Session 15.</i> <i>Harvard University</i>	2022
<ul style="list-style-type: none">- Simulated a simple SPH star model using object oriented methods in Python.- GitHub Repo.	

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| Simulate Observations of Spiral Galaxies | 2022 |
| <i>Hack Day, LSST-DA DSFP Session 14. University of Arizona</i> | |
| <ul style="list-style-type: none"> - Used an autoencoder (neural network) to simulate observations of spiral galaxies. - GitHub Repo. | |
| Volume Integration using Monte Carlo and Deterministic Methods | 2019 |
| <i>Scientific Computing University of California, Irvine</i> | |
| <ul style="list-style-type: none"> - Compared the two methods to integrate over an n-dimensional cubic volume. | |
| Smoothed Particle Hydrodynamics for Compact Stars | 2018 |
| <i>Parallel Computing SDSU</i> | |
| <ul style="list-style-type: none"> - Simulated a compact star utilizing SPH and integrated parallel processing via CUDA. - GitHub Repo | |
| Burgers' Equation in 2D | 2017 |
| <i>Computational Science Seminar San Diego State University</i> | |
| <ul style="list-style-type: none"> - Modeled the propagation of a 2D Gaussian waveform using Burger's equation by finite differencing methods and Mimetic operators. - GitHub Repo | |

AWARDS

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| LSST-DA Data Science Fellowship (DSFP) | 2021-2023 |
| <i>DSFP Fellow LSST-DA</i> | |
| Award granted to supplement data science instruction in Astronomy. | |
| URA Visiting Scholars Program | 2021-2022 |
| <i>Visiting Scholar Fermilab</i> | |
| Award granted to perform collaborative research with Fermilab. | |
| DTEI Summer Fellowship | 2020 |
| <i>DTEI Fellow University of California, Irvine</i> | |
| Award granted for supplemental pedagogical and teaching instruction. | |
| Graduate G-STEM Fellowship. | 2017-2019 |
| <i>G-STEM Fellow San Diego State University</i> | |
| Award granted to provide mentorship and research opportunities. | |
| Research Experience for Undergraduates (REU) | 2015 |
| <i>REU Recipient Rochester Institute of Technology</i> | |
| Research award granted to perform research under Dr. Benjamin Sargent. | |
| Academic Excellence Scholarship (AES) | 2012-2016 |
| <i>AES Recipient University of Texas at Dallas</i> | |
| Excellence award granted for academic performance. | |

PUBLICATIONS

Articles

M. Portman, S. Mesforoush, and W. Hayes (Sept. 2023). "A re-assessment of SpArcFiRe's performance on toy spiral galaxies". In: *Monthly Notices of the Royal Astronomical Society* 526.1, pp. 830–835. doi: [10.1093/mnras/stad2810](https://doi.org/10.1093/mnras/stad2810).

M. Portman (2024). "Automated Multi-Component Decompositions of Spiral Galaxies". Under Review.

M. Portman and A. Palmese (2024). "A Method to Perform Gravitational Wave Transient Follow-up with DESI". In preparation.

Posters

M. Portman and A. Palmese (2022). "Identifying Optical Counterparts From Follow-Up Of Gravitational Wave Events". [ACCESS #18](#).

M. Portman (2021). "Automated Multi-Component Fitting of Light Models to Observations of Spiral Galaxies". [ACCESS #17](#).

M. Portman and A. Palmese (2021). "Identifying Optical Counterparts From Follow-Up Of Gravitational Wave Events". Sustainable Horizons Institute Sustainable Research Pathways ([SHI-SRP](#)) Workshop, Virtual.

M. Portman and W. Hayes (2019). "Physics Based Model for Spiral Arm Detection in SpArcFiRe". [ACCESS #16](#).

M. Portman and F. Weber (2018). "Differential Rotation in Proto-Neutron Stars". [ACCESS #15](#).

M. Portman and B. Sargent (2016). "AGB Stars in the Large and Small Magellanic Clouds". [American Astronomical Society Meeting #227](#). id.144.24.

PROGRAMMING
LANGUAGES

Python	Slurm
Linux/Bash	MPI
MATLAB	CUDA
C++	L ^A T _E X
Fortran	SQL
OpenMP	

OTHER
INTERESTS

Coffee Aficionado	Writing
Baking Bread	Film
Weightlifting	Fashion