

# MATTHEW

## PORTMAN, PH.D.

### CONTACT

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

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### 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

- Dissertation Title: ["Using SpArcFiRe to Automate GALFIT's Multi-Component Decomposition of Spiral Galaxies"](#)
- Developed the [GalfitModule](#), an object-oriented, distributed framework to pipe results from spiral arm detection software, [SpArcFiRe](#), into [GALFIT](#) to automate morphological parameterization for thousands of spiral galaxies within minutes.
- [SpArcFiRe 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.

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](#)

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

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<b>Teaching Assistant</b> <i>University of California, Irvine</i>   Irvine, CA	<b>2019-2024</b>
<ul style="list-style-type: none"><li>- ICS33 Intermediate Programming with Python</li><li>- ICS31 Intro to Programming (Python)</li><li>- ICS6b Boolean Algebra &amp; Logic</li><li>- ICS139W Critical Writing</li></ul>	
<b>Graduate Research Intern</b> <i>Lawrence Livermore National Lab</i>   Livermore, CA	<b>2021, 2022</b>
<b>URA Visiting Scholar</b> <i>Fermilab</i>   Batavia, IL	<b>2021-2022</b>
<b>Graduate Research Assistant</b> <i>San Diego State University</i>   San Diego, CA	<b>2017-2019</b>
<b>Adjunct Faculty</b> <i>Collin County Community College</i>   McKinney, TX	<b>2017</b>
<ul style="list-style-type: none"><li>- MATH 0405 Math Foundations</li></ul>	

## ADDITIONAL PROJECTS

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<b>galfitlib (formerly GalfitModule)</b> <i>Dissertation Research</i>   University of California, Irvine	<b>2019-Present</b>
<ul style="list-style-type: none"><li>- An object oriented framework to handle <a href="#">GALFIT</a> input and output.</li><li>- Compatible with distributed processing, used to automate the multi-component fitting of light models to observations of spiral galaxies with <a href="#">SpARCFiRe</a>.</li><li>- Machine learning methods, specifically regression via <a href="#">XGBoost</a>, are being prototyped to improve input to GALFIT and classify results.</li><li>- <a href="#">GitHub Repo</a>. The galfitlib repo is currently private but can be shared upon reasonable request.</li></ul>	
<b>galaxymusic</b> <i>Hack Day, LSST-DA DSFP Session 18.</i>   University of Washington	<b>2023-Present</b>
<ul style="list-style-type: none"><li>- Parameterize galactic structure with music to create a sonic mosaic of realistic galaxy models.</li><li>- Utilizes the galfitlib (formerly GalfitModule) to handle GALFIT re-parameterization and input.</li><li>- <a href="#">GitHub Repo</a>.</li></ul>	
<b>Visualizing Karaoke Statistics</b> <i>Hack Day, LSST-DA DSFP Session 17.</i>   Texas A&M	<b>2023</b>
<ul style="list-style-type: none"><li>- Develop interactive visualization using Plotly to creatively display popular karaoke music statistics.</li><li>- Use a slime mold algorithm <a href="#">Polyphorm</a> to create traces of musical waveforms.</li></ul>	
<b>Core Mass Fraction Inference</b> <i>Hack Day, LSST-DA DSFP Session 16.</i>   Northwestern University	<b>2022</b>
<ul style="list-style-type: none"><li>- Infer core mass fraction of the moon using gravitation data via statistical inference.</li><li>- <a href="#">GitHub Repo</a>.</li></ul>	

<b>Simple SPH Star Model</b> <i>Hack Day, <a href="#">LSST-DA DSFP Session 15</a>.   Harvard University</i>	2022
<ul style="list-style-type: none"> <li>- Simulated a simple SPH star model using object oriented methods in Python.</li> <li>- <a href="#">GitHub Repo</a>.</li> </ul>	
<b>Simulate Observations of Spiral Galaxies</b> <i>Hack Day, <a href="#">LSST-DA DSFP Session 14</a>.   University of Arizona</i>	2022
<ul style="list-style-type: none"> <li>- Used an autoencoder (neural network) to simulate observations of spiral galaxies.</li> <li>- <a href="#">GitHub Repo</a>.</li> </ul>	
<b>Volume Integration using Monte Carlo and Deterministic Methods</b> <i>Scientific Computing   University of California, Irvine</i>	2019
<ul style="list-style-type: none"> <li>- Compared the two methods to integrate over an n-dimensional cubic volume.</li> </ul>	
<b>Smoothed Particle Hydrodynamics for Compact Stars</b> <i>Parallel Computing   SDSU</i>	2018
<ul style="list-style-type: none"> <li>- Simulated a compact star utilizing SPH and integrated parallel processing via CUDA.</li> <li>- <a href="#">GitHub Repo</a></li> </ul>	
<b>Burgers' Equation in 2D</b> <i>Computational Science Seminar   San Diego State University</i>	2017
<ul style="list-style-type: none"> <li>- Modeled the propagation of a 2D Gaussian waveform using Burger's equation by finite differencing methods and Mimetic operators.</li> <li>- <a href="#">GitHub Repo</a></li> </ul>	

## AWARDS

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

PUBLICATIONS

Articles

**M. Portman** (2024). "Using SpArcFiRe to Help Automate GALFIT's Multi-Component Decomposition of Spiral Galaxies". PhD thesis. University of California, Irvine.

**M. Portman** and W. Hayes (n.d.). "Automated Multi-Component Decompositions of Spiral Galaxies". Under Review.

**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** and A. Palmese (n.d.). "A Method to Perform Gravitational Wave Transient Follow-up with DESI". In preparation.

Conference Proceedings

**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 (6+ years of experience)	Fortran (2+)
Slurm (4+)	C++ (1+)
Linux/Bash (4+)	CUDA (1+)
MATLAB (3+)	MPI (1+)
SQL (2+)	OpenMP (1+)

OTHER INTERESTS

Coffee Aficionado	Writing
Baking Bread	Film
Weightlifting	Fashion