MATTHEW
PORTMAN, PH.D.

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

- 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 | *Advised 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

Teaching Assistant **2019–2024**
University of California, Irvine | *Irvine, CA*

- ICS33 Intermediate Programming with Python
- ICS31 Intro to Programming (Python)
- ICS6b Boolean Algebra & Logic
- ICS139W Critical Writing

Graduate Research Intern **2021, 2022**
Lawrence Livermore National Lab | *Livermore, CA*

URA Visiting Scholar **2021–2022**
Fermilab | *Batavia, IL*

Graduate Research Assistant **2017-2019**
San Diego State University | *San Diego, CA*

Adjunct Faculty **2017**
Collin County Community College | *McKinney, TX*

- MATH 0405 Math Foundations

ADDITIONAL PROJECTS

galfitlib (formerly GalfitModule) **2019–Present**
Dissertation Research | *University of California, Irvine*

- An object oriented framework to handle GALFIT input and output.
- Compatible with distributed processing, used to automate the multi-component fitting of light models to observations of spiral galaxies with SpARcFiRe.
- Machine learning methods, specifically regression via XGBoost, are being prototyped to improve input to GALFIT and classify results.
- GitHub Repo. The galfitlib repo is currently private but can be shared upon reasonable request.

galaxymusic **2023–Present**
*Hack Day, **LSST-DA DSFP** Session 18.* | *University of Washington*

- Parameterize galactic structure with music to create a sonic mosaic of realistic galaxy models.
- Utilizes the galfitlib (formerly GalfitModule) to handle GALFIT re-parameterization and input.
- GitHub Repo.

Visualizing Karaoke Statistics **2023**
*Hack Day, **LSST-DA DSFP** Session 17.* | *Texas A&M*

- 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 **2022**
*Hack Day, **LSST-DA DSFP** Session 16.* | *Northwestern University*

- Infer core mass fraction of the moon using gravitation data via statistical inference.
- GitHub Repo.

Simple SPH Star Model **2022**
*Hack Day, **LSST-DA DSFP** Session 15.* | *Harvard University*

- Simulated a simple SPH star model using object oriented methods in Python.
- GitHub Repo.

Simulate Observations of Spiral Galaxies **2022**
*Hack Day, **LSST-DA DSFP** Session 14.* | *University of Arizona*

- Used an autoencoder (neural network) to simulate observations of spiral galaxies.
- GitHub Repo.

Volume Integration using Monte Carlo and Deterministic Methods **2019**
Scientific Computing | *University of California, Irvine*

- Compared the two methods to integrate over an n-dimensional cubic volume.

Smoothed Particle Hydrodynamics for Compact Stars **2018**
Parallel Computing | *SDSU*

- Simulated a compact star utilizing SPH and integrated parallel processing via CUDA.
- GitHub Repo

Burgers' Equation in 2D **2017**
Computational Science Seminar | *San Diego State University*

- Modeled the propagation of a 2D Gaussian waveform using Burger's equation by finite differencing methods and Mimetic operators.
- GitHub Repo

AWARDS

LSST-DA Data Science Fellowship (DSFP) **2021–2023**
DSFP Fellow | *LSST-DA*
Award granted to supplement data science instruction in Astronomy.

URA Visiting Scholars Program **2021-2022**
Visiting Scholar | *Fermilab*
Award granted to perform collaborative research with Fermilab.

DTEI Summer Fellowship **2020**
DTEI Fellow | *University of California, Irvine*
Award granted to undertake equity-based pedagogical instruction.

Graduate G-STEM Fellowship. **2017–2019**
G-STEM Fellow | *San Diego State University*
Award granted to provide mentorship and research opportunities.

Research Experience for Undergraduates (REU) **2015**
REU Recipient | *Rochester Institute of Technology*
Research award granted to perform research under Dr. Benjamin Sargent.

Academic Excellence Scholarship (AES) **2012-2016**
AES Recipient | *University of Texas at Dallas*
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.

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)
Slurm (4+)
Linux/Bash (4+)
MATLAB (3+)
SQL (2+)
Fortran (2+)
C++ (1+)
CUDA (1+)
MPI (1+)
OpenMP (1+)

OTHER INTERESTS

Coffee Aficionado
Baking Bread
Weightlifting
Writing
Film
Fashion