Jules Fowler

GRADUATE STUDENT

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Summary

Astronomer : NSF Fellow researching exoplanets, adaptive optics, and high contrast imaging.

Software Engineer : `Python` and `Git` expert, Linux enthusiast.

Instructor : Software Carpentry Instructor and Python training developer.

Activist : member of the AAS committee for Sexual and Gender Minorities in Astronomy.

Research Experience

Lab for Adaptive Optics (LAO)

Santa Cruz, CA

University of California, Santa Cruz — *Sept. 2020 - PRESENT*

- **Designing a Lyot and Vortex coronagraph** for upcoming high contrast imaging test bench in the LAO.
- Simulating a **design study for adaptive primaries** with mid-sized (2 meter class) telescopes.
- Characterizing a custom **Spatial Light Modulator** to simulate phase errors introduced by ground based atmospheric turbulence.
- Building SEALpup, a **coronagraph in a box outreach demo** based on the Santa Cruz Extreme AO Lab testbed.
- Advisor : Rebecca Jensen-Clem

Russell B. Makidon Optics Lab

Baltimore, MD

Space Telescope Science Institute (STScI) — *Oct. 2018 - Sept. 2020*

- **Principal Investigator of** the Generalized Lab Architecture for Restructured Optical Experiment (**G.L.A.R.E.**) – an STSCI Director's Discretionary Research project to build **autonomous experiment software and hardware controllers** for optics experiments.
- Wrote **fully-automated target acquisition** and `Python` **control software for nPoint tip/tilt controller** as part of an optics testbed for LUVIOR-like coronagraphy experiments.
- Advisors : Rémi Soummer & Marshall Perrin

Exoplanet Characterization Toolkit

Baltimore, MD

STScI — *May 2017 - Jan. 2020*

- **Developed first on-the-fly observation planning tool for exoplanet transits with JWST** (the James Webb Space Telescope.)
- Built an `HDF5` database and web interface for the Goyal et. al. (2018) grid of forward model transmission spectra.
- Advisors : Kevin Stevenson & Nikole Lewis

Space Telescope Advanced Research Group for the Atmospheres of Transiting Exoplanets

Baltimore, MD

STScI — *Oct. 2017 - Oct. 2018*

- Wrote open source **pipeline to reduce WFC3/IR spatial scan slitless spectroscopy data**, fit transit parameters with a Markov-Chain Monte Carlo (MCMC), calculate Bayesian statistics, and **produce transmission spectra**.
- Advisors : Hannah Wakeford & Jeff Valenti

Wide Field Camera Three Instrument Team

Baltimore, MD

STScI — *Aug. 2016 - Jan. 2020*

- **Lead of the WFC3 Quicklook project**, developing automated monitors and calibration software on a large-scale web and database application.
- **Principal Investigator of eleven HST calibration proposals**.
- Created user guides and tools for WFC3/IR slitless spectroscopy data reduction and anomaly tracking.
- Advisors : Elena Sabbi & Sylvia Baggett

Tufts University

Somerville, MA

Summer Scholar & Senior Thesis — *May 2015 - July 2016*

- **Compared energy contribution of low energy radio jets to gas outflows in AGN**.
- Used `slurm` parallel cluster computing and `CASA` to **reduce a terrabtye of multi-band Very Large Array (VLA) data**.
- Received High Honors for senior thesis detailing analysis and small numbers statistics.
- Advisor : Anna Sajina

University of Texas, Austin

Austin, TX

Research Intern — *May 2012 - August 2013*

- Performed **stellar evolution and structure research on Betelgeuese** and Wolf-Rayet stars.
- Created computational models using `MESA` star.
- Advisor : Craig Wheeler

Education

University of California, Santa Cruz — *Santa Cruz, CA*

Graduate Student — *September 2020 - PRESENT*

- Graduate Student in Astronomy and Astrophysics

Tufts University — *Somerville, MD*

B.S. Astrophysics & Philosophy — *Sept. 2012 - May 2016*

- Graduated with High Thesis Honors.
- Dean's List 2013, 2015

Work Experience

Space Telescope Science Institute — *Baltimore, MD*

Science Software Engineer — *Aug. 2016 - Sept. 2020*

- Member of the Wide Field Camera Three Instrument Team and involved with multiple science projects across the institute.
- **Started SpaceGAYs, the first LGBT+ affinity group at STScI**, and member of the Invision Diversity Working Group.
- **Designed Advanced `Python` training** with outside vendor, and gave SWC inspired introductory `Python` and `Git` training.

Tufts University, Department of Physics and Astronomy — *Somerville, MA*

Teaching Assistant & Tutor — *Sept. 2014- July 2016*

- Lab TA for introductory mechanics and class TA for general audience astronomy seminar.
- Tutored individual students and led study groups for introductory physics, calculus, and linear algebra.
- Assisted students with accessible exam accommodations.

Grants & Awards

Grants

2021	**Exoplanet Exploration Program "ExoExplorers" Inaugural Cohort,** seminar series and scholarship to develop early career exoplanet scientists	*Pasadena, CA*
2021	**University of California Osterbrock Grant,** small project grants to encourage leadership and outreach projects led by astronomy graduate students	*Santa Cruz, CA*
2020	**National Science Foundation Graduate Research Fellowship,** 3 year NSF fellowship for exemplary graduate students in STEM	
2020	**University of California Regents Fellowship,** 1 year University of California wide fellowship for graduate students	*Santa Cruz, CA*
2019	**STScI Data Science Innovation Initiative Grant,** Director's Discretionary Research Fund call for projects with a focus on data science and interesting computational problems	*Baltimore, MD*
2015	**Tufts Summer Scholar Grant,** call for summer long indepedent research projects	*Somerville, MA*
2015	**Tufts Center for Stem Diversity Grant,** grant to create the first collegiate queer science speaker series	*Somerville, MA*

Awards

2019	**STScI Achievement Award,** team award for teaching `GitHub` and `Python` to colleagues at STScI	*Baltimore, MA*
2019	**STScI Achievement Award,** team award for contributing to the Exoplanet Characterization Tool Kit	*Baltimore, MA*
2016	**Tufts University Pride on the Hill,** for contributions to LGBT+ climate	*Somerville, MA*
2015	**Tufts Multicultural Service Award,** for contributions to diversity efforts	*Somerville, MA*

Committees

2019	**Inclusive Astronomy II,** member of the Science Organizing Committee	*Baltimore, MD*
2019	**STScI/AURA Exoplanet Astronomer hiring committee,** member	*Baltimore, MD*
2019	**STScI Information Technology Head hiring committee,** member	*Baltimore, MD*
2018	**AAS Committee for Sexual and Gender Minorities in Astronomy (SGMA),** member	
2016	**out in STEM (oSTEM) @ Tufts,** president and founder	*Somerville, MA*
2015	**Tufts Society of Physics Students ,** president	*Somerville, MA*
2014	**Tufts Queer Students Association,** treasurer	*Somerville, MA*

Certifications & Skills

Certified SCRUM Master	SCRUM Alliance
Certified Software Carpentry Instructor	Software Carpentry
Laser Safety Certification	Laser Institute of America
`Python, Git, conda, bash, Linux, Mac OS, Windows, LaTeX`	expert
`Mathematica, Markdown, HTML`	advanced
`C, MATLAB, Julia, IDL, IRAF/PyRAF, JacaScript, CSS`	beginner

Teaching

Software Carpentry at the AAS — *remote / Seattle, WA*

INSTRUCTOR — *Jan. 2021, Jan. 2019*

- Astronomy focused `Python` and `bash` at the 237TH and 233RD AAS meeting.

Everything you needed to know about JWST Exoplanet Transit Data : How to Plan, Reduce, and Fit your data with the Exoplanet Characterization Toolkit Workshop — *Honolulu, HI*

INSTRUCTOR — *Jan. 2020*

- Submitted proposal for and led an ExoCTK workshop at the 235th AAS meeting.

We Brought a Coronagraph to a Bar! — *Baltimore, MD*

PRESENTER — *Jun. 2019*

- Astronomy on Tap talk with interactive Lyot coronagraph demo.

Software Carpentry at the New York Academy of Sciences — *New York, NY*

INSTRUCTOR — *Jan. 2019*

- Taught general science focused `Python` and `Git` at NYAS.

Tufts University Concepts of the Cosmos — *Somerville, MA*

CLASS TA — *Spring 2016*

- Class TA for the introductory/general education astronomy seminar.

Tufts University Physics 1 & Physics 11 — *Somerville, MA*

LAB TA — *Fall 2015*

- Lab TA for the introductory mechanics courses with and without calculus.

Publications and Presentations

JOURNAL PUBLICATIONS

Disentangling the Planet from the Star in Late-Type M Dwarfs: A Case Study of TRAPPIST-1g

WAKEFORD, H.; LEWIS, N.; **FOWLER, J.**; BRUNO, G.; WILSON, T.; MORAN, S. E.; VALENTI, J.; BATALHA, N.; FILIPPAZZO, J.; BOURRIER, V.; HÖRST, S.; LEDERER, S. M.; DE WIT, J.

The Astronomical Journal, Volume 157, Issue 1, article id. 11, 14 pp. (2019)

The Betelgeuse Project: constraints from rotation

WHEELER, J.; NANCE, S.; DIAZ, M.; SMITH, S.; HICKEY, J.; ZHOU, L.; KOUTOULAKI, M.; SULLIVAN, J.; **FOWLER, J.**

Monthly Notices of the Royal Astronomical Society, Volume 465, Issue 3, p.2654-2661, (2017)

STSCI INSTRUMENT PUBLICATIONS

Analyzing Eight Years of Transiting Exoplanet Observations Using WFC3's Spatial Scan Monitor

STEVENSON, K.; **FOWLER, J.**

Instrument Science Report WFC3 2019-12, 16 pages

WFC3/UVIS Gain Stability Results for Cycles 24 and 25

FOWLER, J.

Instrument Science Report WFC3 2018-17, 24 pages

The Cosmic Ray That Wouldn't Quit: Correcting Cosmic Rays in Overscan Pixels

FOWLER, J.

Instrument Science Report WFC3 2017-12, 7 pages

Monitoring the WFC3/UVIS Relative Gain with Internal Flatfields

Fowler, J.; Baggett, S.

Instrument Science Report WFC3 2017-08, 17 pages

Analysis of Dragon's Breath and Scattered Light Detector Anomalies on WFC3/UVIS

Fowler, J.; Markwardt, L.; Bourque, M.; Anderson, J.

Instrument Science Report WFC3 2017-02 (v.1), 14 pages

Presentations

The Generalized Lab Architecture for Restructured Optical Experiments (GLARE)

poster

Fowler, J.; Noss, J.; Laginja, I.; Soummer, R.; Perrin, M.

winter, 2020

American Astronomical Society, AAS Meeting #235

Standardizing Exoplanet Analysis with the Exoplanet Characterization Tool Kit (ExoCTK)

talk

Fowler, J.; Stevenson, K.; Lewis, N.; Fraine, J.; Pueyo, L.; Bruno, G.; Filippazzo, J.; Hill, M.; Batalha, N.; Wakeford, H.; Bushra, R.

summer, 2018

American Astronomical Society, AAS Meeting #232

Advances on Hubble Wide Field Camera 3 Grism Calibration and Slitless Spectroscopy Analysis

poster

Fowler, J.; Brammer, G.; Ryan, R.; Deustua, S.; Pirzkal, N.

winter, 2018

American Astronomical Society, AAS Meeting #231, id. 355.19

The Exoplanet Characterization ToolKit (ExoCTK)

poster

Stevenson, Kevin; **Fowler, J.**; Lewis, N.; Fraine, J.; Pueyo, L.; Valenti, J.; Bruno, G.; Filippazzo, J.; Hill, M.; Batalha, N.; Bushra, R.

winter, 2018

American Astronomical Society, AAS Meeting #231, id. 148.14

Do Radio Jets Contribute to Driving Ionized Gas Outflows in Moderate Luminosity Type 2 AGN?

poster

Fowler, J.; Sajina, A.; Lacy, M.

winter, 2016

American Astronomical Society, AAS Meeting #227, id.243.08