

Jules Fowler

NSF GRADUATE RESEARCH FELLOW IN ASTRONOMY & ASTROPHYSICS

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Research Experience

University of California, Santa Cruz (UCSC)

Santa Cruz, CA

- Testing two predictive wavefront control methods in simulation and on the SEAL (Santa Cruz Extreme AO Laboratory) testbed. *Sept. 2020 - PRESENT*
- Assisting with ORKID (the ORCAS Keck Instrument Demonstrator – an AO-fed visible light camera at Keck Observatory) commissioning.
- Studying self-luminous substellar companions in polarized light with the Subaru Telescope.
- Mentoring an undergraduate student on focal-plane wavefront sensing for ORKID and the SEAL testbed.

Space Telescope Science Institute (STScI)

Baltimore, MD

- Worked in the Russel B. Makidon Optics Lab, writing scientific software to support the HiCAT (High-contrast Complex Aperture Telescopes) testbed, testing novel coronagraphy for LUVOIR-like telescopes. *Aug. 2016 - Sept. 2020*
- Built the first on-the-fly observation planning tool for exoplanet observations with the James Webb Space Telescope (JWST) for the Exoplanet Characterization ToolKit (ExoCTK).
- Wrote open source pipeline to reduce WFC3/IR spatial scan data, fit transit parameters with a Markov-Chain Monte Carlo (MCMC) simulation, calculate Bayesian statistics, and produce transmission spectra.

Tufts University

Somerville, MA

- Compared energy contribution of low energy radio jets to gas outflows in AGN. *May 2015 - July 2016*
- Detailed reduction and small numbers statistics in a senior honors thesis.

University of Texas, Austin

Austin, TX

May 2012 - August 2013

- Used MESA star to simulate exotic stellar dynamics of Betelgeuse and Wolf-Rayet stars.

Work Experience

Space Telescope Science Institute

Baltimore, MD

SOFTWARE ENGINEER II

Aug. 2016 - Sept. 2020

- Member of the Wide Field Camera Three Instrument Team: lead of the WFC3 Quicklook Project and designed grism user tools.
- Started the first LGBT+ group at STScI, member of the Invision Diversity Working Group, and designed Python training syllabus.

Tufts University, Department of Physics & Astronomy and Academic Resource Center

Somerville, MA

GRADER & TUTOR

Sept. 2014- July 2016

- Grader and tutor for introductory math and physics.
- Assisted students with accessible exam accommodations.

Education

University of California, Santa Cruz

Santa Cruz, CA

4TH YEAR PHD CANDIDATE

Sept. 2020-PRESENT

- **Graduate coursework:** Astrophysics I & II, Stars and Planets I & II, Galaxies and Cosmology I, High Energy Astrophysics, Observational Astronomy, Adaptive Optics, Digital Control Theory, Numerical Linear Algebra
- **Advanced to Candidacy:** August, 2023

Tufts University

Somerville, MD

B.S. ASTROPHYSICS & PHILOSOPHY

Sept. 2012 - May 2016

- Graduated with High Thesis Honors.

Grants & Awards

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| 2021 | JPL Exoplanet Exploration Program “ExoExplorers” , scholarship for early career exoplanet scientists | <i>Pasadena, CA</i> |
| 2021 | University of California Osterbrock Grant , small project grant to build a coronagraph outreach demo | <i>Santa Cruz, CA</i> |
| 2020 | National Science Foundation Graduate Research Fellowship , 3 year fellowship for graduate students in STEM | |
| 2020 | University of California Regents Fellowship , 1 year University of California wide fellowship for graduate students | <i>Santa Cruz, CA</i> |
| 2019 | STScI Achievement Awards , team awards for contributing to ExoCTK and teaching software classes at STScI | <i>Baltimore, MD</i> |
| 2019 | STScI Data Science Innovation Initiative Grant , Director’s Discretionary Research Fund call for projects | <i>Baltimore, MD</i> |
| 2016 | Tufts University Pride on the Hill , for contributions to LGBT+ climate | <i>Somerville, MA</i> |
| 2015 | Tufts Summer Scholar Grant , scholarship for summer long independent research projects | <i>Somerville, MA</i> |
| 2015 | Tufts Multicultural Service Award , for contributions to diversity efforts | <i>Somerville, MA</i> |

Committees & Organizations

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| 2024 | UCSC Astronomy & Astrophysics Graduate Students , Head Grad and faculty liaison | <i>Santa Cruz, CA</i> |
| 2019 | Inclusive Astronomy II , member of the Science Organizing Committee | <i>Baltimore, MD</i> |
| 2018 | AAS Committee for Sexual and Gender Minorities in Astronomy (SGMA) , member | |
| 2016 | out in STEM (oSTEM) @ Tufts , president and founder | <i>Somerville, MA</i> |
| 2015 | Tufts Society of Physics Students , president | <i>Somerville, MA</i> |
| 2014 | Tufts Queer Students Association , treasurer | <i>Somerville, MA</i> |

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, C++, MATLAB, Julia, IDL, IRAF/PyRAF, JaaS, CSS	beginner

Teaching

University of California, Santa Cruz

Santa Cruz, CA

- Developed material for and taught **Python** at a workshop for incoming Lamat summer students.
- Teaching assistant for Computational Physics

Winter, 2023

Software Carpentry

- Taught astronomy focused **Python** and **bash** at the 237TH and 233RD AAS meeting.
- Led a **Python** and **bash** workshop for a general science audience at the New York Academy of Science.

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

WORKSHOP AT THE 235TH AMERICAN ASTRONOMICAL SOCIETY MEETING

Jan. 2020

- Proposed for and led an ExoCTK workshop on observation planning and data reduction for JWST.

Tufts University

Somerville, MA

- Teaching assistant for the Concepts of the Cosmos (non-major astronomy course.)
- Laboratory instructor for Physics 1 & 11 (introductory mechanics.)

Spring 2016

Invited Talks

MACHINE LEARNING APPROACHES TO PREDICTIVE WAVEFRONT CONTROL, OPTIMAL EXOPLANET IMAGING LORENTZ WORKSHOP, LIEDEN, NL, Feb. 2023

DON'T HECKLE MY SPECKLE, EXOEXPLORERS SEMINAR SERIES, VIRUTAL, May 2021

Selected Publications

CLOSED-LOOP UNTIL FURTHER NOTICE: COMPARING PREDICTIVE CONTROL METHODS IN CLOSED-LOOP, J. FOWLER, M.A.M. VAN KOOTEN, R. JENSEN-CLEM *Proc. of AO4ELT7, 2023*

CHASING RAINBOWS AND OCEAN GLINTS: INNER WORKING ANGLE CONSTRAINTS FOR THE HABITABLE WORLDS OBSERVATORY, SOPHIA R. VAUGHAN ET AL., INC J. FOWLER, *MNRAS, 2023*

VISIBLE EXTREME ADAPTIVE OPTICS ON EXTREMELY LARGE TELESCOPES: TOWARDS DETECTING OXYGEN IN PROXIMA CENTAURI B AND ANALOGS, J. FOWLER, SEBASTIAAN HAFFERT, MAAIKE A.M. VAN KOOTEN, ET AL., *Proc. of SPIE, 2023*

TEMPESTAS EX MACHINA: A REVIEW OF MACHINE LEARNING METHODS FOR WAVEFRONT CONTROL, J. FOWLER, RICO LANDMAN, *Proc. of SPIE, 2023*

BATTLE OF THE PREDICTIVE WAVEFRONT CONTROLS: COMPARING DATA AND MODEL-DRIVEN PREDICTIVE CONTROL FOR HIGH CONTRAST IMAGING, J. FOWLER, MAAIKE A.M. VAN KOOTEN, REBECCA JENSEN-CLEM ET AL., *Proc. of SPIE, 2022*

A COMPREHENSIVE ANALYSIS OF WASP-17B'S TRANSMISSION SPECTRUM FROM SPACE-BASED OBSERVATIONS, L. ALDERSON, H. R. WAKEFORD, ET AL., INC J. FOWLER, *MNRAS, 2022*

PREDICTIVE WAVEFRONT CONTROL ON KECK II ADAPTIVE OPTICS BENCH: ON-SKY CORONAGRAPHIC RESULTS, MAAIKE A.M. VAN KOOTEN, REBECCA JENSEN-CLEM, ET AL., INC J. FOWLER, *JATIS, 2022*

WAVEFRONT SENSING AND CONTROL WITH THE MANY HEADED HYDRA MODAL BASIS, J. FOWLER & R. DENO STELTER, *April Fools arxiv, 2022*

A DESIGN STUDY FOR ADAPTIVE PRIMARY MIRRORS IN 1-2 METER CLASS TELESCOPES, J. FOWLER, RACHEL BOWENS-RUBIN, PHIL HINZ, *Proc. of SPIE, 2021*

DISENTANGLING THE PLANET FROM THE STAR IN LATE-TYPE M DWARFS: A CASE STUDY OF TRAPPIST-1G, H. R. WAKEFORD, N. K. LEWIS, J. FOWLER, ET AL., *AJ, 2019*

ANALYZING EIGHT YEARS OF TRANSITING EXOPLANET OBSERVATIONS USING WFC3'S SPATIAL SCAN MONITOR, K. B. STEVENSON & J. FOWLER, *WFC3 ISR, 2019*

THE BETELGEUSE PROJECT: CONSTRAINTS FROM ROTATION, CRAIG J. WHEELER, S. NANCE, ET AL. INC J. FOWLER, *MNRAS, 2017*

[COMPLETE LIST OF PUBLICATIONS »](#)