EMILIE BURNHAM

PhD Candidate in Astronomy and Astrophysics
efb5552@psu.edu | State College, PA | github.com/efburnham
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RESEARCH INTERESTS

Galaxy formation and evolution; large-scale surveys; scientific software development; machine-learning; stellar population synthesis; SED fitting; cosmological simulations.

EDUCATION

The Pennsylvania State University **2023–2029**
PhD, MS in Astronomy & Astrophysics State College, PA, US

- Thesis Advisor: Dr. Joel Leja.
- Expected graduation date: May 2029.

Texas Christian University **2019–2022**
BSc in Physics & Astronomy Fort Worth, TX, US

- Thesis Advisor: Dr. Mia Bovill.
- Graduated summa cum laude.

RESEARCH EXPERIENCE

Graduate Research Assistant **2023–**
Penn State University State College, PA, US

Developed tools (ESPS, PIGLET) to enable fast modeling of galaxy spectra in large surveys. Applied these tools to infer the recent star formation histories of galaxy populations across cosmic time, with a particular emphasis on burstiness. Presented results at conferences and seminars, and published research in peer-reviewed journals.

NSF DAWN IRES Senior Scholar **2026**
Cosmic Dawn Center (DAWN), Neils Bohr Institute, University of Copenhagen Copenhagen, Denmark

Mentored undergraduate students participating in the program and led workshops on research skills used in the field of galaxy formation and evolution. Continued thesis research while in residence at DAWN.

NSF REU Research Assistant **2021**
University of Colorado at Boulder Remote

Conducted research on how well modern radiative transfer codes can recover the absorption features in different spatial features (e.g., plage, faculae) of the solar disk. Presented results at the 2021 Winter American Geophysical Union meeting.

Undergraduate Research Assistant **2020–2023**
Texas Christian University Fort Worth, TX, US

Conducted research on modeling the observable affects of a warm dark matter cosmology in the JWST era. Reduced spectra of nearby open clusters to calculate alpha element abundances. Presented results at the 2023 Winter American Astronomical Society meeting.

INDUSTRY EXPERIENCE

Clinical Data Analyst **2023–2024**
Front Line Mobile Health, PLLC Georgetown, TX, US

Conducted research on the health of first responders. Developed a data pipeline to analyze and visualize health data to employers of first responders.

TEACHING EXPERIENCE

Guest Lecturer

- ASTRO 291: Astronomical Methods and the Solar System, Penn State University | State College, PA | 2025

Teaching Assistant

- PHYS 10293: Archeoastronomy, Texas Christian University | Fort Worth, TX | 2023
- PHYS 20475: Physics I for Majors, Texas Christian University | Fort Worth, TX | 2022

MENTORING EXPERIENCE

Undergraduate Research Mentor, Students Together for Astronomical Research (STAR) Program **2026**
State College, PA
Penn State University

Directly mentored undergraduate student Allyson Garcia on astrophysics research methodologies.

FIRST-AUTHOR PUBLICATIONS

[1] **Emilie Burnham**; Bingjie Wang; Joel Leja; Owen Gonzales; Jenny E Greene; Kartheik G Iyer; Abby Mintz; David J Setton; Sarah Wellons; Rachel Bezanson. *It's More Complicated Than You Think: A Forward Model to Infer the Recent Star Formation History, Bursty or Not, of Galaxy Populations* The Astrophysical Journal (2026).

CO-AUTHOR PUBLICATIONS

[1] Mintz, Abby; Setton, David J; Greene, Jenny E; Leja, Joel; Wang, Bingjie; **Burnham, Emilie**; Suess, Katherine A; Atek, Hakim; Bezanson, Rachel; Brammer, Gabriel; others. *Taking a Break at Cosmic Noon: Continuum-selected Low-mass Galaxies Require Long Burst Cycles* The Astrophysical Journal (2026).

[2] Wohlgemuth, Kealey J; Conner, Michael J; **Burnham, Emilie**; Mota, Jacob A. *Occupational Health Disparities: A Profile of Firefighters and Police Officers* The Journal of Strength and Conditioning Research (2026).

[3] Mitsuhashi, Ikki; Suess, Katherine A; Leja, Joel; Bezanson, Rachel; Greene, Jenny E; **Burnham, Emilie**; Khullar, Gourav; Mintz, Abby; Nanayakkara, Themiya; Glazebrook, Karl; others. *UNCOVER/MegaScience Finds Uniform and Highly Bursty Star Formation at 3< z< 9, consistent with the High-Redshift UV Luminosity Function* arXiv preprint arXiv:2601.16284 (2026).

[4] Cleri, Nikko J; Lewis, Zach J; Leja, Joel; Helton, Jakob M; **Burnham, Emilie**; Curtis, Olivia; de Graaff, Anna; Hirschmann, Michaela; Katz, Harley; Maseda, Michael V; others. *RUBIES: The Evolution of the Ionization Parameter from 0< z< 9* arXiv preprint arXiv:2605.30410 (2026).

[5] Cleri, Nikko J; Olivier, Grace M; Backhaus, Bren E; Leja, Joel; Papovich, Casey; Trump, Jonathan R; Arrabal Haro, Pablo; Buat, Veronique; Burgarella, Denis; **Burnham, Emilie**; others. *Optical Strong Line Ratios Cannot Distinguish between Stellar Populations and Accreting Black Holes at High Ionization Parameters and Low Metallicities* The Astrophysical Journal (2025).

[6] Wang, Bingjie; Leja, Joel; Atek, Hakim; Bezanson, Rachel; **Burnham, Emilie**; Dayal, Pratika; Feldmann, Robert; Greene, Jenny E; Johnson, Benjamin D; Labbe, Ivo; others. *Population Models for Star Formation Timescales in Early Galaxies: The First Step toward Solving Outshining in Star Formation History Inference* The Astrophysical Journal (2025).

[7] Levitt, Danielle E; Wohlgemuth, Kealey J; **Burnham, Emilie**; Conner, Michael J; Collier, J Jason; Mota, Jacob A. *Hazardous alcohol use and cardiometabolic risk among firefighters* Alcohol: Clinical and Experimental Research (2025).

[8] Levitt, Danielle E; **Burnham, Emilie**; Conner, Michael J. *At-risk alcohol use and cardiometabolic risk factors among first responders in the US* Drug and Alcohol Dependence (2024).

HONORS AND AWARDS

Harold and Nancy O'Connor Graduate Excellence Fund Scholarship **2025**
Penn State Eberly College of Science

First-place award at a student/postdoc-led research event featuring talks and posters judged by undergraduates, graduate students, postdocs, and faculty on communication effectiveness, with participation from all departments in the Eberly College of Science.

Frymoyer Award **2025**
Institute of Gravitation and the Cosmos

Awarded to IGC students who have achieved superior academic records or who manifest promise of outstanding academic success. The evaluation of the nominees was based on the nomination letters submitted by faculty members and the packets of materials submitted by the nominees.

Zaccheus Daniel Foundation for Astronomical Science Scholarship **2025**
Penn State Department of Astronomy and Astrophysics

Result of major contributions and achievements as a graduate student in the Penn State Astronomy & Astrophysics Department. Students were nominated by the faculty, and all nominees were evaluated by a committee based on criteria that included academic merit, research accomplishments, and service to the department.

University Graduate Fellowship **2024**
Penn State University

Intended to support recruitment of the very highest caliber prospective students to Penn State's doctoral research programs. The prospects are individuals whose goals are to engage in original research and contribute new knowledge to their perspective fields for the ultimate benefit of society.

Stephen B. Brumbach Distinguished Graduate Fellowship in Science **2023**
Penn State University

Verne M. Willaman Distinguished Graduate Fellowship in Science **2023**
Penn State University

Homer F. Braddock Scholarship in Biology, Chemistry, and Physics **2023**
Penn State University

Dr. C.A. Quarles Physics and Astronomy Scholarship **2021**
Texas Christian University Department of Physics and Astronomy

Awardees are strong candidates for acceptance to graduate school. Received the award twice in separate application cycles. Two-time awardee.

Joseph Morgan Physics Scholarship **2021**
Texas Christian University Department of Physics and Astronomy

One scholarship per year, this award is based on the recommendation of the faculty for students who have demonstrated the greatest excellence and achievement.

Bob Bolen Leadership Scholarship **2021**
The Sarah & Ross Perot Jr. Foundation, Texas Christian University

Awardees exhibit leadership ability and/or potential and a commitment to community service.

TCU Scholar **2021**
Texas Christian University

Maintained a 4.0 GPA. Three-time awardee.

College of Science and Engineering Dean's List **2019**
Texas Christian University College of Science and Engineering. Six-time awardee.

LEADERSHIP AND SERVICE

Astronomy on Tap State College Organizer **2024–**
Astronomy on Tap State College State College, PA

Organized monthly public talks on astronomy topics, coordinated with speakers, and promoted events to engage the local community in astronomy outreach.

Society of Physics Students (SPS) President and Treasurer **2021–2022**
Texas Christian University Chapter of the Society of Physics Students Fort Worth, TX

Led the student chapter of the Society of Physics Students, organized events and meetings, managed finances, and coordinated events to grow participation across departmennts.

OUTREACH

Public Lecture on "Why is Astronomy a Big Data Field?" **2025**
Astronomy on Tap State College State College, PA

Presented a public lecture on the role of data science in modern astronomy, highlighting how astronomers use large datasets to understand the universe and the importance of data analysis skills in the field.

Public Lecture on "The Milky Way Through the Rainbow" **2024**
Astro Night at Penn State State College, PA

Presented a public lecture on how astronomers use different wavelengths of light to study the Milky Way galaxy, showcasing the diverse phenomena that can be observed across the electromagnetic spectrum.

Public Lecture on "Suprises at the Edge fo the Universe Found with JWST" **2024**
Central Pennsylvania Observer's Society State College, PA

Presented the latest discoveries from the JWST, focusing on unexpected findings about galaxies in the early Universe and their implications for our understanding of how galaxies form and evolve.

PROFESSIONAL PRESENTATIONS

Invited Talks

- *"It's More Complicated Than You Think: Inferring the Recent Star Formation History, Bursty or Not, in Galaxy Populations"*
  - Penn State University Center for Astrostatistics and Astroinformatics Lunch Seminar | State College, PA | 2026
  - University of Copenhagen Cosmic Dawn Center (DAWN) Cake Talk Seminar | Copenhagen, Denmark | 2026
  - University of Pittsburgh Joint Extragalactic Group Meeting | Pittsburgh, PA | 2025
  - Penn State University Institute for Gravitation and the Cosmos Primordial Universe and Gravitation Seminar | State College, PA | 2025
  - Princeton University Galactic/Extragalactic Reading Group | Princeton, NJ | 2025

Contributed Talks

- *"It's More Complicated Than You Think: Inferring the Recent Star Formation History, Bursty or Not, in Galaxy Populations"*
  - Eberly Research Showcase | State College, PA | 2025 | (First-place prize)
  - Penn State University Department of Astronomy and Astrophysics Lunch Talk Seminar | State College, PA | 2025
  - 7th Neighborhood Workshop on Astrophysics and Cosmology | State College, PA | 2025 | (First-place prize)
- *"The Need for Speed in Galaxy Evolution Surveys"*
  - Penn State Astronomy and Astrophysics Lunch Talk Seminar | State College, PA | 2025
- *"Measuring the Family Histories of Bursty Star Formation within Galaxy Populations"*
  - Penn State Astronomy and Astrophysics Lunch Talk Seminar | State College, PA | 2024
- *"Forensic Astronomy"*
  - Texas Christian University Annual Student Research Symposium | Fort Worth, TX | 2021

Contributed Posters

- *"It's More Complicated Than You Think: Inferring the Recent Star Formation History, Bursty or Not, in Galaxy Populations"*
  - Carnegie Mellon University Statistical Methods for the Physical Sciences Research Center Workshop | Pittsburgh, PA | 2025 | (simulation-based inference)
  - Penn State University Institute for Computational Data Sciences Symposium | State College, PA | 2025 | (computational methods)
- *"Warm or Cold Dark Matter? A Love-Heat Relationship"*
  - Texas Christian University Annual Student Research Symposium | Fort Worth, TX | 2022
  - American Astronomical Society Winter Meeting | Seattle, WA | 2023
- *"Spectral Runway: An Analysis of Solar Balmer Lines through Observations and Models"*

– American Geophysical Union Winter Meeting | New Orleans, LA | 2021

SKILLS

Computing: Python, JAX, Machine Learning, Data Analysis, Data Visualization, Software Development, High-Performance Computing, Git, Cloud Computing, GPUs