

Teresa Symons

ASSISTANT STAFF SCIENTIST

Caltech/IPAC, MC 100-22, 1200 E. California Blvd., Pasadena, CA 91125

Education

Rochester Institute of Technology (RIT)

Rochester, NY

PHD ASTROPHYSICAL SCIENCES AND TECHNOLOGY (AST)

2022

- Dissertation: *The View from 50 AU: Measuring the Cosmic Optical Background with New Horizons*
- Advisor: Dr. Michael Zemcov

University of Kansas (KU)

Lawrence, KS

MS COMPUTATIONAL PHYSICS AND ASTRONOMY

2017

- Thesis: *photPARTY: Python Automated Square-Aperture Photometry*
- Advisor: Dr. Barbara Anthony-Twarog

Embry-Riddle Aeronautical University (ERAU)

Daytona Beach, FL

BS SPACE PHYSICS

2014

Professional Experience

2024-Pres. **Staff Scientist**, Caltech/IPAC

- PSF generation and photometry pipelines for NEO Surveyor

2022-2024 **Postdoctoral Research Associate**, University of California Irvine (UCI)

- SPHEREx extended PSF reconstruction and mitigation
- Integration of SPHEREx core PSF reconstruction into pipeline module
- Estimation of extragalactic background light with JWST JADES

2023 **NASA Astrophysics Mission Design School**, Jet Propulsion Laboratory

- Science objective lead
- Mission Operations & Ground Data Systems chair

Research Experience

Graduate Research Assistant, RIT

Rochester, NY

ADVISOR: DR. MICHAEL ZEMCOV

2017 - 2022

- Estimation of cosmic optical background with LORRI instrument on New Horizons
- Sensitivity estimation of New Horizons' LEISA instrument to extragalactic background light
- Diffuse integrated starlight estimate with KPNO WIYN data
- SPHEREx diffuse galactic light module for image simulation pipeline
- SPHEREx PSF reconstruction for data analysis pipeline

Graduate Research Assistant, KU

Lawrence, KS

ADVISOR: DR. BARBARA ANTHONY-TWAROG

2016

- Development of automated source detection and photometry pipeline

International REU, University of Florida/Cardiff University

Cardiff, UK

ADVISOR: DR. BANGALORE SATHYAPRAKASH

2013

- Development of pipeline for simulated observations of binary black hole mergers

REU, Arecibo Observatory

Arecibo, PR

ADVISOR: DR. CHRISTIANO BRUM

2012

- Comparison of solar activity to ionospheric electron content with predictive model

Teaching Experience

2022	Guest Lecturer , Introduction to Astronomy, UCI	Irvine, CA
2015-2017	Graduate Teaching Assistant , Physics Lab Solo Instruction and Grading, KU	Lawrence, KS
2015	Museum Science Educator , Da Vinci Science Center	Allentown, PA
2015	Science Instructor , Astrocamp — Guided Discoveries, Inc.	Idyllwild, CA
2011-2014	Writing Center Tutor , ERAU	Daytona Beach, FL

Mentoring Experience

2024-2025	Katarzyna McCoy , Postbaccalaureate Research Assistant <i>Research Project: "Measuring the Extragalactic Background Light with JADES"</i>
2023-2024	Yuqi Fang , Undergraduate Research Assistant, UCI <i>Research Project: "Measuring the Extragalactic Background Light with JADES"</i>
2022-2024	Katarzyna McCoy , Undergraduate Research Assistant, UCI <i>Research Project: "SPHEREx Extended PSF Characterization"</i>
2023	Amber Wong , Undergraduate Research Assistant, UCI <i>Research Project: "JADES Extragalactic Background Light Estimation"</i>
2022-2023	Evan Imata , Undergraduate Research Assistant, UCB <i>Research Project: "NASA PDS Archival of New Horizons COB Measurement Data"</i>
2022	Alex Bush , Undergraduate Research Assistant, RIT <i>Research Project: "Data Selection for New Horizons COB Measurement"</i>
2019-2022	Anna Dignan , RIT Women in Science Peer Mentoring Program, RIT
2021	Kyla O'Kelly , ROAR High School Research Student, RIT
2021	Kayla Dengler , ROAR High School Research Student, RIT
2020-2021	Dennis Houlihan , Capstone Student, RIT <i>Research Project: "A Measurement of the Extragalactic Background Light with LEISA"</i>
2020-2021	Nikki Noughani , AST Graduate Peer Mentoring Program, RIT
2020	Dennis Houlihan , Summer Research Fellowship Student, RIT <i>Research Project: "An Integrated Starlight Estimate with WIYN"</i>
2019-2020	Sara Rosborough , AST Graduate Peer Mentoring Program, RIT
2019	Shaina Thayer , Inclusive Excellence Summer Student, RIT <i>Research Project: "Galactic Ghouls: Optical Ghosting in New Horizons' LORRI Images"</i>
2019	Anna Dignan , Fast Forward Summer Student, RIT <i>Research Project: "Characterizing Dark Current for New Horizons' LORRI Images"</i>
2018	Stephanie Venuto , REU Student, SUNY New Paltz <i>Research Project: "Developing the SPHEREx Data Analysis Pipeline"</i>
2016-2017	Melinda Townsend , KU Graduate Peer Mentoring Program, KU
2013-2014	Sara Rosborough & Olivia Fowler , ERAU Junior-Senior Peer Mentoring Program, ERAU

Awards & Honors

2021	Outstanding Graduate Woman Achievement Award , RIT
2020	Graduate Showcase Outstanding Oral Presentation Award , RIT
2017	Emery E. Slossen Outstanding Teaching Assistant Award , KU Dept. of Physics & Astronomy
2013-Pres.	Sigma Pi Sigma Physics Honor Society
2012-2014	Constance D. Hunter Scholarship , ERAU
2011	Best Freshman Research Paper Award , ERAU Honors Program

Outreach Experience

2020-Pres.	American Astronomical Society (AAS) Astronomy Ambassador	
2024	NASA Here to Observe (H2O) Student Career Pathways , Presenter	<i>Pasadena, CA</i>
2018-2024	Letters to a Pre-Scientist , Pen pal to students from low-income schools	
2021	RIT Opportunity for Astrophysics in Rochester (ROAR) , Organizer	<i>Rochester, NY</i>
2020	National Science Foundation On-the-Spot Audience Feedback Study , Design Tester	
2020	AAS Astronomy Ambassadors Virtual Engagement Training	
2020	RIT Women in Science's Girls in STEM Day , Demonstrator	<i>Rochester, NY</i>
2017-2020	Imagine RIT: Creativity and Innovation Festival , Exhibit Designer & Presenter	<i>Rochester, NY</i>
2019	Camp DayDreams Astronomy Activities , Organizer & Facilitator	<i>Rochester, NY</i>
2019	Astronomy Section of the Rochester Academy of Science , Presenter	<i>Rochester, NY</i>
2016	Astronomy Q&A with middle school students , Presenter	<i>Lawrence, KS</i>
2011	Da Vinci Science Center Internship , Online articles & videos for public outreach	<i>Allentown, PA</i>
2010-2014	ERAU Society of Physics Students STEM Outreach , Organizer & Demonstrator	<i>Daytona Beach, FL</i>

Leadership & Service Activities

2025	Caltech/IPAC Hiring Committee , Member	
2025	IPAC Visiting Graduate Student Fellowship , Review Panel Member	
2024	National Science Foundation , Reviewer	
2024	IPAC Visiting Graduate Student Fellowship , Review Panel Member	
2024	Astrophysical Journal , Reviewer	
2023	UCI Mentoring Excellence , Certificate	
2020-2022	AST Diversity, Equity, and Inclusion Working Group , Member	
2019-2022	RIT Graduate Student Advisory Council , Co-Chair 2019-2021	
2019-2022	RIT Women in Science , Volunteer and Peer Mentor	
2021	AAS Chambliss Poster Competition , Poster Judge	
2020-2021	RIT Graduate Showcase Planning Committee , Member	
2020-2021	RIT Graduate COVID Communications Taskforce , Member	
2020-2021	RIT Graduate Student Diversity, Equity, and Inclusion Journal Club , Organizer	
2019-2021	RIT School of Physics and Astronomy Women's Group , Member	
2019-2021	RIT Three-Minute-Presentation Competition Planning Committee , Member	
2019-2021	RIT Graduate Education Student Resource Group , Member	
2019-2021	RIT Graduate Dean's Advisory Council , Member	
2020	AST/Society of Physics Students Graduate School Application Workshop , Graduate student panelist	
2020	American Physical Society Chapter Program Application , Graduate student coordinator	
2019-2020	RIT Board of Trustees , Graduate student representative	
2017-2018	RIT Conference for Undergraduate Women in Physics , Panelist and Local Organizing Committee Member	
2016-2017	KU Conference for Undergraduate Women in Physics , Site Proposal and Local Organizing Committee Member	
2012-2014	ERAU Society of Physics Students , Chapter President	

Skills

Analytical	Image reduction and calibration, pipeline development
Programming	Python, MATLAB, Astropy, HEALPix/healpy, \LaTeX
Computational	Supercomputing, Multiprocessing, Git, Unix/Linux
Publishing	Writing, editing, graphic design, HTML & web design
Outreach	Curricular and educational material development, working with pre-K-12

Research in Media

- 2025 **ERAU Women Astronomers Day Profile:** [Reaching for the Stars: Women in Astronomy](#)
- 2023 **Sky & Telescope:** [The case of the universe's extra light](#)
- 2022 **Universe Today:** [The universe is brighter than we thought](#)
- 2022 **RIT News:** [New study confirms the light from outside our galaxy brighter than expected](#)
Also seen in AAAS EurekAlert!, ScienceDaily, Phys.org, Tech Explorist, SciTechDaily
- 2022 **Science News:** [The universe's background starlight is twice as bright as expected](#)
- 2021 **AAS Journal Author Series:** [Teresa Symons on 2021ApJS..252...24S](#)

Presentations

*Research students I have mentored are indicated with **

SELECTED TALKS

- 2024. *Measuring the Extragalactic Background Light from the Outer Solar System*. Cornell LEPP Journal Club Invited Talk, Virtual
- 2023. *Measuring the Extragalactic Background Light from the Outer and Inner Solar System*. IPAC Invited Talk, Virtual
- 2023. *A Measurement of the Cosmic Optical Background from the Outer Solar System with New Horizons*. NASA IRSTIG Seminar Invited Talk, Virtual
- 2023. *The Cosmic Optical Background from the Outer Solar System with New Horizons*. Caltech ObsCos Seminar Invited Talk, Virtual
- 2023. *The Cosmic Optical Background from the Outer Solar System with New Horizons*. UCI Astro Postdoc Seminar, Irvine, CA
- 2023. *A measurement of the COB from the $R < 50$ AU LORRI archival data*. New Horizons Science Team Meeting, Virtual
- 2022. *Estimating the Cosmic Optical Background with New Horizons' Long-Range Reconnaissance Imager*. IPAC Invited Talk, Virtual
- 2022. *Estimating the Cosmic Optical Background with New Horizons' Long-Range Reconnaissance Imager*. 239th American Astronomical Society Meeting, Salt Lake City, UT – *Cancelled due to COVID*
- 2020. *Measuring the Cosmic Optical Background with New Horizons*. RIT Graduate Showcase, Virtual
- 2020. *A New Method for PSF Reconstruction in Undersampled Images with Noise Mitigation*. 235th American Astronomical Society Meeting, Honolulu, HI
- 2019. *New Horizons, New Frontiers*. Astronomy Section of the Rochester Academy of Science, Rochester, NY
- 2017. *photPARTY: Python Automated Square-Aperture Photometry*. AST Lunch Colloquium, Rochester, NY
- 2016. *Python Automated Square-Aperture Photometry with photPARTY*. KU Astronomy Seminar, Lawrence, KS
- 2015. *Ripples in Spacetime*. Astrocamp Colloquium, Idyllwild, CA
- 2013. *REUs 101*. ERAU Society of Physics Students, Daytona Beach, FL
- 2013. *Measuring Dark Energy with Binary Black Holes*. Cardiff University School of Physics and Astronomy Colloquium, Cardiff, UK
- 2012. *A Comparison between Observational Data and IRI Model Predictions for the Arecibo Region*. Arecibo Observatory Colloquium, Arecibo, PR

POSTERS

- Symons, T.**, Zemcov, M., Cooray, A., *Houlihan, D., Lisse, C., Poppe, A. 2020. *Lessons Learned from Measuring the Cosmic Optical Background with LORRI on New Horizons*. 3rd Interstellar Probe Exploration Workshop
- Symons, T.**, *Thayer, S., *Dignan, A., Zemcov, M., Cooray, A., Lisse, C., Ngyuen, C., Poppe, A. 2019. *Measuring the Cosmic Optical Background with New Horizons*.
12th Great Lakes Cosmology Workshop
Astronomical Society of New York Fall Meeting
RIT Graduate Showcase

- Symons, T.**, Anthony-Twarog, B. J. 2017. *photPARTY: Python Automated Square-Aperture Photometry*. Mid-American Regional Astrophysics Conference
- Symons, T.**, Sathyaprakash, B. S., Sutton, P., Nuttall, L. 2014. *Measuring Dark Energy with Binary Black Holes*. Southeastern Conference for Undergraduate Women in Physics
Society of Physics Students Zone 6 Meeting
- Symons, T.**, Brum, C. G., Cabassa-Miranda, E., Franco, E., Aponte, N. 2012. *Solar Activity Effects on Total Electron Content over Arecibo Observatory: Observational Results versus IRI Predictions*. Society of Physics Students Zone 6 Meeting

Publications & Conference Proceedings

Research students I have mentored are indicated with *

ADS Bibliography Link

- Crill, B., et al. (including **Symons, T.**). 2025. *The SPHEREx Sky Simulator: Science Data Modeling for the First All-Sky Near-Infrared Spectral Survey*. ApJS, accepted
- Balakrishnan, M., et al. (including **Symons, T.**). 2024. *MAUVE: An Ultraviolet Astrophysics Probe Mission Concept*. PASP, 136, 10
- Symons, T.**, Zemcov, M. 2023. *New Horizons Cosmic Optical Background Observations*. NASA Planetary Data System
- Symons, T.**, Zemcov, M., Cooray, A., Lisse, C., Poppe, A. 2023. *A Measurement of the Cosmic Optical Background and Diffuse Galactic Light Scaling from the $R < 50$ AU New Horizons-LORRI Data*. ApJ, 945, 45
- Symons, T.** 2022. *The View from 50 AU: Measuring the Cosmic Optical Background with New Horizons*. ProQuest Dissertations and Theses, Publication Number: 29326009, ISBN: 9798841793496
- Symons, T.**, Zemcov, M., Bock, J., Cheng, Y., Crill, B., Hirata, C., *Venuto, S. 2021. *Superresolution Reconstruction of Severely Undersampled Point-spread Functions Using Point-source Stacking and Deconvolution*. ApJS, 252, 24
- *Houlihan, D., **Symons, T.**, Zemcov, M. 2021. *An Assessment of the LEISA Spectrometer for Extragalactic Background Light Measurements*. Res. Notes AAS, 5, 187
American Astronomical Society, AAS Meeting #238, id. 132.06
- Crill, B., et al. (including **Symons, T.**). 2020. *SPHEREx: NASA's Near-Infrared Spectrophotometric All-Sky Survey*. Proc. SPIE, 11443, 114430I
- Zemcov, M., et al. (including **Symons, T.**). 2020. *Astrophysics from the Outer Solar System: Leveraging Joint Missions to Maximize Science Return*. White paper submitted to the Heliophysics 2050 Workshop
- Symons, T.**, Zemcov, M., Crill, B., Cheng, Y., *Venuto, S. 2020. *A New Method for Point Source Function Reconstruction in Undersampled Images with Noise Mitigation*. American Astronomical Society, AAS Meeting #235, id. 136.04
- Zemcov, M., et al. (including **Symons, T.**). 2019. *Opportunities for Astrophysical Science from the Inner and Outer Solar System*. Science white paper submitted to the Astro2020 decadal review
- Symons, T.** 2017. *photPARTY: Python Automated Square-Aperture Photometry*. ProQuest Dissertations and Theses, Publication Number: AAT 10276302, ISBN: 9780355346428
- Symons, T.**, Anthony-Twarog, B. J. 2017. *photPARTY: Python Automated Square-Aperture Photometry*. American Astronomical Society, AAS Meeting #229, id. 236.06
- Symons, T.**, Brum, C. G., Cabassa-Miranda, E., Franco, E., Aponte, N. 2012. *Solar Activity Effects on Total Electron Content over Arecibo Observatory: Observational Results versus IRI Predictions*. American Geophysical Union, Fall Meeting, id. SA23A-2149
- Franco, E., Brum, C. G., **Symons, T.**, Cabassa-Miranda, E. 2012. *Solar and Season Variability of the Transition Height over Arecibo Observatory*. American Geophysical Union, Fall Meeting, id. SA23A-2150
- Cabassa-Miranda, E., Brum, C. G., Franco, E., **Symons, T.** 2012. *On the Relationship between the Noon F2-peak Parameters and the Solar Ultraviolet Irradiance Variations over Arecibo*. American Geophysical Union, Fall Meeting, id. SA23A-2148