

Teresa Symons

ASSISTANT STAFF SCIENTIST

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Education

Rochester Institute of Technology (RIT) PHD ASTROPHYSICAL SCIENCES AND TECHNOLOGY (AST) • Advisor: Dr. Michael Zemcov	<i>Rochester, NY</i> 2022
University of Kansas (KU) MS COMPUTATIONAL PHYSICS AND ASTRONOMY • Advisor: Dr. Barbara Anthony-Twarog	<i>Lawrence, KS</i> 2017
Embry-Riddle Aeronautical University (ERAU) BS SPACE PHYSICS	<i>Daytona Beach, FL</i> 2014

Professional Experience

- 2024-Pres. **Staff Scientist**, Caltech/IPAC
 - PSF generation and photometry 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 ADVISOR: DR. MICHAEL ZEMCOV • 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	<i>Rochester, NY</i> 2017 - 2022
Graduate Research Assistant, KU ADVISOR: DR. BARBARA ANTHONY-TWAROG • Development of automated source detection and photometry pipeline	<i>Lawrence, KS</i> 2016
International REU, University of Florida/Cardiff University ADVISOR: DR. BANGALORE SATHYAPRAKASH • Development of pipeline for simulated observations of binary black hole mergers	<i>Cardiff, UK</i> 2013
Independent Honors Research Project, ERAU ADVISOR: DR. MATTHEW ZETTERGREN • Magnetohydrodynamic simulations of auroral waves	<i>Daytona Beach, FL</i> 2013
REU, Arecibo Observatory ADVISOR: DR. CHRISTIANO BRUM • Comparison of solar activity to ionospheric electron content with predictive model	<i>Arecibo, PR</i> 2012

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

2023-2024	Yuqi Fang , Undergraduate Research Assistant, UCI <i>Research Project: “Measuring the Extragalactic Background Light with JADES”</i>	
2023	Amber Wong , Undergraduate Research Assistant, UCI <i>Research Project: “JADES Extragalactic Background Light Estimation”</i>	
2022-2024	Katarzyna McCoy , Undergraduate Research Assistant, UCI <i>Research Project: “SPHEREx Extended PSF Characterization”</i>	
2022-2023	Evan Imata , Undergraduate Research Assistant, UCB <i>Research Project: “NASA 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”</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”</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	

Outreach Experience

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

Leadership & Service Activities

- 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

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

Skills

- Analytical** Image reduction and calibration, pipeline development
- Programming** Python, MATLAB, Astropy, HEALPix/healpy, \LaTeX
- Computational** Supercomputing, Multiprocessing, Git, Unix/Linux

Research in Media

- 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 Explorer, 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](#)

- 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