Teresa Symons

Postdoctoral Research Associate · Dept. of Physics and Astronomy

University of California Irvine, 2158 Frederick Reines Hall, Irvine, CA 92697

Education

Rochester Institute of Technology (RIT) — *Rochester, NY*
PhD Astrophysical Sciences and Technology (AST) — *2022*
- Advisor: Dr. Michael Zemcov

University of Kansas (KU) — *Lawrence, KS*
MS Computational Physics and Astronomy — *2017*
- Advisor: Dr. Barbara Anthony-Twarog

Embry-Riddle Aeronautical University (ERAU) — *Daytona Beach, FL*
BS Space Physics — *2014*

Professional Experience

2022-Pres. **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

Independent Honors Research Project, ERAU — *Daytona Beach, FL*
Advisor: Dr. Matthew Zettergren — *2013*
- Magnetohydrodynamic simulations of auroral waves

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

2023	**Yuqi Fang**, Undergraduate Research Assistant, UCI
	Research Project: "Measuring the Extragalactic Background Light with JADES"
2022-2023	**Katarzyna McCoy**, Undergraduate Research Assistant, UCI
	Research Project: "SPHEREx Extended PSF Characterization"
2022-2023	**Evan Imata**, Undergraduate Research Assistant, UCB
	Research Project: "NASA Archival of New Horizons COB Measurement Data"
2022	**Alex Bush**, Undergraduate Research Assistant, RIT
	Research Project: "Data Selection for New Horizons COB Measurement"
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
	Research Project: "A Measurement of the Extragalactic Background Light"
2020-2021	**Nikki Noughani**, AST Graduate Peer Mentoring Program, RIT
2020	**Dennis Houlihan**, Summer Research Fellowship Student, RIT
	Research Project: "An Integrated Starlight Estimate"
2019-2020	**Sara Rosborough**, AST Graduate Peer Mentoring Program, RIT
2019	**Shaina Thayer**, Inclusive Excellence Summer Student, RIT
	Research Project: "Galactic Ghouls: Optical Ghosting in New Horizons' LORRI Images"
2019	**Anna Dignan**, Fast Forward Summer Student, RIT
	Research Project: "Characterizing Dark Current for New Horizons' LORRI Images"
2018	**Stephanie Venuto**, REU Student, SUNY New Paltz
	Research Project: "Developing the SPHEREx Data Analysis Pipeline"
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**	
2018-2023	**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

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 ∗

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

Selected Talks

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*

2021. *New Horizons: Into the Dark*. AST Research Talks Jamboree, Rochester, NY

2020. *Measuring the Cosmic Optical Background with New Horizons*. RIT Graduate Showcase, Virtual

2020. *SPHEREx PSF Reconstruction*. AST Research Talks Jamboree, Virtual

2020. *A New Method for PSF Reconstruction in Undersampled Images with Noise Mitigation*. 235th American Astronomical Society Meeting, Honolulu, HI

2019. *Measuring the Cosmic Optical Background with New Horizons*. AST Research Talks Jamboree, Rochester, NY

2019. *New Horizons, New Frontiers*. Astronomy Section of the Rochester Academy of Science, Rochester, NY

2018. *Developing the SPHEREx Analysis Pipeline*. AST Research Talks Jamboree, 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

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

References

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