

# Edward W. Schwieterman

## CURRICULUM VITAE

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### Mailing Address

Department of Earth and Planetary Sciences  
University of California, Riverside  
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### Contact Information

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**Current Position:** Assistant Professor of Astrobiology  
(2020 - Present) University of California, Riverside (UCR)  
Department of Earth and Planetary Sciences

### Education:

- 2010-09 – 2016-08** University of Washington (UW)  
Ph.D., Astronomy & Astrobiology  
Thesis Advisor: Dr. Victoria Meadows
- 2010-09 – 2011-08** University of Washington (UW)  
M.Sc., Astronomy
- 2006-08 – 2010-05** Florida Institute of Technology (FIT)  
B.Sc., Astronomy & Astrophysics, *Magna Cum Laude*, May 2010  
B.Sc., Physics, *Magna Cum Laude*, May 2010

### Other Professional Experience

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- 2019-2020. Postdoctoral Fellow, Georgia Institute of Technology (GT)
- 2015-present. Affiliate Research Scientist, Blue Marble Space Institute of Science (BMSIS)
- 2016-2019. NASA Postdoctoral Fellow, University of California, Riverside
- 2010-2016. Graduate Research & Teaching Assistant, University of Washington

### Selected High Impact & Recent First-Author Publications—See below for full pub list

[[Google Scholar](#) h-index=30; N<sub>cite</sub>=4112; \*includes (co-)advised student (co-)author(s)]

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- \*Schwieterman, E. W., et al. (2024). Artificial Greenhouse Gases as Exoplanet Technosignatures. *The Astrophysical Journal*, 969(1), 20.
- \*Schwieterman, E. W., & Leung, M. (2024). An Overview of Exoplanet Biosignatures. *Reviews in Mineralogy and Geochemistry*, 90(1): 465–514. [arXiv]
- \*Schwieterman, E. W., Olson, S. L., Pidhorodetska, D., et al. 2022. Evaluating the Plausible Range of N<sub>2</sub>O Biosignatures on Exo-Earths: An Integrated Biogeochemical, Photochemical, and Spectral Modeling Approach. *The Astrophysical Journal*, 937(2), 109.
- \*Schwieterman, E. W., Reinhard, C. T., Olson, S. L., Harman, C.E., Lyons, T.W. 2019b. A limited habitable zone for complex life. *The Astrophysical Journal*, 878, 19
- \*Schwieterman, E.W. et al. 2018. Exoplanet Biosignatures: A Review of Remotely Detectable Signs of Life. *Astrobiology*, 18(6), 663-708.
- Schwieterman, E.W., Meadows, V.S., et al. 2016. Identifying Planetary Biosignature Impostors: Spectral Features of CO and O<sub>4</sub> Resulting from Abiotic O<sub>2</sub>/O<sub>3</sub> Production. *ApJL*, 819: L13
- Schwieterman, E.W., et al. 2015. Detecting and Constraining N<sub>2</sub> Abundances in Planetary Atmospheres Using Collisional Pairs. *The Astrophysical Journal* 810, 57.

**Extramural Grant Activity** [\*PI; +Institutional PI or lead/sole UCR Co-PI](Contributed to \$32M total in funding as PI/Co-I; obtained **\$2.08M** in funding as PI or lead/sole UCR Co-I)

- 2024-2027<sup>+</sup>. NASA Planetary Data Archiving, Restoration, and Tools (PDART) Program. *Fundamental Spectroscopy of Methylated Halogen Biomarkers for Observations of Habitable Worlds* | Co-Investigator | Total: \$680K | To UCR: \$114K.
- 2023-2028<sup>+</sup>. NASA ICAR Program. *Strange New Worlds: Characterizing Nearby M-dwarf Habitable Zone Planets* | Co-Investigator | Total: \$4.96M | To UCR: \$270K.
- 2023-2028<sup>+</sup>. NASA ICAR Program. *The Virtual Planetary Laboratory: Advancing the Search for Life on Exoplanets* | Inst. Co-Investigator | Total: \$7.67M | To UCR: \$164K.
- 2023-2025<sup>+</sup>. NASA Exoplanet Research Program. *Estimating pi with PIE: Constraining the Population Proportion of M-Dwarf Planetary Atmospheres with Planetary Infrared Excess* | Co-Investigator | Total: \$561K | To UCR: \$51K.
- 2023-2025<sup>+</sup>. NASA Exoplanet Research Program. *Assessing Atmospheric Impacts of X-ray and UV Irradiation on Earth-like Planets in Directly Imageable Habitable Zones* | Inst. Co-Investigator/Deputy PI | Total: \$735K | To UCR: \$217K.
- 2022-2024<sup>\*</sup>. The Kavli Foundation / Scialog Search for Life in the Universe. *Methylated Organometallic Gases as Potential Biosignatures* | Principal Investigator | Total: \$55K.
- 2022-2025<sup>\*</sup>. NASA FINESST. *High CO<sub>2</sub> Climates and Observables in the Outer Habitable Zone* | Principal Investigator | Future Investigator: D. Pidhorodetska | Total: \$150K.
- 2022-2024<sup>\*</sup>. NASA Exoplanets Research Program. *Experimental Constraints for Improving Terrestrial Exoplanet Models* (ExCITE-PM) | Principal Investigator | Science PI: Sukrit Ranjan | Total: \$677K.
- 2021-2024. NASA Habitable Worlds. *Venus as an Exoplanet Laboratory: Testing the Boundaries of Habitability* | Collaborator | Principal Investigator: Stephen Kane.
- 2021-2023<sup>\*</sup>. UC MEXUS-CONACYT. *Early Earth as an exoplanet: The impact of stellar flares on atmospheric chemistry and remote signatures* | Principal Investigator | Total \$6.2K.
- 2020-2025. NASA ICAR. *Alternative Earths: How to Build a Detectable Biosphere* | Co-Investigator and Task Lead | Total: \$4.6M.
- 2020-2023<sup>+</sup>. NASA ICAR. *The M Dwarf Opportunity* | Inst. Co-I | Total: \$1.6M | To UCR: \$147K.
- 2019-2023<sup>+</sup>. NASA Exobiology. *Atmospheric Seasonality as a Biosignature* | Institutional Co-Investigator, Co-Lead | Total: \$450K | To UCR: \$208K.
- 2018-2020<sup>+</sup>. NASA Exobiology. *Back to Basics: Assessing Earth's Atmospheric Biosignatures from Space and Across Time* | Co-Investigator | Total: \$467K | To UCR: \$22K.
- 2018-2023. NASA NExSS The Virtual Planetary Laboratory (Co-I; ~\$11M)
- 2016-2019. NASA Postdoctoral Program Fellowship (~\$210K)
- 2016-2017<sup>\*</sup>. NASA Astrobiology Institute Director's Discretionary Fund (PI; \$46K)
2015. Kenilworth Foundation Grant for the UW Pre-Major in Astronomy Program (\$16.5K)
2015. UW Student Technology Fee (STF) Grant, Planetarium Upgrade (Co-I; \$47K)
2015. UW STF Grant, Manastash Ridge Observatory Imaging Camera (Co-I; \$37K)
- 2011-2015. UW GPSS grants for graduate student improvements (\$1.5K total)
- 2013<sup>\*</sup>. American Philosophical Society Lewis and Clark Fund for Research (PI; \$4K)

### **Honors, Awards, and Fellowships**

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2020-2023. Scialog Signatures of Life in the Universe Fellow

Supported by Research Corporation for Science Advancement/Heising-Simons Foundation

2016-2019. NASA Postdoctoral Program Fellowship

### **Departmental and University Service (UCR)**

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Chair & Member, Scholarship Committee, Earth and Planetary Sciences, 2020-Present (Chair from 2022)

Member, Earth and Planetary Sciences Ad-hoc Curriculum Revision, 2021-2023

Member, Departmental Strategic Planning Committee, 2021

Member, Admission Rubric Revisions Ad Hoc Committee, 2020

Organizer, numerous departmental & university outreach events, 2020-Present

### **Professional Service and Synergistic Activities**

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2016 - 2024. Referee for peer-reviewed journals including *Nature Astronomy*, *Nature Communications*, *Royal Society Open Science*, *Astrobiology*, *The Astronomical Journal (AJ)*, *The Astrophysical Journal (ApJ)*, *The Planetary Science Journal (PSJ)*, *Planetary and Space Sciences (PSS)*, *Monthly Notices of the Royal Astronomical Society (MNRAS)*, the *International Journal of Astrobiology (IJA)*, the *Journal of Astronomical Telescopes, Instruments, and Systems (JATIS)*, *Acta Astronautica*, and *Scientific Reports*.

2024, 2023, 2022, 2021, 2020, 2019, 2018. Panelist for multiple NASA programs, including the Exoplanet Research Program (XRP), Habitable Worlds, Exobiology, PSTAR, and the NASA Postdoctoral Program.

2024-Present. Member of the Board of Directors of the Scientific Society for Astrobiology (SSA)

2024-Present. Co-Chair of Habitable Worlds Observatory Biosignature Possibilities Working Group

2024-Present. Steering Committee Member of HWO Living Worlds Working Group

2024-Present. Steering Committee of Technosignatures Science Analysis Group (SAG)

2023-Present. Science Organizing Committee for Exoplanets in Our Backyard 3 (Nov. 2024)

2024. Session convener and chair, Astrobiology Science Conference 2024 (Providence, Rhode Island)

2022. Session convener and chair, Astrobiology Science Conference 2022 (Atlanta, GA)

2021. Session chair, American Astronomical Society Meeting #237 (Virtual)

2021. Exobiology Biosignature Standards of Evidence Organizing Committee (Virtual)

2020. Local Organizing Committee Member, Exoplanets in Southern California (Riverside, CA)

2019. Session convener and chair, Astrobiology Science Conference 2019 (Bellevue, WA)

2018. Session convener and chair, Goldschmidt geochemistry conference (Boston, MA)

2017. Session convener, Astrobiology Science Conference, Mesa, AZ

2016-2018. NExSS Workshop on Exoplanet Biosignatures, Review Paper Lead 2017

Reviewer, Lewis & Clark Fund for Field Research in Astrobiology

2015-2016. Student Technology Fee Committee (UW; \$5 million/year fund)

2015. Executive Secretary, NASA Solar System Workings Panel

2010-2015. Senator, Graduate and Professional Student Senate (GPSS), University of Washington

*GPSS Committees*: Executive (2014-2015), Finance & Budget (2012-2014; Chair: 2012- 2013),

Elections (2014, 2015), STF Oversight (2015), Judiciary (2010-2011)

### **Selected Scientific Talks and Panels**

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2024. Schwieterman, E. "An Overview of Exoplanet Biosignatures." Reviews in Mineralogy & Geochemistry (RiMG) Workshop: Exoplanets: Compositions, Mineralogy, Evolution. Goldschmidt Conference. Chicago, IL. Aug. 18, 2024. [Invited]

2024. Schwieterman, E. "Searching for Biospheres and Technospheres with Next Generation Observatories." Exoplanets and Habitability Group Seminar. ETH Zurich. Zurich, Switzerland. Aug. 8, 2024.

2024. Schwieterman, E. "Challenges for Advanced Life in the Habitable Zone and Implications for the Search for Life in the Universe." Are we a Unique Species on a Unique Planet? Centre for ExoLife Sciences at the University of Copenhagen. Copenhagen, Denmark. August 2, 2024. [Invited]

2024. Schwieterman, E. “Studying Earth as an Exoplanet to Advance the Search for Habitable Worlds” and “From Biosphere to Atmosphere to Telescope: Fingerprinting Signs of Life on Distant Worlds.” Josep Comas i Sola International Astrobiology School. Universidad Internacional Menéndez Pelayo. Santander, Spain. June 24 & 27, 2024. [Invited]
2024. Schwieterman, E. “Artificial Greenhouse Gases as Exoplanet Technosignatures.” Astrobiology Science Conference 2024. Providence, Rhode Island. May 8, 2024.
2024. Schwieterman, E. “An Overview of Exoplanet Biosignatures.” Penn State Astrobiology Hour. Penn State University & Virtual. March 13, 2024. [Invited]
2023. Schwieterman, E. “Exoplanet Biosignatures: Searching for Signs of Life on Distant Worlds.” 2023 National Astronomy Consortium (NAC) XI Annual Meeting. Howard University / Virtual. October 7<sup>th</sup>, 2023. [Invited]
2023. Schwieterman, E. “Earth as an Exoplanet: Relevance to ExoEarths.” Exoplanet Analysis Group (ExoPAG) 28. San Antonio, TX. October 1, 2023. [Invited]
2023. Schwieterman, E. “Prospects for Biosignatures.” Sagan Summer Workshop 2023: Characterizing Exoplanet Atmospheres: The Next Twenty Years. Pasadena, CA. July 28, 2023. [Invited]
2023. Schwieterman, E. “Exoplanet Biosignatures: The Search for Life on Other Worlds—CH<sub>4</sub>, N<sub>2</sub>O, and halomethanes.” Sellers Exoplanet Environments Collaboration Exoplanets Seminar Series. Goddard Space Flight Center. June 15, 2023. [Invited]
2023. Schwieterman, E. “Beyond the Pale Blue Dot: The Search for Life on Exoplanets.” AGENASTRO Third International Astrobiology Congress. Virtual Presentation April 16, 2023. [Invited, Remote]
2022. Schwieterman, E. “Evaluating Maximum Plausible N<sub>2</sub>O Biosignatures on ExoEarths orbiting FGKM Stars,” American Astronomical Society #241. Pasadena, CA. June 14, 2022. id. 234.02.
2022. Schwieterman, E. “Uncertainties in the Detection of Venus Phosphine and its Potential Connection to Life,” The Venus Dialogues: Getting to Know Our Neighbor - Progress and Prospects in a New Generation of Venus Research. AbSciCon. Atlanta, Georgia. May 20, 2022. [Invited]
2022. Schwieterman, E. “Remote Detection of Habitable Conditions and Life on Exoplanets,” PCE3 Showcase. Astrobiology Science Conference. Atlanta, Georgia. May 19, 2022.
2022. Schwieterman, E. “Biosignature Assessment Framework: Detecting Exoplanetary Oxygen,” Biosignature Assessment Framework Townhall. Astrobiology Science Conference. Atlanta, Georgia. May 17, 2022. [Invited]
2022. Schwieterman, E. “Evaluating Maximum Plausible N<sub>2</sub>O Biosignatures on ExoEarths,” Astrobiology Science Conference. Atlanta, Georgia. May 17, 2022.
2022. Schwieterman, E. “Exploring Novel (and traditional) Biosignatures & Technosignatures,” BMSIS Symposium. Blue Marble Space Institute of Science. Atlanta, GA. May 15, 2022.
2022. Schwieterman, E. “Exoplanetary Oxygen as a Biosignature Standards of Evidence Worked Example,” The Biosignature Standards of Evidence Workshop Outcomes and Assessment Framework hosted by NASA’s Network for Life Detection (NFoLD). Virtual. March 29, 2022. [Invited]
2021. Schwieterman, E. “Challenges for Advanced Life in the Habitable Zone and Implications for Technosignatures,” Technosignatures Seminar hosted by NASA Goddard Space Flight Center / Sellers Exoplanet Environments Collaboration. Virtual. September 8, 2021. [Invited]
2021. Schwieterman, E. Panel on “Exoplanets and Unifying Space,” Robert H. Goddard Symposium hosted by the American Astronautical Society. Panelist. Virtual. May 6, 2021. [Invited]
2021. Schwieterman, E. “Evaluating Methane as an Exoplanet Biosignature,” Habitable Worlds Conference contributed short talk. Virtual. Feb. 25, 2021.
2021. Schwieterman, E. “Panel on Biosignature Science” Habitable Worlds Conference, panelist. Virtual. Feb. 24, 2021. [Invited]
2021. Schwieterman, E. “Challenges for Advanced Life in the Habitable Zone” University of Rochester. Physics and Astronomy colloquium. Feb. 8, 2021. [Invited].

2021. Schwieterman, E. Evaluating Methane as a Biosignature on Habitable Anoxic Planets Orbiting FGKM Stars. American Astronomical Society Meeting #237. id. 505.06.
2020. Schwieterman, E. "Planetary Astrobiology: Modeling Habitable Planets and Remote Biosignatures." UCR EPS Department Seminar. Nov. 9, 2020.
2020. Schwieterman, E. "Primer on Stellar Evolution." Pre-biotic Chemistry and Early Earth Environments (PCE) NASA RCN Workshop. Oct. 2, 2020. [Invited]
2020. Schwieterman, E. Chemical consequences of high CO<sub>2</sub> on temperate terrestrial planets in the habitable zone. American Astronomical Society Meeting #235. id. 126.08.
2019. "Alternative Earths Through Time and Space" University of Bern, Switzerland.  
Center for Space and Habitability colloquium. Bern, Switzerland. Nov. 20, 2019. [Invited]
2019. Schwieterman, E. "Exoplanet Biosignatures". Frontiers in Biosignatures Plenary Session. Astrobiology Science Conference. June 24, 2019. Bellevue, WA [Invited].
2019. Schwieterman, E. "Detecting and Confirming Biosignatures with HabEx." American Astronomical Society Meeting #234. HabEx Splinter Session. June 10, 2019. [Invited]
2019. "A Limited Habitable Zone for Complex Life" Florida Institute of Technology. Physics & Space Science colloquium. Melbourne, FL. March 22, 2019. [Invited]
2019. "Exoplanet Biosignatures Overview." Biosignatures in the 2030s Splinter Session. American Astronomical Society 233<sup>rd</sup> meeting in Seattle, WA [Invited]
2018. "Earth as a Laboratory for Exoplanet Biosignatures" California State Polytechnic University, Pomona. Physics seminar. Pomona, CA. October 25, 2018. [Invited]
2018. "Characterizing Ozone Detectability on Weakly Oxygenated Terrestrial Exoplanets" LUVOR Seminar Series, NASA Goddard SFC. April 4, 2018. [Invited, Remote]
2017. "An Introduction to Planetary Habitability and the Search for Life Beyond Earth." The Early History of Planetary Systems. Tartu, Estonia, Aug 8-10, 2017. [Invited]
2017. "Characterizing N<sub>2</sub>O as an Exoplanet Biosignature: Early Earth as a Template" Goldschmidt conference, Paris, France, Aug 12-18, 2017.
2017. "A Phase-dependent Spectral Earth Database with Applications for Directly Imaged Earth-like Exoplanets." AbSciCon 2017, held April 24–28, 2017 in Mesa, Arizona. No. 1965, id. 3515.

### **Selected Education and Outreach Talks and Events**

2024. "A Search for Another Earth." Riverside Astronomical Society Meeting. Riverside, California. ~50 audience members. July 20<sup>th</sup>, 2024. [Invited]
2024. Four invited talks on Sky & Telescope-hosted Total Solar Eclipse cruise event. "Studying Earth as an Exoplanet to Advance the Search for Habitable Worlds," "From Biosphere to Atmosphere: What is a Biosignature Anyway," "Alternative Earths through Time and Space," and "Exploring Possible Planetary Technosignatures." Insight Cruises. ~300 registered participants in program. March-April, 2024. [Invited]
2023. "Exoplanets and the Search for Life in the Universe" New Jersey Astronomical Association monthly meeting (virtual). July 22, 2023. Archived online. [Invited]
2023. "The frontier of exoplanetary science: towards the discovery of planets like our own" UCR Palm Desert Campus "Are We Alone?" seminar. March 23, 2023. 85 live audience members. [Invited]
2021. "Exoplanet Biosignatures: The Search for Life Outside the Solar System" UC Riverside Cosmic Thursdays, August 2021. 270 live viewers. Archived online. [Invited]
2020. "Ask an Astrobiologist with Dr. Eddie Schwieterman" streamed by SAGANet and NASA Astrobiology on June 16, 2020 and archived online. [Invited]
2020. "Seeking Extraterrestrial Life Like Us: Biosignatures, Technosignatures, and Habitable Zone for Complexity" UCR Palm Desert Campus "Are We Alone?" seminar on January 21, 2020. Approximately 300 members of the public attended. [Invited]



2019. “Alien Worlds: The Future of Exoplanet Science and the Search for Life Elsewhere.” Florida Institute of Technology on March 22, 2019. 110 attendees. [Invited]
2017. “Alien Planets: Are Other Earths Lurking in our Galaxy?” UCR Palm Desert Campus “Are We Alone?” Seminar on April 6, 2017. Approximately 350 members of the public attended. [Invited]
2017. Demonstrated cloud chamber to interested audience members during “Sensing the Universe” activity following “Are We Alone?” science lecture on February 1, 2017 at UCR.
2016. “Measuring Exoplanet Atmospheres for Signs of Life.” Night Sky Network webinar held on November 16, 2016. 111 audience members attended virtually. [Invited]
2016. “Life Beyond the Solar System: The hunt for habitable worlds and biosignatures in the 2020s and beyond”, public talk to the Seattle Astronomical Society (Seattle, April 20, 2016).
2016. “Biosignatures and Technosignatures: Finding life outside of the solar system”, the Pacific Science Center’s Science and a Movie Night (Seattle, March 23-24, 2016). [Invited]
2016. “Promoting Inclusivity in STEM through Active Recruiting and Mentoring: The Pre-Major in Astronomy Program (Pre-MAP) at the University of Washington.” AAS 227, #313.04.
2015. “An Astrobiologist in the Land of Eternal Sunsets”, NASA Famelab (Chicago, 2015).
2015. “Lifesigns and Biosignatures: How we’ll find life outside the solar system”, Astronomy on Tap science outreach talk (Seattle, October 28, 2015).
2015. “Bridging the Skill Gap from High School to Student Researcher: The Pre-Major in Astronomy Program (Pre-MAP) at the University of Washington.” Northwest Astronomy Teaching Exchange (NATE), Center for Astronomy Education (CAE).

### **Teaching and Advising Experience and Relevant Professional Development**

- 2021-2023. Instructor, GEO 013—The Solar System and Beyond, UCR (W21, F21, W23, F23, F24)  
[Lower-division undergraduate course with enrollments of 100-330]
2023. Instructor, GEO 284 / 184—Planetary Atmospheres, UCR (S23) [Grad/Upper-div Undergrad]
2022. Instructor, GEO 182—Planetary Astrobiology, UCR (W22, W24) [Upper-div Undergrad]
- 2022-2024. Instructor, GEO 265—Ethics & Astrobiology Seminar, UCR (S22, S24) [Grad]
- 2021-2023. Instructor, GEO 283—Graduate Astrobiology Seminar, UCR (F21, W22, F22, W23, S23, F24)
2021. Instructor, GEO 290—Directed Studies: Planetary Atmospheres, UCR (Spring 21) [Grad]
- 2024-present. Primary advisor to Aoshuang Ji. NASA Postdoctoral Program (NPP) Fellow at UCR.
- 2022-present. Primary advisor to Shang-Min Tsai. Postdoctoral Scholar at UCR.
- 2022-present. Primary advisor to Evan Sneed. PhD Student at UCR. (1 paper)
- 2022-present. Primary advisor to Wynter Broussard. PhD Student at UCR (1 paper)
- 2020-present. Primary advisor to Daria Pidhorodetska. PhD Student at UCR (5 papers)
- 2020-present. Primary advisor to Michaela Leung. PhD Student at UCR (6 papers)
- 2020-present. Co-advisor to Arturo Miranda, PhD student at UNAM, Mexico (primary advisor: Dra. Antígona Segura; 1 paper)
- 2022-2024. UC mentor to Cal-Bridge student Taylor Juchau at Cal Poly Humbolt
- 2022-2024. Co-advised UCR student Emri Williams on their Honors Capstone Project in creative writing
- 2022-2023. Research & senior thesis advisor for UCR undergrad Cecelia Ngo
- 2017-2019. Lead Organizer. Astrobiology Seminar (weekly), UC Riverside
- 2016-2018. Science co-advisor to Stephanie Olson, UCR PhD student, now an assistant professor at Purdue University (6 papers)

2018. How to Teach Students Problem-Solving Skills (CAE/AAS) (participant, 06/05)  
 2018. Using Anchored Inquiry to Teach Astronomy /Physics (BSCS/AAS) (participant, 06/03)  
 2016-2019. Postdoc collaborator to Jacob Lustig-Yaeger, PhD Student at UW (2 papers)  
 2017. Co-advisor to Spandan Dash, student in BMSIS Young Scientist Summer Program  
 2016. Guest Lecturer, Astronomy 150 “The Planets” (UW)  
 2015. Facilitator, “Being an RA in the Physical Sciences” workshop, TA/RA Conference (UW)  
 2014. Instructor of Record, ASTR 192 “Pre-Major in Astronomy seminar” (UW)  
 2013. Teaching Assistant, ASTBIO 115 “Introduction to Astrobiology” (UW)  
 2012-2013. Physics/Astronomy Tutor, Student Athlete Academic Services (UW)  
 2011. Teaching Assistant, ASTR 101 “Introduction to Astronomy” (UW)  
 2010-2011. Teaching Assistant, ASTR 150 “The Planets” (UW)  
 2011, 2014. Astronomy Tutor, CLUE program (UW)

### Education and Outreach Service

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2017-Present. Public speaker at UCR Palm Desert “Are we Alone?” seminars and other venues for communicating science to the public (see above).  
 2010-2016. UW Planetarium and Mobile Planetarium Show Presenter (min 1/qrt)  
 2010-2016. Staff Member & Events Organizer, Pre-Major in Astronomy Program (UW)  
 2009. NASA International Year of Astronomy Student Ambassador, Florida  
 2006-2008. Coach, Brevard County (FL) Collaborative High School Science Bowl Team

### Peer-Reviewed Papers and Book Chapters

(Google Scholar h-index=30; N<sub>cite</sub>=4112; \*includes (co-)advised student/postdoc (co-)author(s); underlined)

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- \***Schwieterman, E. W.**, & **Leung, M.** (2024). An Overview of Exoplanet Biosignatures. *Reviews in Mineralogy and Geochemistry*, 90(1): 465–514. [arXiv]
- \***Tsai, S.-M.**, Innes, H., Wogan, N. F., & **Schwieterman, E. W.** (2024). Biogenic sulfur gases as biosignatures on temperate sub-Neptune waterworlds. *The Astrophysical Journal Letters*, 966: L24.
- \***Schwieterman, E. W.**, Fauchez, T. J., Haqq-Misra, J., Kopparapu, R. K., Angerhausen, D., **Pidhorodetska, D.**, **Leung, M.**, **Sneed, E. L.**, & Ducrot, E. (2024). Artificial Greenhouse Gases as Exoplanet Technosignatures. *The Astrophysical Journal*, 969(1): 20.
- \***Broussard, W.**, **Schwieterman, E. W.**, Ranjan, S., Sousa-Silva, C., Fateev, A., & Reinhard, C. T. (2024). The Impact of Extended H<sub>2</sub>O Cross Sections on Temperate Anoxic Planet Atmospheres: Implications for Spectral Characterization of Habitable Worlds. *The Astrophysical Journal*, 967(2): 114.
- Binder, B.A., Peacock, S., **Schwieterman, E. W.**, et al. 2024. X-ray Emission of Nearby Low-mass and Sun-like Stars with Directly Imageable Habitable Zones. *The Astrophysical Journal Supplements*. In Press.
- Barth, P., Stüeken, E. E., Helling, C., **Schwieterman, E.** & Telling, J. (2024). The effect of lightning on the atmospheric chemistry of exoplanets and potential biosignatures. *Astronomy & Astrophysics*, 668: A58.
- \*Villanueva, G. L., Fauchez, T. J., Kofman, V., Alei, E., Lee, E. K. H., Janin, E., Himes, M. D., Leconte, J., **Leung, M.**, Faggi, S., Mak, M. T., Sergeev, D. E., Kozakis, T., Manners, J., Mayne, N., **Schwieterman, E. W.**, et al. (2024). Modeling Atmospheric Lines by the Exoplanet Community (MALBEC) Version 1.0: A CUISINES Radiative Transfer Intercomparison Project. *The Planetary Science Journal*, 5(3):64.
- \*Angerhausen, D., **Pidhorodetska, D.**, **Leung, M.**, Hansen, J., Alei, E., Dannert, F., Kammerer, J., Quanz, S. P., & **Schwieterman, E. W.** (2024). Large Interferometer For Exoplanets (LIFE). XII. The Detectability of Capstone Biosignatures in the Mid-infrared—Sniffing Exoplanetary Laughing Gas and Methylated Halogens. *The Astronomical Journal*, 167(3): 128.

- \*Tsai, S.-M., Parmentier, V., Mendonça, J.M., Tan, X., Deitrick, R., Hammond, M., Savel, A.B., Zhang, X., Pierrehumbert, R.T., **Schwieterman, E.W.** (2024) Global Chemical Transport on Hot Jupiters: Insights from the 2D VULCAN Photochemical Model. *The Astrophysical Journal*, 963, 41.
- de Wit, J., and 80 colleagues (including **Schwieterman, E.W.**) 2024. A roadmap for the atmospheric characterization of terrestrial exoplanets with JWST. *Nature Astronomy*. 8, 810-818.
- Dalba, P. A., Kane, S. R., Isaacson, H., Fulton, B., Howard, A. W., **Schwieterman, E. W.**, Thorngren, D. P., Fortney, J., Vowell, N., Beard, C., Blunt, S., Brinkman, C. L., Chontos, A., Dai, F., Giacalone, S., Hill, M. L., Kosiarek, M., Lubin, J., Mayo, A. W., ... Villanueva, S. (2024). Giant Outer Transiting Exoplanet Mass (GOT 'EM) Survey. IV. Long-term Doppler Spectroscopy for 11 Stars Thought to Host Cool Giant Exoplanets. *The Astrophysical Journal Supplement Series*, 271(1), 16.
- Young A, Robinson T, Krissansen-Totton J, **Schwieterman EW**, Wogan N, Way M, Sohl L, Arney G, Reinhard C, Line M, Catling D. (2024). Inferred Chemical Disequilibrium Biosignatures for Proterozoic Earth-Like Exoplanets. *Nature Astronomy*. 8: 101-110.
- \*Ranjan, S., **Schwieterman, E.W.**, Leung, M., Harman, C.E., Hu, R. (2023) The Importance of the Upper Atmosphere to CO/O<sub>2</sub> Runaway on Habitable Planets Orbiting Low-mass Stars. *The Astrophysical Journal Letters*, 958, L15.
- Mettler, J.-N., Quanz, S. P., Helled, R., Olson, S. L., & **Schwieterman, E. W.** (2023). Earth as an Exoplanet: II. Earth's Time-Variable Thermal Emission and its Atmospheric Seasonality of Bio-Indicators. *Astrophysical Journal*. 946:82.
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## White Papers and Other Non-Refereed Articles

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## Press Releases & Selected Media

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2024. The American Astronomical Society’s AAS Nova featured three 2024 studies by my group, including "Signals from Sulfur on Water-World Exoplanets" (about a study led by my Postdoc Shang-Min Tsai), "Inputs Under Investigation" (about a study led by PhD student Wynter Broussard), and "From Biosignatures to Technosignatures" (about a study led by me). The AAS Nova article can be found here: <https://aasnova.org/2024/06/26/monthly-roundup-the-allure-of-temperate-exoplanets/>
2024. Quoted in a Chandra X-Ray Observatory press release about the characterization of the X-ray emission of nearby stars that are targets for characterization of orbiting exoplanets with the upcoming Habitable Worlds Observatory. Paper in press at *The Astrophysical Journal Supplements*. [https://chandra.cfa.harvard.edu/press/24\\_releases/press\\_061224.html](https://chandra.cfa.harvard.edu/press/24_releases/press_061224.html)  
The story was picked up by Universe Today, Space.com, Phys.org, EarthSky, and other media outlets.

2024. "Telltale greenhouse gases could signal alien activity." Jules Bernstein, UCR.  
<https://news.ucr.edu/articles/2024/06/25/telltale-greenhouse-gases-could-signal-alien-activity>  
The article was picked up by BBC Science Focus Magazine, Universe Today, Forbes, Space.com, Earth.com, Astronomy Magazine, and others.
2024. "Webb telescope probably didn't find life on an exoplanet — yet." Jules Bernstein, UCR.  
<https://news.ucr.edu/articles/2024/05/02/webb-telescope-probably-didnt-find-life-exoplanet-yet>  
The article was picked up by Sci News, Live Science, Space.com, Study Finds, and other outlets.
2024. "How lightning on exoplanets could make it harder to find alien life." Briley Lewis, Popular Science.  
Quoted on a co-authored study by Barth et al. (2024) on the influence of lightning on photochemistry.
2024. Three appearances on Netflix's *The UnXplained: Mysteries of the Universe* with William Shatner. The episodes are: "The Life and Death of the Sun," Search for the Next Frontier," and "Mysterious Earth."
2023. "Overlooked Heavy Metal Gases Could Reveal Alien Life." Adam Hadhazy, The Kavli Foundation.  
<https://www.kavlifoundation.org/news/overlooked-heavy-metal-gases-could-reveal-alien-life>
2023. "The deadly atmosphere on Venus could help us find habitable worlds. Here's how." Laurence Tognetti, Space.com. <https://www.space.com/venus-exoplanets-find-habitable-worlds>
2022. "Broccoli gas: a better way to find life in space. Airborne chemical sends unmistakable biological signal." Jules Bernstein, UCR. <https://news.ucr.edu/articles/2022/10/10/broccoli-gas-better-way-find-life-space> Featured as a NASA Science Highlight.
2022. "Laughing gas in space could mean life. Exoplanet hunters should check for N<sub>2</sub>O." Jules Bernstein, UCR. <https://news.ucr.edu/articles/2022/10/04/laughing-gas-space-could-mean-life>  
Featured as a NASA Science Highlight. It was also picked up by several media outlets, including USA Today, Popular Mechanics, CNET, and others.
2022. "8 Teams Win Awards in 2nd Year of Scialog: Signatures of Life in the Universe."  
<https://rescorp.org/news/2022/10/8-teams-win-awards-in-2nd-year-of-scialog-signatures-of-life-in-the-universe>
2022. "Ancient microbes may help us find extraterrestrial life forms." Jules Bernstein, UCR.  
<https://news.ucr.edu/articles/2022/06/27/ancient-microbes-may-help-us-find-extraterrestrial-life-forms>
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<https://news.ucr.edu/articles/2021/09/29/investigating-potential-life-around-galaxys-smallest-stars>
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### **Memberships in Professional Societies**

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American Astronomical Society, Division of Planetary Sciences, American Physical Society, American Geophysical Union, European Association of Geochemistry, Scientific Society for Astrobiology