Edward W. Schwieterman

CURRICULUM VITAE

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Citizenship: U.S. Citizen

Current Position: NASA Postdoctoral Program Fellow
University of California, Riverside (UCR)
NAI Alternative Earths Team
Supervisor/PI: Timothy Lyons

Education: UNIVERSITY OF WASHINGTON (UW)
Ph.D., Astronomy & Astrobiology, August 2016
Thesis Advisor: Dr. Victoria Meadows
Master of Science, Astronomy, August 2011

FLORIDA INSTITUE OF TECHNOLOGY (FIT)
B.Sc., Astronomy & Astrophysics, *Magna Cum Laude*, May 2010
B.Sc., Physics, *Magna Cum Laude*, May 2010

Other Professional Experience

2015-present. Research Scientist, Blue Marble Space Institute of Science (BMSIS)

2010-2016. Graduate Research & Teaching Assistant, University of Washington

2009-2010. Research Assistant, Lowell Observatory

Selected Grants and Awards

2016-2018. NASA Postdoctoral Program Fellowship (~$140K)

2016. NASA Astrobiology Institute Director's Discretionary Fund (PI; $46K)

2015. Kenilworth Foundation Grant for the Pre-Major in Astronomy Program ($16.5K)

2015. Wildcard Award, NASA Famelab Contest, Chicago/AbSciCon Regional Heat

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 students ($1.5K total)

2013. American Philosophical Society Lewis and Clark Fund for Research (PI; $4K)

2013. NAI Scholar, International Summer School in Astrobiology

2012. NAI Scholar, Nordic-NASA Summer School

Selected Academic Service and Synergistic Activities

2016 - present. Peer reviewer for the journals *Astrobiology, Monthly Notices of the Royal Astronomical Society,* and *Journal of Astronomical Telescopes, Instruments, and Systems*

2017. Co-convener, session on "Characterizing Exoplanet Biosignatures with Ground and Space-based Telescopes", Astrobiology Science Conference

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

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

2015. Executive Secretary, NASA Solar System Workings Panel

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

GPSS Committees: Executive (2014-2015), Finance & Budget (2012-2014; Chair: 2012-2013), Elections (2014, 2015), STF Oversight (2015), Judiciary (2010-2011)

2015. Student Representative, Academic Grievance Hearing Panel

Selected Scientific Talks

2017. "An Introduction to Planetary Habitability and its Connection to the Search for Life Beyond Earth." The Early History of Planetary Systems and Habitable Planets. Tartu, Estonia, Aug 8-10, 2017.

2017. "Characterizing N_2O 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."The Astrobiology Science Conference 2017, held April 24–28, 2017 in Mesa, Arizona. No. 1965, id. 3515.

2017. "VPL Stellar and Planetary Spectra. Identifying Habitable Planets of Nearby M Dwarfs: The Virtual Planetary Laboratory Tools Workshop". The 229th American Astronomical Meeting, held January 2-7 in Grapevine, TX.

2016. "Exploring Exoplanet Biosignatures using Spectral Models." University of California, Riverside Earth Sciences & Astrobiology lunch talk.

2016. "Spectral identification of abiotic O_2 buildup from early runaways and rarefied atmospheres." American Astronomical Society Meeting #227, #211.04.

2015. "Using Dimers to Constrain Planetary Habitability and Discriminate Against False Positives for Life." Astrobiology Science Conference 2015 held in Chicago, IL talk #7486.

2015. "Distinguishing True and False Positive Oxygen Signatures with Models and Observations." American Astronomical Society Meeting #225, #224.02.

2015. "Spectrally Identifying Habitable Worlds and Biosignatures", Blue Marble Space Institute of Science, Seattle, WA and broadcast online.

2013. "Non-photosynthetic Pigments: Adventures in Microbiology and Spectral Modeling" UW Astrobiology Program Research Rotation talk.

Selected Education and Outreach Talks and Events

2017. "Alien Planets: Are Other Earths Lurking in our Galaxy?" UCR Palm Desert Campus on April 6, 2017. Approximately 350 members of the public attended.

2017. Demonstrated cloud chamber to interested audience members during "Sensing the Universe" activity following "Are We Alone?" science lecture on February 1, 2017.

2016. "Measuring Exoplanet Atmospheres for Signs of Life." Night Sky Network webinar held on November 16, 2016. 111 audience members attended virtually.

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).

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. "Promoting Inclusivity in STEM through Active Recruiting and Mentoring: The Pre-Major in Astronomy Program (Pre-MAP) at the University of Washington." American Astronomical Society Meeting #227, #313.04.

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).

Education and Outreach Service

2010-2016. UW Planetarium and Mobile Planetarium Show Presenter

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

Teaching and Advising Experience

2016-2018. Co-advisor to Stephanie Olson, PhD at UCR, (2 papers published, 1 in review)

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)

Peer-Reviewed Publications (Google Scholar h-index=12; *includes an advised student (co)author)

***Schwieterman, E.W.** et al. 2018. Exoplanet Biosignatures: A Review of Remotely Detectable Signs of Life. *Astrobiology*, in press. arXiv preprint 1705.05791

Meadows, V.S., Arney, G.N., **Schwieterman, E.W.** et al. 2018. The Habitability of Proxima Centauri b: Environmental States and Observational Discriminants *Astrobiology*, 18(2). doi: 10.1089/ast.2016.1589

Meadows, V.S., Reinhard, C.T., Arney, G.N., Parenteau, M.N., **Schwieterman, E.W.** et al., 2018. Exoplanet Biosignatures: Understanding Oxygen as a Biosignature in the Context of Its Environment. Astrobiology, in press. arXiv preprint 1705.07560

Walker, S.I., et al. (including **Schwieterman, E.W.**) 2018. Exoplanet Biosignatures: Future Directions. *Astrobiology*, accepted. arXiv preprint 1705.08071

*Reinhard, C.T., Olson, S.L., **Schwieterman, E.W.**, Lyons, T.W., 2017. False Negatives for Remote Life Detection on Ocean-Bearing Planets: Lessons from the Early Earth. Astrobiology 17, 287–297.

Arney, G.N., et al. (including **Schwieterman, E.**) 2017. Pale Orange Dots: The Impact of Organic Haze on the Habitability and Detectability of Earthlike Exoplanets. *The Astrophysical Journal* 836, 49.

Gentry, D.M., et al. (including **Schwieterman, E.W**.) 2017. Correlations Between Life-Detection Techniques and Implications for Sampling Site Selection in Planetary Analog Missions. *Astrobiology* 17, 1009–1021.

Schwieterman, E.W., Meadows, V.S., et al. 2016. Identifying Planetary Biosignature Impostors: Spectral Features of CO and O_4 Resulting from Abiotic O_2/O_3 Production. *The Astrophysical Journal Letters*, 819: L13

Krissansen-Totton, J., **Schwieterman, E.W.,** et al., 2016. Is the Pale Blue Dot Unique? Optimized Photometric Bands for Identifying Earth-Like Exoplanets. *The Astrophysical Journal* 817, 31.

Stüeken, E.E., et al. (including **Schwieterman, E.W.**) 2016. Modeling pN_2 through Geological Time: Implications for Planetary Climates and Atmospheric Biosignatures. *Astrobiology* 16, 949–963.

Arney, G., et al. (including **Schwieterman, E.**). 2016. The Pale Orange Dot: The Spectrum and Habitability of Hazy Archean Earth. *Astrobiology* 16, 873–899.

Schwieterman, E.W., Robinson, T.D., Meadows, V.S., Misra, A., Domagal-Goldman, S., 2015. Detecting and Constraining N_2 Abundances in Planetary Atmospheres Using Collisional Pairs. *The Astrophysical Journal* 810, 57.

Harman, C.E., **Schwieterman, E.W.,** Schottelkotte, J.C., Kasting, J.F., 2015. Abiotic O_2 Levels on Planets Around F, G, K, and M Stars: Possible False Positives for Life? *The Astrophysical Journal* 812, 137.

Schwieterman, E.W., Cockell, C.S., Meadows, V.S., 2015. Nonphotosynthetic Pigments as Potential Biosignatures. *Astrobiology* 15, 341–361.

Amador, E.S., et al. (including **Schwieterman, E.W.**). 2015. Synchronous in-field application of life-detection techniques in planetary analog missions. *Planetary and Space Sciences*, 106: 1-10.

Robinson, T.D., et al. (including **Schwieterman, E.W.**). 2014. Detection of Ocean Glint and Ozone Absorption Using LCROSS Earth Observations. *The Astrophysical* Journal 787, 171.

Knight, M.M., et al. (including **Schwieterman, E.W.**) 2012. A Quarter-Century of Observations of Comet 10P/Tempel 2 at Lowell Observatory: Continued Spin-Down, Coma Morphology, Production Rates, and Numerical Modeling. *The Astronomical Journal*, 144:153.

Meech, K.J., et al. (including **Schwieterman, E.W.**) 2011. EPOXI: Observations from a Worldwide Earth-Based Campaign. *The Astrophysical Journal Letters*, 734:L1.

Knight, M.M., et al. (including **Schwieterman, E.W.**) 2011. The Increasing Rotation Period of Comet 10P/Tempel 2. *The Astronomical Journal*, 141:2.

Book Chapters, White Papers, and Other Articles (*includes a student author)

Schwieterman, Edward W. "Surface and Temporal Biosignatures." Handbook of Exoplanets. Ed. Deeg, Hans J. & Belmonte Juan A. Springer, 2018. *in press*.

*Olson, Stephanie L.; **Schwieterman, Edward W.**; Reinhard, Christopher T.; Lyons, Timothy W. "Earth: Atmospheric Evolution of a Habitable Planet." Handbook of Exoplanets. Ed. Deeg, Hans J. & Belmonte Juan A. Springer, 2018. *in press*.

***Schwieterman, E.**, Reinhard, C., Olson, S., Lyons, T., 2018. *The Importance of UV Capabilities for Identifying Inhabited Exoplanets with Next Generation Space Telescopes*. A white paper submitted in response to the National Academies of Sciences Study: Astrobiology Science Strategy for the Search for Life in the Universe. arXiv preprint 1801.02744.

Domagal-Goldman, S., et al. (including **Schwieterman, E.W.**) 2018. *Life Beyond the Solar System: Remotely Detectable Biosignatures.* A white paper submitted in response to the National Academies of Sciences Study: Astrobiology Science Strategy for the Search for Life in the Universe. arXiv preprint 1801.06714.

Trainer, M., et al. (including **Schwieterman, E.W.)** 2018. *"Pale Orange Dot": Titan As An Analog For Early Earth And Hazy Exoplanets.* A white paper submitted in response to the National Academies of Sciences Study: Astrobiology Science Strategy for the Search for Life in the Universe.

Haqq-Misra, J., Som, S., Mullan, B., Loureiro, R., **Schwieterman, E.**, et al. 2018. *The Astrobiology of the Anthropocene*. A white paper submitted in response to the National Academies of Sciences Study: Astrobiology Science Strategy for the Search for Life in the Universe. arXiv preprint 1801.00052.

Schwieterman, E. W., et al. 2010. Time-Series Photometry of GW Librae One Year after Outburst. *Journal of the Southeastern Association for Research in Astronomy*, Vol 3.

Addison, B. C., et al. (including **Schwieterman, E.W**.) 2010. Modeling and Observing Extrasolar Planetary Transits. *Journal of the Southeastern Association for Research in Astronomy*, Vol 3.

Piwowar, D., Wood, M.A., **Schwieterman, E.W.**, et al. 2010. Time-Series Photometry of the Cataclysmic Variable Systems VY Aquarii and V2491 Cygni. *Journal of the Southeastern Association for Research in Astronomy*, Vol 3.

Press Releases & Media

2018. "False Positives, False Negatives; The World of Distant Biosignatures Attracts and Confounds." Marc Kauffman, *Many Worlds/ NASA Astrobiology Newsletter: https://astrobiology.nasa.gov/news/false-positives-false-negatives-the-world-of-distant-biosignatures-attracts-and-confounds/*

2017. "A new atmosphere in astronomy: UW alumni and Virtual Planetary Laboratory featured for exoplanet modeling." Alan Brazelton, *The UW Daily*: http://www.dailyuw.com/features/article_fc7ca23e-021f-11e7-9e7e-1f7266f313ac.html

2016. "Planet Hunters Seek New Ways to Detect Alien Life." Alexandra Witze, *Nature News.* doi:10.1038/535474a

2016. "False Positives in the Search for Extraterrestrial Life." Paul Glister, *Centauri Dreams. https://www.centauri-dreams.org/2016/03/02/false-positives-in-the-search-for-extraterrestrial-life/*

2016. "Life or an illusion? Avoiding 'false positives' in the search for living worlds." Peter Kelley – *UW Today*. https://www.washington.edu/news/2016/02/29/life-or-illusion-avoiding-false-positives-in-the-search-for-living-worlds/

2016. "Nitrogen may be a sign of habitability." Elizabeth Howell, *Astrobiology Magazine*. https://www.astrobio.net/news-exclusive/nitrogen-may-be-a-sign-of-habitability/

2015. "Earth observations show how nitrogen may be detected on exoplanets, aiding search for life." Peter Kelley, *UW Today*. https://www.washington.edu/news/2015/09/03/earth-observations-show-how-nitrogen-may-be-detected-on-exoplanets-aiding-search-for-life/

2015. "Spectrum of life: Nonphotosynthetic pigments could be biosignatures of life on other worlds." Peter Kelley, *UW Today*. https://www.washington.edu/news/2015/06/22/spectrum-of-life-nonphotosynthetic-pigments-could-be-biosignatures-of-life-on-other-worlds/