

Natasha E. Batalha

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Studies planetary atmospheres at the nexus of observation and theory, with planets within the Solar System and beyond. Leverages and develops open science theoretical models (climate, spectroscopic, cloud) to determine atmospheric properties from spectroscopic observations of exoplanets and Brown Dwarfs. Leading a 142-hour JWST large program focused on super-Earths & sub-Neptunes, and involved in 310 other hours of JWST year 1 exoplanet science.

Appointments

- **NASA Ames Research Center** **Moffett Field, CA**
Research Scientist *Oct 2019 – present*
- **University of California Santa Cruz** **Santa Cruz, CA**
UC President's Postdoctoral Fellow *Sep 2018 – Sep 2019*
- **Space Telescope Science Institute** **Baltimore, MD**
Postdoc Science Mission Office *Aug 2017 - Aug 2018*

Education

- **The Pennsylvania State University** **State College, PA**
Dual PhD, Astronomy/Astrophysics & Astrobiology *2017*
Dissertation: A Synergistic Approach to Interpreting Planetary Atmospheres
- **Cornell University** **Ithaca, NY**
B.A., Physics *2013*

Awards, Fellowships

- **2021:** NASA Ames Early Career Award
- **2020:** Evans Visiting Lectureship in Exoplanet Science, UC Irvine
- **2018:** University California Postdoctoral Fellowship
- **2017:** Ford Foundation Fellow, Honorable Mention
- **2017:** Alfred P. Sloan Foundation Minority Graduate Scholarship
- **2016:** Kavli Student Fellow
- **2015:** National Astrobiology Early Career Collaboration Award
- **2015:** Stephen B. Brumback Graduate Fellowship in Astrophysics
- **2014:** National Science Foundation Graduate Research Fellowship
- **2013:** STEM Scholar Graduate Fellow

- **PICASO**: <https://natashabatalha.github.io/picaso>
Enables computation of reflected light, thermal, and transmission spectroscopy for exoplanets and Brown Dwarfs.
- **PandExo**: <https://natashabatalha.github.io/PandExo>
Enables simulations of JWST and HST observations.
- **Virga**: <https://natashabatalha.github.io/Virga>
Enables theoretical modeling of exoplanet and Brown Dwarf clouds.

Publications | 12/42 1st author | h-index:20 | Citations:1813

1. **2022**: Batalha, N., Teske, J., Wolfgang, A., et al. 2022, submitted, ApJ
2. **2022**: The JWST Transiting Exoplanet Community Early Release Science Team, Ahrer, E.-M., Alderson, L., et al. 2022, Nature, arXiv:2208.11692, 10.1038/s41586-022-05269-w
3. **2022**: Mukherjee, S., Batalha, N. E., Fortney, J. J., & Marley, M. S. 2022a, ApJ, arXiv:2208.07836. 2208.07836
4. **2022**: Skemer, A., Deno Stelter, R., Sallum, S., et al. 2022, SPIE, arXiv:2208.10721. 2208.10721
5. **2022**: Mukherjee, S., Fortney, J. J., Batalha, N. E., et al. 2022b, ApJ, arXiv:2208.14317. 2208.14317
6. **2022**: Robbins-Blanch, N., Kataria, T., Batalha, N. E., & Adams, D. J. 2022, , 930, 93, 10.3847/1538-4357/ac658c
7. **2022**: Alderson, L., Wakeford, H. R., MacDonald, R. J., et al. 2022, MNRAS, 512, 4185, 10.1093/mnras/stac661
8. **2022**: Mang, J., Gao, P., Hood, C. E., et al. 2022, ApJ, 927, 184, 10.3847/1538-4357/ac51d3
9. **2022**: Rooney, C. M., Batalha, N. E., Gao, P., & Marley, M. S. 2022, ApJ, 925, 33, 10.3847/1538-4357/ac307a
10. **2022**: Adams, D. J., Kataria, T., Batalha, N. E., Gao, P., & Knutson, H. A. 2022, , 926, 157, 10.3847/1538-4357/ac3d32
11. **2022**: Harman, C. E., Kopparapu, R. K., Stefánsson, G., et al. 2022, PSJ, 3, 45, 10.3847/PSJ/ac38ac
12. **2021**: Gharib-Nezhad, E., Marley, M. S., Batalha, N. E., et al. 2021b, ApJ, 919, 21, 10.3847/1538-4357/ac0a7d
13. **2021**: Tang, S.-Y., Robinson, T. D., Marley, M. S., et al. 2021, ApJ, 922, 26, 10.3847/1538-4357/ac1e90
14. **2021**: Sotzen, K. S., Stevenson, K. B., May, E. M., et al. 2021, , 162, 168, 10.3847/1538-3881/ac0e2c
15. **2021**: Briesemeister, Z., Sallum, S., Skemer, A., & Batalha, N. 2021, in Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, Vol. 11823, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 1182308, 10.1117/12.2594880
16. **2021**: Mukherjee, S., Fortney, J. J., Jensen-Clem, R., et al. 2021b, ApJ, 923, 113, 10.3847/1538-4357/ac2d92
17. **2021**: Gharib-Nezhad, E., Iyer, A. R., Line, M. R., et al. 2021a, ApJs, 254, 34, 10.3847/1538-4365/abf504
18. **2021**: Mukherjee, S., Batalha, N. E., & Marley, M. S. 2021a, ApJ, 910, 158, 10.3847/1538-4357/abe53b
19. **2021**: Gan, T., Wang, S. X., Teske, J. K., et al. 2021, MNRAS, 501, 6042, 10.1093/mnras/staa3886
20. **2020**: Lewis, N. K., Wakeford, H. R., MacDonald, R. J., et al. 2020, ApJL, 902, L19, 10.3847/2041-8213/abb77f
21. **2020**: Hayworth, B. P. C., Kopparapu, R. K., Haqq-Misra, J., et al. 2020, Icarus, 345, 113770, 10.1016/j.icarus.2020.113770
22. **2019**: Wakeford, H. R., Lewis, N. K., Fowler, J., et al. 2019, AJ, 157, 11, 10.3847/1538-3881/aaf04d

23. **2019:** Mayorga, L. C., Batalha, N. E., Lewis, N. K., & Marley, M. S. 2019, AJ, 158, 66, 10.3847/1538-3881/ab29fa
24. **2019:** Batalha, N. E., Marley, M. S., Lewis, N. K., & Fortney, J. J. 2019b, ApJ, 878, 70, 10.3847/1538-4357/ab1b51
25. **2019:** Batalha, N. E., Lewis, T., Fortney, J. J., et al. 2019a, ApJL, 885, L25, 10.3847/2041-8213/ab4909
26. **2019:** Batalha, N. E., Smith, A. J. R. W., Lewis, N. K., et al. 2018c, AJ, 156, 158, 10.3847/1538-3881/aad59d
27. **2018:** Moran, S. E., Hörst, S. M., Batalha, N. E., Lewis, N. K., & Wakeford, H. R. 2018, AJ, 156, 252, 10.3847/1538-3881/aae83a
28. **2018:** Blumenthal, S. D., Mandell, A. M., Hébrard, E., et al. 2018, ApJ, 853, 138, 10.3847/1538-4357/aa9e51
29. **2018:** Batalha, N. E., Lewis, N. K., Line, M. R., Valenti, J., & Stevenson, K. 2018b, ApJL, 856, L34, 10.3847/2041-8213/aab896
30. **2018:** —. 2018a, EPSL, 484, 415, 10.1016/j.epsl.2017.12.018
31. **2018:** Kempton, E. M. R., Bean, J. L., Louie, D. R., et al. 2018, PASP, 130, 114401, 10.1088/1538-3873/aadf6f
32. **2018:** Bean, J. L., Stevenson, K. B., Batalha, N. M., et al. 2018, PASP, 130, 114402, 10.1088/1538-3873/aadbf3
33. **2017:** Batalha, N. E., & Line, M. R. 2017, AJ, 153, 151, 10.3847/1538-3881/aa5faa
34. **2017:** Christiansen, J. L., Vanderburg, A., Burt, J., et al. 2017, AJ, 154, 122, 10.3847/1538-3881/aa832d
35. **2017:** Batalha, N. E., Kempton, E. M. R., & Mbarek, R. 2017a, ApJL, 836, L5, 10.3847/2041-8213/aa5c7d
36. **2017:** Batalha, N. E., Mandell, A., Pontoppidan, K., et al. 2017b, PASP, 129, 064501, 10.1088/1538-3873/aa65b0
37. **2016:** Haqq-Misra, J., Kopparapu, R. K., Batalha, N. E., Harman, C. E., & Kasting, J. F. 2016, ApJ, 827, 120, 10.3847/0004-637X/827/2/120
38. **2016:** Batalha, N. E., Kopparapu, R. K., Haqq-Misra, J., & Kasting, J. F. 2016, Earth and Planetary Science Letters, 455, 7, 10.1016/j.epsl.2016.08.044
39. **2015:** Batalha, N., Kalirai, J., Lunine, J., Clampin, M., & Lindler, D. 2015b, arXiv e-prints, arXiv:1507.02655. 1507.02655
40. **2015:** Batalha, N., Domagal-Goldman, S. D., Ramirez, R., & Kasting, J. F. 2015a, Icarus, 258, 337, 10.1016/j.icarus.2015.06.016
41. **2015:** Cowan, N. B., Greene, T., Angerhausen, D., et al. 2015, PASP, 127, 311, 10.1086/680855
42. **2011:** Agüeros, M. A., Covey, K. R., Lemonias, J. J., et al. 2011, ApJ, 740, 110, 10.1088/0004-637X/740/2/110

Awarded Grants & Observing Time

- **2021: PI** | 21-XRP21-0182
Towards High Metallicity: Integrated Composition-Dependent Molecular Opacities for Modeling Super-Earth to Neptunian Atmospheres. Science PI: Gharib-Nezhad, Ehsan
- **2021: PI** | JWST-GO-2512 | 142 hours
Seeing the Forest and the Trees: Unveiling Small Planet Atmospheres with a Population-Level Framework. PI: Teske, Johanna
- **2021: Co-I** | JWST-GO-2358 | 13.1 hours
Under the Light of a Dead Star: Revealing the Atmospheric Composition of a White Dwarf Planet. PI: MacDonald, Ryan
- **2021: Co-I** | JWST-GO-2358 | 75.6 hours

- Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-Dwarf Planet Atmospheres.* PI: Stevenson, Kevin
- **2021:** Co-I | JWST-GO-2667 | 9.2 hours
Good vibrations: Directly measuring Exoplanet aerosol compositions with MIRI spectroscopy. PI: Wakeford, Hannah
 - **2021:** Co-I | JWST-AR-1977
Glow in the Dark: New Models for the Atmospheric Structure and Evolution of High Metallicity and. PI: Marley, Mark
 - **2021:** Subject Level Member | JWST-GTO-1353 | 74.9 hours
Transit and Eclipse Spectroscopy of a Hot Jupiter. PI: Lewis, N.
 - **2020:** Subject Level Member | JWST-GTO-1312 | 34.1 hours
Transiting and Eclipse Spectroscopy of a Warm Neptune. PI: Lewis, N.
 - **2020:** Subject Level Member | JWST-GTO-1331 | 22 hours
Transit Spectroscopy of TRAPPIST-1e. PI: Lewis, N.
 - **2020:** Co-I | Interdisciplinary Consortia for Astrobiology Research
Follow the Volatiles: Tracing chemical species relevant to habitability from proto-planetary disks to exoplanet atmospheres. PI: Batalha, N.M.
 - **2020:** Co-I | HST-GO-16180
Constructing the First Spectroscopic, Multi-Dimensional Map of a Hot Jupiter. PI: Kataria, T
 - **2020:** Co-I | Gemini 2020-LP
A high-resolution survey of molecular abundances in transiting exoplanet atmospheres. PI: Mansfield, M.
 - **2019:** Co-I | HST-GO-15836
A deep look into the atmosphere of an exoplanet around a pre-main sequence star. PI: Newton, E.
 - **2019:** Collaborator | Planetary Data Archiving, Restoration, and Tools
Enhancing capabilities of the HITRAN and HITEMP molecular spectroscopic databases for planetary research. PI: Gordon, I.
 - **2019:** **Science PI** | NASA Unsolicited Proposal
Community Tool for Computing, Manipulating and Visualizing Molecular and Atomic Opacities. PI: Lewis, N.K.
 - **2017:** Co-I | JWST-ERS-1366
The Transiting Exoplanet Community Early Release Science Program. PI: Batalha, N.M.
 - **2017:** Co-I | HST-GO-14918
Definitive Measurement of WASP-17b's Water Abundance in Preparation of JWST. PI: Wakeford, H.R.

Professional Service

REFEREE: AAS, MNRAS

PANELIST: TESS, HST, ROSES

MEMBER: AAS, DPS, SACNAS

COMMITTEES: 2020-p: Planetary Data System User Committee

2019-p: ExoPAG Executive Committee

ORGANIZER: 2021: Division of Planetary Science Meeting

2020: ExoExplorers Program

2015: AbGradCon

2014: Emerging Researchers in Exoplanet Symposium

CHAIR: 2021-p: Bay Area Exoplanet Meeting

LEAD: 2022-p: Transform to Open Science Module Lead for Open Results

Broader Impacts

- **2021-p:** Subject Matter Expert, Chabot Space Science Center
Regular speaker on topics related to NASA's search for life beyond earth, and diversity, equity and inclusion within STEM
- **2021-p:** Subject Matter Expert, NASA Community College Network
An initiative to bring NASA Subject Matter Experts (SMEs), research findings, and science resources into the nation's community college system
- **2018-p:** Advisor/Instructor, Evergreen Valley Community College - Citizen Science Initiative
501(c)3 with the goal of increasing BIPOC students in STEM.
- **2017:** Instructor, Project Favela
501(c)3 with the goal of providing education to students in Rocinha, one of Brazil's largest favelas.
- **2014-2017:** Instructor, Centre County Prison Society Education Program
501(c)3 with the goal of providing education within the prison system.
- **2015-2017:** Director of Programs, Learn to Be Foundation
501(c)3 with the goal of providing underserved K-12 students with free 1-on-1 online tutoring

Selected Media

Clear+Vivid with Alan Alda | Mar. 2022 : Podcast Interview, "Natalie and Natasha Batalha: Looking for Life on Alien Worlds" <https://www.youtube.com/watch?v=EKfHnNWo9hc>

Vice News | Dec. 2021 | 15k+ views: The World's Largest Telescope is Leaving Earth https://www.youtube.com/watch?v=aqI_HXo_Ogs

Quanta Magazine Mini-Documentary | Dec. 2021 | 1.9M+ views: "The Webb Space Telescope Will Rewrite Cosmic History" <https://www.youtube.com/watch?v=shPwW11MEHg>

Quanta Magazine Feature | Dec. 2021: "The Webb Space Telescope Will Rewrite Cosmic History. If It Works." <https://www.quantamagazine.org/why-nasas-james-webb-space-telescope-matters-so-much-2021-12-07/>

CNN Documentary | 2021: "The Hunt for Planet B" Directed by Nathaniel Kan <https://www.imdb.com/title/tt13848014/>

UCSC Press | 2021: "Meet the NASA scientist opening up exoplanet research" <https://ucscsciencenotes.com/feature/meet-the-nasa-scientist-opening-up-exoplanet-research/>

NBC News | Dec. 2021 | 15k+ views: "Silicon Valley Scientists Tout Historic Launch of James Webb Space Telescope" <https://www.youtube.com/watch?v=EKfHnNWo9hc>

AirTalk with KPCC NPR | Dec. 2021 : "NASA Prepares to Launch Its Most Complicated Telescope to Date: The James Webb" <https://www.kpcc.org/show/airtalk/2021-12-07/a-look-into-retail-and-proper>

National Geographic | Dec. 2021 : "The James Webb Space Telescope Will Transform our Understanding of Alien Worlds" <https://www.nationalgeographic.com/science/article/the-james-webb-space-telescope-will-transform-our-understanding-of-alien-worlds/>

Canadian Broadcast Corporation, The Current with Matt Galloway | Dec. 2021: "The James Webb Space Telescope Gets Ready for Lift-Off" <https://www.nationalgeographic.com/science/article/the-james-webb-space-telescope-will-transform-our-understanding-of-alien-worlds/>

NPR KQED News | Apr. 2021 | 1k+ views: "Search for Exoplanets" https://www.youtube.com/watch?v=HD_02wsYlyU&t=921s

Invited Talks, Seminars, Panels & Colloquia

- **Aug. 2022:** ASA-HITRAN
- **Dec. 2021:** UC Berkeley Center for Integrative Planetary Science Seminar

- **Nov. 2021:** Department of Astrophysics Colloquium, University of California Santa Cruz
- **Oct. 2021:** SACNAS: Exploring the Universe with NASA Astrophysics
- **Aug. 2021:** European Southern Observatory: Atmospheres, Atmospheres! Do I look like I care about atmospheres?
- **Aug. 2021:** NASA Ames Summer Series
- **July 2021:** Sagan Summer Workshop
- **June 2021:** Scialog: Signatures of Life in the Universe
- **Apr. 2021:** College of Science Seminar Series, San Jose State University
- **Nov. 2020:** Astronomy & Astrophysics Colloquium, Caltech Institute of Technology
- **July 2020:** Sagan Summer Workshop
- **Dec. 2019:** OWL @ ETH - paving the way to the atmospheric characterization of terrestrial exoplanets
- **Dec. 2019:** Department of Astronomy Colloquium, University of Michigan
- **Nov. 2019:** Carnegie Observatory Colloquium, Pasadena, CA
- **Jul. 2019:** Moonshots and Earthshots in the Search for Life Beyond Earth, Green Bank, WV
- **Dec. 2018:** Department of Astrobiology Colloquium, University of Washington
- **Nov. 2018:** Department of Space Sciences Planetary Lunch Seminar, Cornell University
- **Nov. 2018:** Stars and Planets Seminar Series, Harvard Center for Astrophysics
- **Oct. 2018:** Department of Astronomy & Astrophysics, University of California Santa Cruz
- **Oct. 2018:** Department of Physics Colloquium, University of California Merced
- **Jun. 2018:** Panelist at Emerging Researchers in Exoplanets Symposium
- **Jun. 2018:** Planetary Exploration Group Seminar, JHU Applied Physics Lab
- **Feb. 2018:** George Mason University Observatory Public Lecture, Fairfax, VA
- **Jul. 2017:** Enabling Transiting Exoplanet Observations with JWST Workshop, Space Telescope Science Institute
- **Feb. 2017:** School of Earth and Space Exploration Seminar, Arizona State University
- **Aug. 2016:** Planetary Systems: A Synergistic View, Quy Nhon, Vietnam
- **Aug. 2016:** Department of Terrestrial Magnetism Colloquium, Carnegie Institute
- **Mar. 2016:** Planetary Lunch Seminar, Goddard Space Flight Center
- **Mar. 2016:** Planetary Lunch Seminar, Center for Exoplanets and Habitable Worlds, The Pennsylvania State University
- **Feb. 2016:** Seminar, Jet Propulsion Laboratory
- **May 2015:** Special Seminar to The Pennsylvania State Board of Visitors
- **May 2015:** Special Seminar to The Pennsylvania State Dean of Eberly College of Science Advisory Committee

Contributed Talks

- Sept. 2019:** Bay Area Exoplanet Meeting, NASA Ames, CA
- Aug. 2019:** Extreme Solar Systems IV, Reykjavik, Iceland
- Dec. 2018 :** Bay Area Exoplanet Meeting, NASA Ames, CA
- Sept. 2018:** Bay Area Exoplanet Meeting, NASA Ames, CA
- Jul. 2018:** Exoplanets II, Cambridge, UK
- May. 2018:** Chesapeake Bay Area Exoplanet Meeting, Carnegie DTM, MD
- Jan. 2018:** Winter AAS Conference, Washington DC

Jan. 2017: Winter AAS Conference, Grapevine, Texas

Oct. 2016: Division of Planetary Sciences Conference, Pasadena, CA

Jan. 2014 : Winter AAS Conference, Washington, DC