William O. Balmer

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Education

Johns Hopkins University, Baltimore, MD, USA 2023 – present
PhD Candidate in Astrophysics
- Thesis: *Mapping Giant Planet Dynamics and Atmospheres on the Bleeding Edges of Detectability*
- Advisor: Laurent Pueyo

Johns Hopkins University, Baltimore, MD, USA 2021 – 2023
Masters in Physics

Amherst College, Amherst, MA, USA 2017 – 2021
BA *cum laude* in Astronomy; BA *cum laude* in Physics
- Thesis: *The Orbit and Hα Variability of the Embedded Accreting Protostellar Companion HD 142527 B*
- Advisor: Katherine Follette

Positions

Johns Hopkins University *Baltimore, MD*
- Self-funded Graduate Research Assistant 2024-present
- George E. Owen Fellow 2021-2024
- Maryland Space Grant Observatory Fellow 2022-2023

Follette Lab, Amherst College *Amherst, MA*
- Undergraduate Research Assistant 2018-2021

SIOS Lab, Cornell University *Ithaca, NY*
- Undergraduate Research Assistant 2020

Grants and Awards

James Webb Space Telescope Program GO-6915 (2025) **PI**, $286,747
James Webb Space Telescope Program GO-6905 (2025) **PI**, $172,614
James Webb Space Telescope Program DD-4558 (2024) **co-PI**, $50,000
James Webb Space Telescope Program GO-3337 (2024) **co-PI**, $170,704
Hubble Space Telescope Program GO-17122 (2024) **co-PI**, $132,841
NASA WIYN Data Award (2023) **PI**, $6,000
NASA WIYN Data Award (2022) **PI**, $6,000
George E. Owen Fellowship (2021-2024) **Awardee**, $18,000
Amherst Memorial Fellowship (2021, 2022, 2023) **Awardee**
Charles Hamilton Houston Award (2020) **Awardee**, $4,500
Gregory S. Call Student Researcher Award (2019) **Awardee**, $3,500
Sarles Fellow Award (2018) **Awardee**, $3,500

Students Advised

Ash Messier (2025-present), Johns Hopkins University grad student.
Evelyn Bruinsma (2025-present), Johns Hopkins University grad student.
Gavin Wang (2023-present), Johns Hopkins University undergraduate. Goldwater Scholarship Winner.
Klara Matuszewska (2025), STScI summer intern.
Henry Dennen (2024), Johns Hopkins University summer intern.
Matthew Prem (2022-2023), University of Maryland undergraduate.

Publications

First Author († indicates co-first authorship/equal contribution)

6. †Bardalez Gagliuffi, D. C., †**Balmer, W. O.**, Pueyo, L., et al. (2025) *ApJL*, 988, L18. *JWST Coronagraphic Images of 14 Her c: A Cold Giant Planet in a Dynamically Hot Multiplanet System*
5. **Balmer, W. O.**, Kammerer, J., Pueyo, L., et al. (2025) *AJ*, 169, 209. *JWST-TST High Contrast: Living on the Wedge, or, NIRCam Bar Coronagraphy Reveals CO_2 in the HR 8799 and 51 Eri Exoplanets' Atmospheres*
4. **Balmer, W. O.**, Franson, K., Chomez, A., et al. (2025) *AJ*, 169, 30. *VLTI/GRAVITY Observations of AF Lep b: Preference for Circular Orbits, Cloudy Atmospheres, and a Moderately Enhanced Metallicity*
3. **Balmer, W. O.**, Pueyo, L., Lacour, S., et al. (2024) *AJ*, 167, 64. *VLTI/GRAVITY Provides Evidence the Young, Substellar Companion HD 136164 Ab Formed Like a "Failed Star"*
2. **Balmer, W. O.**, Pueyo, L., Stolker, T., et al. (2023) *ApJ*, 956, 99. *VLTI/GRAVITY Observations and Characterization of the Brown Dwarf Companion HD 72946 B*
1. **Balmer, W. O.**, Follette, K. B., Close, L. M., et al. (2022) *AJ*, 164, 29. *Improved Orbital Constraints and Hα Photometric Monitoring of the Directly Imaged Protoplanet Analog HD 142527 B*

In preparation

2. **Balmer, W. O.**, Thompson, W., Pueyo, L., et al. in prep. *On the Eccentric Orbit of 51 Eri b and Limits on an Inner Perturber*
1. **Balmer, W. O.**, Messier, A., Pueyo, L., et al. in prep. *Direct Images of CO_2 in the Atmosphere of a Super-Jovian Indicate Planet Formation Occurs Above the Deuterium Burning Limit*

Second- or third- author (** indicates first author advised by W.O.B)

4. **Wang, G., **Balmer, W. O.**, Pueyo, L., et al. (2025) *AJ*, 169, 336. *A Revised Density Estimate for the Largest Known Exoplanet, HAT-P-67 b*
3. Maire, A.-L., Leclerc, A., **Balmer, W. O.**, et al. (2024) *A&A*, 691, A263. *Direct imaging and dynamical mass of a benchmark T-type brown dwarf companion to HD 167665*
2. Franson, K., **Balmer, W. O.**, Bowler, B. P., et al. (2024) *ApJL*, 974, L11. *JWST/NIRCam 4–5 μm Imaging of the Giant Planet AF Lep b*
1. Blunt, S., **Balmer, W. O.**, Wang, J. J., et al. (2023) *AJ*, 166, 257. *First VLTI/GRAVITY Observations of HIP 65426 b: Evidence for a Low or Moderate Orbital Eccentricity*

Co-author

32. Beichman, C., Sanghi, A., Mawet, D., et al. (2025) *arXiv*, arXiv:2508.03814. *Worlds Next Door: A Candidate Giant Planet Imaged in the Habitable Zone of α Cen A. I. Observations, Orbital and Physical Properties, and Exozodi Upper Limits*
31. Sanghi, A., Beichman, C., Mawet, D., et al. (2025) *arXiv*, arXiv:2508.03812. *Worlds Next Door: A Candidate Giant Planet Imaged in the Habitable Zone of α Cen A. II. Binary Star Modeling, Planet and Exozodi Search, and Sensitivity Analysis*
30. Stolker, T., Samland, M., Waters, L. B. F. M., et al. (2025) *A&A*, 700, A21. *Direct imaging discovery of a young giant planet orbiting on Solar System scales*
29. Winterhalder, T. O., Kammerer, J., Lacour, S., et al. (2025) *A&A*, 700, A4. *Orbit and atmosphere of HIP 99770 b through the eyes of VLTI/GRAVITY*
28. Crotts, K. A., Carter, A. L., Lawson, K., et al. (2025) *ApJL*, 987, L41. *Follow-up Exploration of the TWA 7 Planet–Disk System with JWST NIRCam*
27. Hoch, K. K. W., Rowland, M., Petrus, S., et al. (2025) *Natur*, 643, 938-942. *Silicate clouds and a circumplanetary disk in the YSES-1 exoplanet system*
26. Hayoz, J., Bonse, M. J., Dannert, F., et al. (2025) *A&A*, 698, A87. *High-contrast spectroscopy with the new VLT/ERIS instrument: Molecular maps and radial velocity of the gas giant AF Lep b*
25. Trevascus, D., Blunt, S., Christiaens, V., et al. (2025) *A&A*, 698, A19. *Differentiating formation models with new dynamical masses for the PDS 70 protoplanets*

24. Sanghi, A., Beichman, C., Mawet, D., et al. (2025) *RNAAS*, 9, 119. *A Preliminary Search for Planets and Exozodiacal Emission Around α Centauri A with JWST/MIRI*
23. Denis, A., Vigan, A., Costes, J., et al. (2025) *A&A*, 696, A6. *Characterization of AF Lep b at high spectral resolution with VLT/HiRISE*
22. Bogat, E., Schlieder, J. E., Lawson, K. D., et al. (2025) *arXiv*, arXiv:2504.11659. *Probing the Outskirts of M Dwarf Planetary Systems with a Cycle 1 JWST NIRCam Coronagraphy Survey*
21. Ray, S., Sallum, S., Hinkley, S., et al. (2025) *ApJL*, 983, L25. *The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems. III. Aperture Masking Interferometric Observations of the Star HIP 65426 at 3.8 μm*
20. Chai, Y., Chen, C. H., Worthen, K., et al. (2024) *ApJ*, 976, 167. *A JWST MIRI MRS View of the η Tel Debris Disk and Its Brown Dwarf Companion*
19. Hoch, K. K. W., Theissen, C. A., Barman, T. S., et al. (2024) *AJ*, 168, 187. *JWST-TST High Contrast: Spectroscopic Characterization of the Benchmark Brown Dwarf HD 19467 B with the NIRSpec Integral Field Spectrograph*
18. Xuan, J. W., Mérand, A., Thompson, W., et al. (2024) *Natur*, 634, 1070-1074. *The cool brown dwarf Gliese 229 B is a close binary*
17. Blunt, S., Wang, J., Hirsch, L., et al. (2024) *JOSS*, 9, 6756. *orbitize! v3: Orbit fitting for the High-contrast Imaging Community*
16. Kammerer, J., Lawson, K., Perrin, M. D., et al. (2024) *AJ*, 168, 51. *JWST-TST High Contrast: JWST/NIRCam Observations of the Young Giant Planet β Pic b*
15. Winterhalder, T. O., Lacour, S., Mérand, A., et al. (2024) *A&A*, 688, A44. *Combining Gaia and GRAVITY: Characterising five new directly detected substellar companions*
14. Ruffio, J.-B., Perrin, M. D., Hoch, K. K. W., et al. (2024) *AJ*, 168, 73. *JWST-TST High Contrast: Achieving Direct Spectroscopy of Faint Substellar Companions Next to Bright Stars with the NIRSpec Integral Field Unit*
13. Nowak, M., Lacour, S., Abuter, R., et al. (2024) *A&A*, 687, A248. *Catalogue of dual-field interferometric binary calibrators*
12. Nasedkin, E., Mollière, P., Lacour, S., et al. (2024) *A&A*, 687, A298. *Four-of-a-kind? Comprehensive atmospheric characterisation of the HR 8799 planets with VLTI/GRAVITY*
11. Pourré, N., Winterhalder, T. O., Le Bouquin, J.-B., et al. (2024) *A&A*, 686, A258. *High contrast at short separation with VLTI/GRAVITY: Bringing Gaia companions to light*
10. Petrus, S., Whiteford, N., Patapis, P., et al. (2024) *ApJL*, 966, L11. *The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems. V. Do Self-consistent Atmospheric Models Represent JWST Spectra? A Showcase with VHS 1256–1257 b*
9. Worthen, K., Chen, C. H., Law, D. R., et al. (2024) *ApJ*, 964, 168. *MIRI MRS Observations of β Pictoris. I. The Inner Dust, the Planet, and the Gas*
8. Sallum, S., Ray, S., Kammerer, J., et al. (2024) *ApJL*, 963, L2. *The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems. IV. NIRISS Aperture Masking Interferometry Performance and Lessons Learned*
7. Grant, D., Lewis, N. K., Wakeford, H. R., et al. (2023) *ApJL*, 956, L32. *JWST-TST DREAMS: Quartz Clouds in the Atmosphere of WASP-17b*
6. Carter, A. L., Hinkley, S., Kammerer, J., et al. (2023) *ApJL*, 951, L20. *The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems I: High-contrast Imaging of the Exoplanet HIP 65426 b from 2 to 16 μm*
5. Follette, K. B., Close, L. M., Males, J. R., et al. (2023) *AJ*, 165, 225. *The Giant Accreting Protoplanet Survey (GAPlanetS)-Results from a 6 yr Campaign to Image Accreting Protoplanets*
4. Hinkley, S., Lacour, S., Marleau, G.-D., et al. (2023) *A&A*, 671, L5. *Direct discovery of the inner exoplanet in the HD 206893 system. Evidence for deuterium burning in a planetary-mass companion*
3. Miles, B. E., Biller, B. A., Patapis, P., et al. (2023) *ApJL*, 946, L6. *The JWST Early-release Science Program for Direct Observations of Exoplanetary Systems II: A 1 to 20 μm Spectrum of the Planetary-mass Companion VHS 1256-1257 b*

2. Adams Redai, J. I., Follette, K. B., Wang, J., et al. (2023) *AJ*, 165, 57. *The Giant Accreting Protoplanet Survey (GAPlanetS): Optimization Techniques for Robust Detections of Protoplanets*

1. Betti, S. K., Follette, K. B., Ward-Duong, K., et al. (2022) *ApJL*, 935, L18. *Near-infrared Accretion Signatures from the Circumbinary Planetary-mass Companion Delorme 1 (AB)b*

Selected Press Releases and News

Frigid Exoplanet in Strange Orbit Imaged by NASA's Webb (Bardalez-Gagliuffi & Balmer et al. 2025): STScI/NASA Press Release, Forbes, Space.com
Scientists used JWST instruments 'wrong' on purpose to capture direct images of exoplanets (Balmer et al. 2025b): Space.com
NASA's Webb Images Young, Giant Exoplanets, Detects Carbon Dioxide (Balmer et al. 2025b): JHU/STScI/NASA Press Release, CBS, AFP, El Mundo, Futurism.com, Mashable.com, BBC Sky at Night
UT Astronomers Race To Capture Image of Exoplanet Near Star (Franson et al. 2024): McDonald Observatory Press Release
Newfound alien planet has nuclear fusion going in its core (Hinkley et al. 2023) Space.com

PI Observing Programs

JWST GO-6915, Cycle 4 **PI**, 48 hours
JWST GO-6905, Cycle 4 **PI**, 24 hours
MINERVA-A NN-EXPLORE, 2025A **Co-PI**, 23 hours
VLTI/GRAVITY, P114 **PI**, 7 hours
JWST DD-4558, Cycle 2 **Co-PI**, 6.4 hours
VLTI/GRAVITY, P112 **PI**, 9 hours
JWST GO-3337, Cycle 2 **Co-PI**, 7.6 hours
VLTI/GRAVITY, P111-116 **PI**, 15 hours
HST GO-17122, Cycle 30 **Co-PI**, 9 orbits
VLTI/GRAVITY, P109 **PI**, 3 hours
WIYN 3.5m NN-EXPLORE, 2022A **PI**, 2.4 nights
SOAR 4.1m NOIRLAB, 2022A **PI**, 2 nights
ARC 3.5m APO, 2021.4 **PI**, 24 hours

Selected Talks

Contributed

JWST Coronagraphic Images of 14 Her c: a Cold Giant Planet in a Dynamically Hot, Multi-planet System
American Astronomical Society 246th Meeting, Anchorage, AK — June 2025

The Bleeding Edges of Direct Imaging with JWST
NASA ExoPAG 31, National Harbor, MD — January 2025

Long baseline optical interferometry of exoplanets and brown dwarfs
Chesapeake Bay Area Exoplanet Meeting #11, Baltimore, MD — May 2024

Direct Detection and Characterization of Ice-line Giants with Optical Interferometry
SEEC Symposium on Pathways to Characterizing Non-Transiting Planets, Greenbelt, MD — April 2024

The Unexpected Detection of HR8799e with NIRCam Coronagraphy and Implications for Cycle 3
Planetary Systems and the Origins of Life in the Era of JWST, STScI Spring Symposium, Baltimore, MD — May 2023

Unprecedented precision: using the VLTI jointly with Gaia to characterize substellar companions
Cool Stars 21, Toulouse, FR — August 2022

Invited

Directly Imaging Giant Planets with JWST
Planetary Astronomy Lunch Seminar, University of Maryland, College Park, MD — September 2025

Ibid.
Institute for Astronomy Star and Planet Seminar, Honolulu, HI — September 2025

Living on the Wedge: New insights from Bar Coronagraphy

NIRCam Builders Meeting, Biosphere 2, Tucson, AZ — March 2025
Ibid.
Max Planck Institute for Astronomy ExoCoffee, Heidelberg, DE — January 2025
Direct detection of a cold giant planet in a dynamically hot system
JHU ExoJamboree, Baltimore, MD — November 2024
Ibid.
Carnegie Earth and Planetary Laboratory Astronomy Seminar, Washington DC — October 2024
The formation of AF Leporis b
Protoplanets Group, Observatoire de la Côte d'Azur, Nice, FR — June 2024
Ibid.
European Southern Observatory Star and Planet Formation Seminar, Garching, DE — November 2023
The 4-5 micron color of HR 8799
European Southern Observatory Stellar Coffee and Planetary Tea, Garching, DE — November 2023
Ibid.
ExoGRAVITY Collaboration Workshop, Heidelberg, DE — November 2023
Ibid.
`petitRADTRANS` Collaboration Workshop, Heidelberg, DE — November 2023
Benchmark Brown Dwarfs at Extreme Precision
American Museum of Natural History Astronomy Colloquium, New York City, NY — February 2023
Ibid.
Space Telescope Science Institute HotSci Series, Baltimore, MD — August 2022

Service and Outreach

Referee/review service:

- Reviewer, Consolidator Grant, European Research Council (2025)
- Executive Secretary, NASA XRP Panel (2024)
- Referee for Astronomy & Astrophysics (2025-)
- Referee for The Astrophysical Journal (2025-)
- Referee for The Astronomical Journal (2022-)

Organization service:

- JHU ExoJamboree 2025 SOC
- JHU Exoplanet No-PhDs Journal Club Lead Organizer (2022-)

Outreach activities:

- Observatory Open Houses, K-12 Tours, Maryland Space Grant Observatory (2022-)
- Pen Pal, Letters to a Pre-Scientist (2024-)
- Editor, *Astrobites* (2023-2024)
- Author, *Astrobites* (2021-2023)
- Astronomy Editor, *The Amherst STEM Network* (2019-2021)
- Observatory Operator, Amherst College Observatory (2021)

Public Lectures:

- Invited talk, North County High School (2023)
- Invited talk, Howard Astronomical League (2022)
- Invited talk, Balticon 56 (2022)
- Invited Talk, UMass Amherst Astronomy Club (2021)