

William O. Balmer

PHOTON HUNTER · FRINGE TRACKER · EXOPLANETEER

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Work Experience

Maryland Space Grant Consortium

Baltimore, MD

MARYLAND SPACE GRANT CONSORTIUM OBSERVATORY FELLOW

Sept. 2022 - present

- Organizing outreach events and observatory Open Houses at the MDSG Observatory
- Leading visits, coordinating volunteers, and facilitating public engagement with astronomy
- Training telescope users, maintaining telescope operations, and upgrading observatory instrumentation
- Mentoring undergraduate and high-school students in astronomy projects
- adv. Dr. Matt Collinge, Deputy Director MDSGC

Space Telescope Science Institute

Baltimore, MD

GRADUATE RESEARCH ASSISTANT

Jun. 2021 - present

- Investigating the atmospheres and formation of exoplanets and substellar companions using space and ground based telescopes
- Member of the ExoGRAVITY collaboration, working on data reduction, spectral characterization, and observations from VLT/GRAVITY
- Member of the JWST High Contrast Imaging ERS collaboration and developer/tester of spaceKLIP
- Conducted observations, data reduction, and analysis of NIR spectroscopy, including from the ARC3.5m/TripleSpec, SOAR/TripleSpec, and Keck/MOSFIRE spectrographs
- Expert angular, reference, and spectral differential imaging analysis of data from VLT/NACO, JWST/NIRCam, and JWST/MIRI
- adv. Dr. Laurent Pueyo, Dr. Julien Girard, and Dr. David Sing

Follette Lab, Amherst College

Amherst, MA

UNDERGRADUATE RESEARCH ASSISTANT

Jun. 2018 - Aug. 2021

- Conducted angular and spectral differential imaging to search transitional disks for forming exoplanets
- Calibrated absolute astrometric solution for the Visible Light Adaptive Optics (VisAO) instrument
- Transition Disk Database Project Lead: coordinated and managed junior researchers in aggregating data and developing a platform for a centralized, public record of the properties of over 200 transition disks
- Contributed to the Giant Accreting Protoplanet Survey (Follette et al. 2021, in prep.) project code and data reduction
- adv. Dr. Kate Follette

SIOS Lab, Cornell University

Ithaca, NY

UNDERGRADUATE RESEARCH ASSISTANT

Jun. 2020 - Aug. 2020

- Performed space telescope mission yield simulations for Miniaturized Distributed Occulture/Telescope (mDOT) mission
- Contributed to EXOSIMS project code (Savransky et al. 2017)
- adv. Dr. Dmitry Savransky

Physics and Astronomy Department, Amherst College

Amherst, MA

TEACHING ASSISTANT, GRADING ASSISTANT, AMHERST COLLEGE OBSERVATORY (ACO) OPERATOR

Sept. 2019 - May. 2021

- TA for ASTR112 (2019F), ASTR337 (2020F), ASTR341 (2021S)
- Conducted data collection/reduction, telescope setup/operation, grading/rubric construction, and assisted students with coding challenges. Led a lecture on the implementation of fourier domain image filtering.

Education

Johns Hopkins University

Baltimore, MD

PH.D STUDENT IN ASTRONOMY & ASTROPHYSICS

Aug. 2021 - present

- Current courseload: *Interstellar Medium and Astrophysical Fluid Dynamics* and *Exoplanets and Planet Formation*
- Previous courses: *Fourier Optics and Interferometry in Astronomy*, *Astrophysical Dynamics*

Amherst College

Amherst, MA

BACHELORS OF ARTS *cum laude*

Aug. 2017 - May. 2021

- Physics and Astronomy double major
- A- average
- Honors thesis in Astronomy was unanimously nominated by the department for summa cum laude honors

Grants & Awards

\$18,000	Owen Scholars Fellowship , Krieger School of Arts and Sciences, JHU	2021-2024
\$8,600	Amherst Memorial Fellowship (x2) , Amherst College Board of Trustees	2021-2023
Award	Chambliss Student Poster Award Honorable Mention , AAS 237th meeting	2021
\$4,500	Charles Hamilton Houston Award , Charles Hamilton Houston Internship Program	2020
\$3,500	Gregory S. Call Student Researcher Award , Gregory S. Call Student Research Program	2019
\$3,500	Sarles Fellow Award , The Sarles Science Fund	2018

Accepted Proposals

PI hrs: 86.6 • Co-I hrs: 0

Co-PI	HST/STIS, HST/COS HST TAC, “Testing Planetary Formation Mechanisms through the First FUV - Optical Spectrum of a Young, Accreting Planet,” PI: C. Robinson, Co-PI: W. Balmer, Co-I: K. Ward-Duong, K. Follette, S. Betti, L. Jiang, J. Debes, J. Kammerer, J. Girard, L. Pueyo (9 orbits)	Cycle 30
PI	VLTI/GRAVITY ESO TAC, “Characterizing the target of a novel JWST Cycle 1 GO observation with VLTI/GRAVITY,” PI: W. Balmer, Co-I: J. Kammerer, L. Pueyo, A. Sivaramakrishnan, S. Lacour (3 hours)	P109
PI	WIYN3.5m NNExplore TAC, “A precision mass measurement of the most inflated hot-Saturn HAT-P-67 b,” PI: W. Balmer, Co-I: Z. Rustamkulov, D. Sing (2.4 nights)	2022A
PI	SOAR4.1m NOIRLAB TAC, “Characterization of exoGRAVITY Host Stars (GHOSTS): in the Southern Hemisphere,” PI: W. Balmer, Co-I: L. Pueyo, D. Sing (2 nights)	2022A
PI	ARC3.5m Apache Point Observatory TAC, “Characterization of exoGRAVITY Host Stars (GHOSTS): Northern Hemisphere,” PI: W. Balmer (24 hrs)	2021, Q4

Talks

Conference:

Unprecedented precision: using VLTI/GRAVITY jointly with Gaia to characterize substellar companions near and far, young and old

Cool Stars 21 Splinter, Toulouse

BALMER, W. O. ; PUEYO, L. ; MAIRE, A.-L. ; LACOUR, S. ; NOWAK, M. ; WANG, J. ; BLUNT, S. ; STOLKER, T. ; MOLLIÈRE, P. ; SING, D.

Jul. 2022

Colloquia & Seminars

- **STScI HotSci 2022**, Baltimore, MD *August 17th, 2022*
- **American Museum of Natural History Astronomy Colloquium**, New York City, NY *Oct. 2022*

Outreach & Service

Outreach	— Observatory Open Houses, <i>MDSGO</i>	2022-
Outreach	— Invited talk, <i>Howard Astronomical League</i>	<i>Jun. 2022</i>
Outreach	— Invited talk, <i>Balticon 56</i>	<i>May 2022</i>
Sci-Comm	— Author, <i>Astrobites</i>	2019 - 2021
Sci-Comm	— Astronomy Editor, <i>The Amherst STEM Network</i>	2019 - 2021
Volunteer	— Observatory Operator, <i>Amherst College Observatory</i>	2021
Outreach	— Invited talk, <i>UMass Amherst Astronomy Club</i>	<i>Apr. 2021</i>

Refereed Publications

First Author (1)

Improved Orbital Constraints and H α Photometric Monitoring of the Directly Imaged Protoplanet Analog HD 142527 B

The Astronomical Journal

BALMER, W. O. ; FOLLETTE, K. B. ; CLOSE, L. M. ; MALES, J. R. ; DE ROSA, R. J. ; ADAMS REDAI, J. I. ; WATSON, A. ; WEINBERGER, A. J. ; MORZINSKI, K. M. ; MORALES, J. ; WARD-DUONG, K. ; PUEYO, L.

2022

- We present 5 years of images of the accreting protostar HD 142527 B from the MagAO/VisAO instrument, for which we determine an updated astrometric solution. We find the binary is on an orbit perpendicular to the circumbinary disk and we tentatively detect year-to-year variation in the mass accretion rate onto the smaller binary component.

Co-author (3)

Near-infrared Accretion Signatures from the Circumbinary Planetary Mass Companion Delorme 1 (AB)b

Astronomy & Astrophysics Letters

BETTI, S. K. ; FOLLETTE, K. B. ; WARD-DUONG, K. ; AOYAMA, Y. ; MARLEAU, G. -D. ; BARY, J. ; ROBINSON, C. ; JANSON, M. ; BALMER, W. O. ; CHAUVIN, G. ; PALMA-BIFANI, P.

2022

Direct Discovery of the Inner Exoplanet in the HD206893 System

Astronomy & Astrophysics Letters

HINKLEY, S. ; LACOUR, S. ; MARLEAU, G. D. ; LAGRANGE, A. M. ; WANG, J. J. ; KAMMERER, J. ; CUMMING, A. ; NOWAK, M. ; RODET, L. ; STOLKER, T. ; BALMER, W. O. ; RAY, S. ; BONNEFOY, M. ; MOLLIÈRE, P. ; LAZZONI, C. ; KENNEDY, G. ; MORDASINI, C. ; ET AL.

2022

Performance of near-infrared high-contrast imaging methods with JWST from commissioning

Proceeding of SPIE Astronomical Telescopes + Instrumentation 2022

KAMMERER, JENS ; GIRARD, JULIEN ; CARTER, AARYNN L. ; PERRIN, MARSHALL D. ; COOPER, RACHEL ; THATTE, DEEPASHRI ; VANDAL, THOMAS ; LEISENRING, JARRON ; WANG, JASON ; BALMER, WILLIAM O. ; SIVARAMAKRISHNAN, ANAND ; PUEYO, LAURENT ; WARD-DUONG, KIMBERLY ; SUNNQUIST, BEN ; ADAMS REDAI, JÉA

2022

Conference Proceedings

Unprecedented precision: using VLT/GRAVITY jointly with Gaia to characterize substellar companions near and far, young and old

Cool Stars 21 Splinter

BALMER, W. O. ; PUEYO, L. ; MAIRE, A-L. ; LACOUR, S. ; NOWAK, M. ; WANG, J. ; BLUNT, S. ; STOLKER, T. ; MOLLIÈRE, P. ; SING, D.

Jul. 2022

Characterization of the L-type Brown Dwarf Companion to the Nearby Solar-type Star HD 72946 with VLT/GRAVITY, VLT/SPHERE, and RVs

In the Spirit of Lyot 2022 – Leiden

BALMER, W. O. ; PUEYO, L. ; MAIRE, A-L. ; LACOUR, S. ; NOWAK, M. ; STOLKER, T. ; MOLLIÈRE, P. ; SING, D. ; WANG, J. ; BLUNT, S.

Jun. 2022

Drums in the Deep: constraining the orbit and photometric variability of the chasm-carving M-dwarf HD 142527B

American Astronomical Society meeting #237, id. 332.03.

BALMER, W. O. ; FOLLETTE, K. B. ; MALES, J. ; CLOSE, L. ; MORZINSKI, K. ; WEINBERGER, A.

Jan. 2021

Exploring the Transition Disk Population with a public facing database

American Astronomical Society meeting #235, id. 281.04

BALMER, W. O. ; JAIN, A. ; FOLLETTE, K.

Jan. 2020