Natalie H. Allen

Trottier Postdoctoral Fellow · IREx/University of Montreal

nallen19@jhu.edu | nataliehallen.com

Education

Johns Hopkins University — *Baltimore, MD, USA*
PhD Astronomy & Astrophysics — *Graduation: August 2026*
- Dissertation: *Towards an Understanding of Exoplanets and their Host Stars with JWST*
  - Advised by Néstor Espinoza and David Sing

Johns Hopkins University — *Baltimore, MD, USA*
MA Physics — *Graduation: May 2023*

University of Rochester — *Rochester, NY, USA*
BS Physics & Astronomy — *Graduation: May 2020*
- Minor in mathematics
- *Cum Laude* with Highest Distinction

Research Positions

IREx/University of Montreal — *Montreal, QC, CA*
Trottier Postdoctoral Fellow — *Fall 2026 - present*
- Using JWST to research the nature of rocky exoplanets and their M dwarf hosts
- Co-PI of large JWST multi-year observing to program to characterize the potentially Earthlike TRAPPIST-1 e

Johns Hopkins University — *Baltimore, MD, USA*
Graduate Research Assistant — *Fall 2020 - Summer 2026*
- Advisor: Dr. Néstor Espinoza
  - Disentangling stellar signals from atmospheric signals for terrestrial planets orbiting M dwarfs through joint stellar and atmospheric modeling

Johns Hopkins University — *Baltimore, MD, USA*
Graduate Research Assistant — *Fall 2020 - Summer 2026*
- Advisor: Dr. David Sing
  - Space-based multi-wavelength atmospheric spectroscopy of giant planets as part of the JWST/HST Grand Tour

University of Rochester — *Rochester, NY, USA*
Undergraduate Research Assistant — *Spring 2019 - Summer 2022*
- Advisor: Dr. Miki Nakajima
  - Ran simulations of the Earth's largest impact crater in shock simulation code iSALE and compared results with geophysical evidence

University of Rochester — *Rochester, NY, USA*
Undergraduate Research Assistant — *Spring 2017 - Summer 2020*
- Advisor: Dr. Dan Watson
  - Wrote code to reduce and analyze Hubble and Spitzer Space Telescope multi-epoch narrow band imaging of star forming region NGC1333

NASA Jet Propulsion Lab — *Pasadena, CA, USA*
Research Intern — *Summer 2019*
- Advisor: Dr. Karl Stapelfeldt
  - Simulated shock physics of outflows from young stellar objects to constrain birth cloud feedback rates from archival space telescope observations using the MAPPINGS V code

Space Telescope Science Institute — *Baltimore, MD, USA*
Visiting Scientist — *Summer 2018*
- Guest of Dr. Joel Green
  - Wrote python code to analyze extreme stellar outflows from Spitzer Space Telescope observations

Awards, Fellowships, & Grants

2026-	**Trottier Postdoctoral Fellow**, IREx/University of Montreal	-
2024-	**James Webb Space Telescope Program 6456 & 9256**, NASA	*300,000+ USD*
2020-25	**Graduate Research Fellowship**, National Science Foundation	*159,000 USD*
2020	**Stoddard Senior Thesis Prize**, University of Rochester	*1,000 USD*
2020	**Janet Fogg Prize**, University of Rochester	*1,000 USD*
2020	**Undergraduate Teaching Award**, University of Rochester	-
2019-20	**Barry M. Goldwater Scholarship**,	*7,500 USD*
2019	**Distinguished Undergraduate Award – Frederick A. Tarantino Scholarship**, USRA	*5,000 USD*
2017-18 2018-19	**Outstanding Chapter Award**, Society of Physics Students National	-
2017-18 2018-19	**Blake Lily Prize**, Society of Physics Students National	-
2018	**Women in Physics Grant**, American Physical Society	*1,000 USD*
2016-20	**Whipple Science & Research Scholarship**, University of Rochester	*48,000 USD*

Publications

38 total accepted papers, 5 as first author. ORCID: 0000-0002-0832-710X

First-Author

N. H. Allen, N. Espinoza, V. A. Boehm, et al. 2026. JWST TRAPPIST-1 e/b Program: Motivation and first observations, The Astronomical Journal, 171, 105.

N. H. Allen, N. Espinoza, H. Diamond-Lowe, et al. 2025. Hot Rocks Survey IV: Emission from LTT 3780 b is consistent with a bare rock, The Astronomical Journal, 170, 240.

N. H. Allen, D. K. Sing, N. Espinoza, et al. 2024. HST SHEL: Enabling Comparative Exoplanetology with HST/STIS, The Astronomical Journal, 168, 111.

N. H. Allen, N. Espinoza, A. Jordán, et al. 2022. ACCESS: Tentative detection of H2O in the ground-based optical transmission spectrum of the low-density hot Saturn HATS-5b, The Astronomical Journal, 164, 153.

N. H. Allen, M. Nakajima, K. Wünnemann, et al. 2022. A Revision of the Formation Conditions of the Vredefort Crater, Journal of Geophysical Research: Planets, 127, 8.

Second- and Third-Author

N. Espinoza, **N. H. Allen**, A. Glidden et al. 2025. JWST-TST DREAMS: NIRSpec/PRISM Transmission Spectroscopy of the Habitable Zone Planet TRAPPIST-1 e, The Astrophysical Journal Letters, 990, L52.

L. M. Ramos Rosado, D. Sing, **N. H. Allen**, et al. 2025. HST SHEL: Revealing Haze and Confirming Elevated Metallicity in the Warm Neptune HAT-P-26b, The Astronomical Journal, 169, 259.

A. Gressier, N. Espinoza, **N. H. Allen**, et al. 2024. Hints of a sulfur-rich atmosphere around the 1.6 $R_\oplus$ Super-Earth L98-59 d from JWST NIRSpec G395H transmission spectroscopy, The Astrophysical Journal Letters, 975, L10.

E. Agol, **N. H. Allen**, B. Benneke, et al. 2024. Updated Forecast for TRAPPIST-1 Times of Transit for All Seven Exoplanets Incorporating JWST Data, Research Notes of the American Astronomical Society, 8, 274.

Co-Author

D. K. Sing et al. incl. **N. H. Allen**. 2026. A JWST transiting survey of FGK stellar limb darkening: empirical evidence for quadratic laws and atmospheric model comparisons, accepted to AJ.

A. Glidden et al. incl. **N. H. Allen**. 2026. Leveraging Impact Parameter to Mitigate the Transit Light Source Effect: Early Insights from TRAPPIST-1, accepted to ApJL.

S. Mukherjee et al. incl. **N. H. Allen**. 2026. Cloudy mornings and clear evenings on a giant extrasolar world, Science, 392, 858.

M. Holmberg et al. incl. **N. H. Allen**. 2026. Hot Rocks Survey. V. Secondary Eclipse Photometry of GJ 3473 b with JWST/MIRI, the Astronomical Journal, 171, 251.

C. Fisher et al. incl. **N. H. Allen**. 2026. JWST NIRSpec finds no clear signs of an atmosphere on TOI-1685 b, Monthly Notices of the Royal Astronomical Society, 545, 4.

K. Sotzen et al. incl. **N. H. Allen**. 2025. Non-detection of Nightside Emission from HAT-P-26b due to Stellar Contamination, Research Notes of the AAS, 9, 352.

J. Lustig-Yaeger et al. incl. **N. H. Allen**. 2025. JWST-TST DREAMS: The Nightside Emission and Chemistry of WASP-17b, the Astrophysical Journal Letters, 994, L4.

A. Gressier et al. incl. **N. H. Allen**. 2025. JWST-TST DREAMS: Sulfur dioxide in the atmosphere of the Neptune-mass planet HAT-P-26 b from NIRSpec G395H transmission spectroscopy, the Astronomical Journal, 170 292.

A. Glidden et al. incl. **N. H. Allen**. 2025. JWST-TST DREAMS: Secondary Atmosphere Constraints for the Habitable Zone Planet TRAPPIST-1 e, The Astrophysical Journal Letters, 990, L53.

G. Fu et al. incl. **N. H. Allen**. 2025. Overcast mornings and clear evenings in hot Jupiter exoplanet atmospheres, The Astrophysical Journal Letters, 989, L17.

M. Fortune et al. incl. **N. H. Allen**. 2025. Hot Rocks Survey III: A deep eclipse for LHS 1140c and a new Gaussian process method to account for correlated noise in individual pixels, Astronomy & Astrophysics, 701, A25.

E. A. Meier-Valdés et al. incl. **N. H. Allen**. 2025. Hot Rocks Survey. II. The thermal emission of TOI-1468 b reveals a bare hot rock, Astronomy & Astrophysics, 698, A68.

P. C. August et al. incl. **N. H. Allen**. 2025. Hot Rocks Survey I: A possible shallow eclipse for LHS 1478 b, Astronomy & Astrophysics, 695, A171.

K. A. Bennett et al. incl. **N. H. Allen**. 2025. An HST Transmission Spectrum of the Closest M Dwarf Transiting Rocky Planet LTT 1445Ab, The Astronomical Journal, 169, 111.

D. R. Louie et al. incl. **N. H. Allen**. 2025. JWST-TST DREAMS: A Precise Water Abundance for Hot Jupiter WASP-17b from the NIRISS SOSS Transmission Spectrum, The Astronomical Journal, 169, 86.

A. Gressier et al. incl. **N. H. Allen**. 2025. JWST-TST DREAMS: A Supersolar Metallicity in WASP-17 b's Dayside Atmosphere from NIRISS SOSS Eclipse Spectroscopy, The Astronomical Journal, 169, 57.

A. Banerjee et al. incl. **N. H. Allen**. 2024. Atmospheric retrievals suggest the presence of a secondary atmosphere and possible sulfur species on L 98-59 d from JWST NIRSpec G395H transmission spectroscopy, The Astrophysical Journal Letters, 975, L11.

D. Valentine et al. incl. **N. H. Allen**. 2024. JWST-TST DREAMS: Nonuniform Dayside Emission for WASP-17b from MIRI/LRS, The Astronomical Journal, 168, 123.

N. Espinoza et al. incl. **N. H. Allen**. 2024. Inhomogeneous terminators on the exoplanet WASP-39 b, Nature, 632, 1017.

J.-B. Ruffio et al. incl. **N. H. Allen**. 2023. JWST-TST High Contrast: Achieving direct spectroscopy of faint substellar companions next to bright stars with the NIRSpec IFU, The Astronomical Journal, 168, 73.

D. Grant et al. incl. **N. H. Allen**. 2023. JWST-TST DREAMS: Quartz Clouds in the Atmosphere of WASP-17b, The Astrophysical Journal Letters, 956, L32.

C. D. McGruder et al. incl. **N. H. Allen**. 2023. ACCESS, LRG-BEASTS, & MOPSS: Featureless Optical Transmission Spectra of WASP-25b and WASP-124b, The Astronomical Journal, 166, 120.

M. Libralato et al. incl. **N. H. Allen**. 2023. JWST-TST Proper Motions. I. High-precision NIRISS Calibration and Large Magellanic Cloud Kinematics, The Astrophysical Journal, 950, 101.

A. Feinstein et al. incl. **N. H. Allen**. 2023. Early Release Science of the exoplanet WASP-39b with JWST NIRISS, Nature, 614, 670.

L. Alderson et al. incl. **N. H. Allen**. 2023. Early Release Science of the exoplanet WASP-39b with JWST NIRSpec G395H, Nature, 614, 664.

Z. Rustamkulov et al. incl. **N. H. Allen**. 2023. Early Release Science of the exoplanet WASP-39b with JWST NIRSpec PRISM, Nature, 614, 659.

E.-M. Ahrer et al. incl. **N. H. Allen**. 2023. Early Release Science of the exoplanet WASP-39b with JWST NIRCam, Nature, 614, 653.

JWST Transiting Exoplanet Community Early Release Science Team, 2022. Identification of carbon dioxide in an exoplanet atmosphere, Nature, 614, 649.

C. D. McGruder et al. incl. **N. H. Allen**. 2022. ACCESS: Confirmation of a Clear Atmosphere for WASP-96b and a Comparison of Light Curve Detrending Techniques, The Astronomical Journal, 164, 134.

Observing Programs

James Webb Space Telescope

- **PI** (Co-PI Néstor Espionza): Using stellar contamination proxy TRAPPIST-1 b to search for an atmosphere on TRAPPIST-1 e - 128.8 hours
- Co-I (PI Lupita Tovar Mendoza): Characterizing Infrared Stellar Flares on TRAPPIST-1 Using Archival JWST Data - Archival
- Co-I (PI Jens Hoeijmakers): What causes the infrared and optical variability of the hot rocky super-Earth 55 Cnc e? - 38.2 hours
- Co-I (PI Eric Agol): Confirming an 8th planet in the TRAPPIST-1 system - 22.7 (DDT)
- Co-I (PI Katherine Bennett): Does Our Closest M-Dwarf Rocky Neighbor Have An Atmosphere? We Need to Find Out. - 43.6 hours
- Co-I (PI Prune August): Confirming a Tentative Terrestrial Atmosphere Detection on LHS 1478 b with JWST/MIRI - 38.4 hours
- Co-I (PI David Sing): JWST's Exoplanet Grand Tour Spectroscopic Survey - 125.66 hours
- Co-I (PI Brett Morris): Spin doctor: unwinding stellar contamination from TRAPPIST-1 - Archival
- Co-I (PI Néstor Espionza, Co-PI Diana Powell): Hot Jupiter Atmospheric Forecast: Are mornings cloudier than evenings in other worlds? - 61.53 hours
- Co-I (PI Hannah Diamond-Lowe, Co-PI Joao Mendonca): The Hot Rocks Survey: Testing 9 Irradiated Terrestrial Exoplanets for Atmospheres - 115.11 hours
- Co-I (PI Chloe Fisher): TOI-125: Comparative Atmospheric Chemistry Within One System - 19.82 hours
- Co-I (PI Chloe Fisher): Constraining the Oxidation State of the Super-Earth TOI-1685 b - 24.72 hours

Hubble Space Telescope

- Co-I (PI Katherine Bennett): Flares, Everywhere and All at Once: An NUV/Optical Flare Study of Proxima Centauri - 23 orbits
- Co-I (PI Leonardo dos Santos): Hydrodynamic atmospheric escape in a benchmark sample of exoplanets in the hot-Neptune desert - 20 orbits
- Co-I (PI David Sing): The HST/JWST synergy: A deep dive into the NUV with WASP-39b to answer key formation questions - 24 orbits
- Co-I (PI David Sing): Sculpting Hubble's Exoplanet Legacy: A Comprehensive Uniform Dataset of Exoplanet Transmission Spectra - Archival
- Co-I (PI David Sing): A Comparative Study of Planetary Atmospheres in Low-Metallicity Environments - 27 orbits

Apache Point Observatory

- PI: Confirmation of an Optical Slope in the Atmosphere of WASP-69b - 2 nights
- PI: Reanalysis of the Atmosphere of XO-2b in a New Epoch of KOSMOS - 2 nights

Selected Presentations

2025

Carnegie EPL Astronomy Seminar

Towards the detection of terrestrial atmospheres with JWST

MIT Stars & Planets Workshop

Investigating TRAPPIST-1(e) through a JWST campaign of close transit observations

Exoclimes VII

Using JWST and close transits to characterize the atmosphere of TRAPPIST-1 e

Planetary Astronomy Lunch Seminar, University of Maryland

Towards the detection of terrestrial atmospheres with JWST

Know Thy Star, Know Thy Planet 2

Characterizing the atmosphere of TRAPPIST-1 e in the face of stellar contamination

2024

JHU Exojamboree

Ibid.

Boston Area Planetary Science Meeting

Ibid.

MIT Stars & Planets Workshop

Ibid.

Exoplanets 5

Enabling JWST transmission spectroscopy in the presence of stellar contamination

Pandora Science Team Workshop

Dealing with stellar contamination: the case of TRAPPIST-1 e

2023

Exoclimes

HST SHEL: Enabling Comparative Exoplanetology with HST/STIS

STScI Spring Workshop: Planetary Systems and the Origins of Life in the Era of JWST

Towards the Simultaneous Retrieval of Planetary Atmospheres and Stellar Surfaces

AEThER Team Workshop

How do we observe the atmospheres of small planets?

American Astronomical Society Meeting 241

Towards the Simultaneous Retrieval of Planetary Atmospheres and Stellar Surfaces

2022

Exoplanets 4

ACCESS: Tentative detection of H2O in the ground-based optical transmission spectrum of the low density hot-Saturn HATS-5b

52nd Lunar and Planetary Science Conference

Simulating the Formation of Earth's Largest Impact Crater

Selected Service and Outreach

2025-	**Reviewer**, AAS, RAS, Nature Journals
2024-	**Goldwater Scholar Community Ambassadors**, Mentor
2024-	**Skype a Scientist**, Volunteer
2023-	**NASA Community College Network**, Volunteer
2022-	**Letters to a Pre-Scientist**, Volunteer
2024-2026	**JHU Physics and Astronomy Mentorship Program**, Mentor
2022-2026	**JHU Exoplanet No-PhDs Journal Club**, Founder, Organizer
2022-2023	**STScI Spring Symposium 2023**, Workshop Organizing Committee
2022	**NASA Panel**, Executive Secretary
2020-2026	**Physics and Astronomy Graduate Students**, Multiple organizing positions including undergraduate-graduate mentorship program lead, class representative, journal club lead

Selected Press

NASA, *NASA Webb Looks at Earth-Sized, Habitable-Zone Exoplanet TRAPPIST-1 e*

NRC Netherlands, *With lightning-fast observations, astronomers can see celestial phenomena that pass by in a flash*

Scientific American, *JWST Will Finally Hunt for Alien Moons—And Much More*

CBC Quirks and Quarks radio, *A crater in Africa was caused by an asteroid twice the size of the one that killed the dinosaurs*

Popular Science, *The asteroid that created Earth's largest crater may have been way bigger than we thought*

Professional Memberships

Hot Rocks Survey
Pandora Mission Team
AEThER Collaboration
JWST Telescope Scientist Team
JWST Transiting Exoplanet Community ERS Team
STARGATE Collaboration

Phi Beta Kappa (ΦBK)
Sigma Pi Sigma ($\Sigma\Pi\Sigma$)
American Physical Society (APS)
American Astronomical Society (AAS)
Society of Physics Students (SPS)