

Natalie Allen

Johns Hopkins University
nataliehallen.com
(206) 265-0789
nallen19@jhu.edu

EDUCATION

Johns Hopkins University

- Ph.D. in Astrophysics Expected Graduation: 2026
- M.A. in Physics Graduation: May 2023

University of Rochester

- B.S. in Physics and Astronomy, Minor in Mathematics Graduation: May 2020
 - *Cum Laude* with Highest Distinction (GPA: 3.86/4.0)
- Senior Thesis: *A Study of the Emission Line Structure of HH 7-11 with Hubble and Spitzer*
 - Advisor: Dan Watson

RESEARCH INTERESTS

Exoplanets: observation, atmospheres, formation, stellar activity, habitability, biosignatures

RESEARCH

Johns Hopkins University

Research Assistant (Advisor - [Dr. Néstor Espinoza](#)) Fall 2020 - Present

- Disentangling stellar contamination from atmospheric signals for terrestrial planets orbiting M dwarfs through joint retrievals
- Searching for constraints on morning/evening terminator limb inhomogeneities for transiting exoplanets
- Precise ground-based transit spectroscopy of exoplanets

Research Assistant (Advisor - [Dr. David Sing](#)) Fall 2020 - Present

- Comparative exoplanetology through a uniform reduction and analysis of all HST exoplanet atmosphere observations as part of the SHEL Archival Program
- Space-based UV to IR transit spectroscopy of giant planets as part of the PanCET Program

University of Rochester

Research Assistant (Advisor - [Dr. Dan Watson](#)) Spring 2017 - Present

- Research in star formation and outflows, primarily in nearby region NGC 1333
- Ran shock simulations using MAPPINGS V and wrote code in Python to match observational data from both the Spitzer and Hubble Space Telescopes to simulated data
- Reduced data from Hubble Space Telescope observations

Research Assistant (Advisor - [Dr. Miki Nakajima](#)) Spring 2019 - Summer 2022

- Research in terrestrial impact craters
- Ran simulations of the Vredefort crater impact in shock simulation iSALE

- Made comparisons of simulation results with geophysical evidence and compared to past studies

NASA Jet Propulsion Lab

Summer 2019

Research Intern (Advisor - [Dr. Karl Stapelfeldt](#))

- Analyzed data from a number of different telescopes to explore star formation feedback and shock physics
- Attended [Sagan Summer Workshop on Astrobiology](#)

Space Telescope Science Institute

Summer 2018

Visiting Scientist (Guest of [Dr. Joel Green](#))

- Shared star formation research results with collaborators at Johns Hopkins University and Space Telescope Science Institute
- Wrote python code to analyze data from extreme stellar outflows
- Continued collaboration after summer position finished

PUBLICATIONS C. D. McGruder et al. incl. **N. H. Allen**. 2023. [ACCESS, LRG-BEASTS, & MOPSS: Featureless Optical Transmission Spectra of WASP-25b and WASP-124b](#), accepted in AJ.

M. Libralato et al. incl. **N. H. Allen**. 2023. [JWST-TST Proper Motions. I. High-precision NIRISS Calibration and Large Magellanic Cloud Kinematics](#), ApJ, 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 NIRCам](#), Nature, 614, 653.

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

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](#), AJ, 164, 153.

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](#), AJ, 164, 134.

N. H. Allen, M. Nakajima, K. Wnnemann, et al. 2022. [A Revision of the Formation Conditions of the Vredefort Crater](#), JGR: Planets, 127, 8.

CONFERENCE TALKS/ POSTERS

N. H. Allen, D. K. Sing, N. Espinoza, R. O'Steen, N. Nikolov, Z. Rustamkulov, L. Ramos-Rosado, K. Stevenson, H. Wakeford, M. López-Morales, M. Alam, E. May, T.

Evans. HST SHEL: Enabling Comparative Exoplanetology with HST/STIS, Exeter, UK, June 26, 2023.

N. H. Allen, N. Espinoza. [Towards Simultaneous Retrievals of Planetary Atmospheres and Stellar Surfaces](#), *STScI Spring Symposium 2023: Planetary Systems and the Origins of Life in the Era of JWST*, Baltimore, MD, May 18, 2023.

N. H. Allen, N. Espinoza, B. Rackham, J. de Wit. [Towards the Simultaneous Retrieval of Planetary Atmospheres and Stellar Surfaces](#), *American Astronomical Society, AAS Meeting #241*, Seattle, WA, January 10, 2023.

N. H. Allen, N. Espinoza, A. Jordán, M. López-Morales, D. Apai, B. V. Rackham, D. J. Osip, I. C. Weaver, C. McGruder, H. Reggiani, R. Brahm, F. Rodler, N. K. Lewis, J. J. Fortney, J. Fraine, J. Kirk. [ACCESS: Tentative detection of H₂O in the ground-based optical transmission spectrum of the low density hot-Saturn HATS-5b](#), *Emerging Researchers in Exoplanet Science*, State College, PA, August 1, 2022.

N. H. Allen, N. Espinoza, A. Jordán, M. López-Morales, D. Apai, B. V. Rackham, D. J. Osip, I. C. Weaver, C. McGruder, H. Reggiani, R. Brahm, F. Rodler, N. K. Lewis, J. J. Fortney, J. Fraine, J. Kirk. [ACCESS: Tentative detection of H₂O in the ground-based optical transmission spectrum of the low density hot-Saturn HATS-5b](#), *Exoplanets IV*, Las Vegas, NV, May 1, 2022.

N. H. Allen, M. Nakajima, S. Helhoski, K. Wnnemann, D. Trail. [Simulating the Formation of Earth's Largest Impact Crater](#). *52nd Lunar and Planetary Science Conference*, Virtual, March 17, 2021.

N. H. Allen, K. Stapelfeldt, D. Watson, T. Bergin, A. Frank, T.N. Gautier. J. Green, S.T. Megeath, G. Melnick, D. Neufeld, A. Rubinstein. [A Study of the Infrared Emission Line Structure of HH 7-11 with Hubble and Spitzer](#). *American Astronomical Society, AAS Meeting #235*, Honolulu, HI, January 6, 2020.

N. H. Allen, T. Bergin, A. Frank, T.N. Gautier. J. Green, S.T. Megeath, G. Melnick, D. Neufeld, K. Stapelfeldt, D. Watson. [Outflows and star-formation feedback from young stellar objects in NGC1333](#). *American Astronomical Society, AAS Meeting #233*, Seattle, WA, January 7, 2019.

N. H. Allen, D. Watson. [Outflows and star-formation feedback from young stellar objects in NGC1333](#). *Maria Mitchell Women in Science Symposium*, Wellesley, MA, October 6, 2018.

N. H. Allen, T.P. Jacques. [Outflows and star-formation feedback from young stellar objects in NGC1333](#). *Conference for Undergraduate Women in Physics*, Rochester, NY, January 13, 2018.

OBSERVING

JWST

- Co-I (PI Néstor Espinoza, Co-PI Diana Powell): Hot Jupiter Atmospheric Forecast: Are mornings cloudier than evenings in other worlds?
- Co-I (PI Hannah Diamond-Lowe, Co-PI Joao Mendonca): The Hot Rocks Survey: Testing 9 Irradiated Terrestrial Exoplanets for Atmospheres
- Co-I (PI Chloe Fisher): TOI-125: Comparative Atmospheric Chemistry Within One System

- Co-I (PI Chloe Fisher): Constraining the Oxidation State of the Super-Earth TOI-1685 b

Hubble Space Telescope

- 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

Las Cumbres Observatory

- Co-I (PI Néstor Espinoza): Photometric Monitoring of TRAPPIST-1 To Enable Precision Spectroscopy of TRAPPIST-1e

Apache Point Observatory

- PI: Confirmation of an Optical Slope in the Atmosphere of WASP-69b
 - First transit spectroscopy with APO
 - One of the first uses of the KOSMOS Instrument
- PI: Reanalysis of the Atmosphere of XO-2b in a New Epoch of KOSMOS

LEADERSHIP POSITIONS

Johns Hopkins University

Exoplanet No-PhDs Journal Club

Spring 2023-Present

- Co-founder and organizer

Physics and Astronomy Graduate Students association Fall 2020 - Spring 2023

- Fall 2022 - Spring 2023: No-PhDs Journal Club/Wine & Cheese talks co-chair
- Fall 2021 - Spring 2022: Second-year graduate student representative, Undergraduate liaison, No-PhDs Journal Club co-chair
 - Organized "Reading Program" undergraduate/graduate mentorship program
- Fall 2020 - Spring 2021: First-year graduate student representative, Undergraduate liaison co-chair
 - Helped to plan prospective graduate student open house

University of Rochester

Society of Physics Students

Fall 2017 - Spring 2020

(Secretary Fall 2017 - Spring 2018, President Fall 2018 - Spring 2019)

- Coordinated physics and astronomy intro level class tutoring
- Delegated executive board chairs and committees
- Helped plan outreach, social, and professional development events

Society of Women in Astronomy and Physics

Fall 2017 - Spring 2020

(President, Fall 2017 - Spring 2019, Secretary Fall 2019 - Spring 2020)

- Co-founder, successfully proposed and accepted as official student organization
- Held social and professional development events to create a community for an underrepresented group in physics and astronomy
- Created outreach events to promote the development of women in STEM

HONORS AND AWARDS	National Science Foundation Graduate Research Fellowship	2020-2023
	Stoddard Senior Thesis Prize, U. of Rochester Physics and Astronomy	2020
	Janet Fogg Prize, U. of Rochester Physics and Astronomy	2020
	Undergraduate Teaching Award, U. of Rochester Physics and Astronomy	2020
	Barry M. Goldwater Scholarship	2019-20
	USRA Distinguished Undergraduate Award – Frederick A. Tarantino Scholarship	2019
	Outstanding Chapter Award - Society of Physics Students National	2017-18, 2018-19
	Blake Lily Prize, Society of Physics Students National	2017-18, 2018-19
	Women in Physics Grant, American Physical Society	2018
	Excellence in Cosponsorship - Society of Physics Students, U. of Rochester	2018
	Whipple Science & Research Scholarship, U. of Rochester	2016-2020
SERVICE	STScI Spring Symposium 2023, Workshop Organizing Committee	2022-2023
	Executive Secretary for NASA Panel	2022
TEACHING EXPERIENCE	University of Rochester	
	Department of Physics and Astronomy - Peer Advisor	Fall 2019 - Spring 2020
	College Center for Advising Services	
	<ul style="list-style-type: none"> Advise Physics and Astronomy students on classes, research opportunities, etc. 	
	Department of Physics and Astronomy - Teaching Assistant	Fall 2017 - Spring 2020
	<ul style="list-style-type: none"> Astronomy 142: Elementary Astrophysics (Honors) 	Spring 2019, 2020
	<ul style="list-style-type: none"> Astronomy 111: The Solar System & Its Origin 	Fall 2017, 2018, 2019
	<ul style="list-style-type: none"> Astronomy 102: Relativity, Black Holes, and the Big Bang 	Spring 2018
	Society of Physics Students Workshops	Fall 2017 - Spring 2020
	<ul style="list-style-type: none"> Taught workshops on Mathematica and Python to college students Gave talks on research and college to high school students at Brighton High School 	
MEMBERSHIPS	Pandora Mission Team	
	AETHeR Collaboration	
	JWST Telescope Scientist Team	
	JWST Transiting Exoplanet Community Early Release Science 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)	
COMPUTER SKILLS	Python	Igor Pro
	UNIX shell scripting (Bash)	TheSky6
	SAOImage DS9	CCDSOFT
	Mathematica	CCDStack
	L ^A T _E X	Microsoft Office Suite