

**Interests** I develop and maintain open source software in Python, often in the pursuit of characterizing exoplanets and their host stars with observations from the ground and from space.

**Employment** Senior Software Engineer September 2022 – present  
Space Telescope Science Institute, MD, USA

NCCR PlanetS Postdoctoral Research Fellow July 2019 – August 2022  
Universität Bern, Bern, Switzerland

**Education** University of Washington, Seattle, WA, USA  
PhD in Astronomy and Astrobiology June 2014 – April 2019  
M.Sci. in Astronomy Sep 2013 – June 2014  
Dissertation: “The Effects of Stellar Magnetic Activity and Variability on Observations of Exoplanets”

University of Maryland, College Park, MD, USA Aug 2009 – Dec 2012  
B.Sci. with High Honors in Astronomy  
B.Sci. in Physics (double degree)

**Open-Source Software** *Leadership Roles:*

- [astropy Team roles](#): Workshops Coordinator (2019-present) and NDData module maintainer (2023-present)
- [OpenAstronomy](#) Steering Committee member (2018-present)
- Former manager of the [Exoclimate Simulation Platform](#) (2020-2022)

*Selected projects:*

- **Maintainer and contributor** of [astropy](#) (in the top 50 of >400 contributors, 2015-present)
- **Co-creator and maintainer** of [astroplan](#): an [astropy-affiliated package](#) for astronomical observation planning (top contributor, 2015-present)
- **Contributor and former maintainer** to [Exoclimates Simulation Platform](#) (2019-2022)
- **Creator** of pedagogical statistics tutorials for data science on [Markov Chain Monte Carlo](#), [Gaussian Process regression](#), and [Approximate Bayesian Computation](#)
- **Creator** of [shampoo](#): numerical reconstruction toolkit for digital holographic microscopy for microbiology and astrobiology (top contributor, 2015-present)

**Software Workshops**

- **Leader**: astropy and jdaviz Workshops, Université de Montréal, Canada, 2023 April 5
- **Instructor**: Introduction to Astropy Workshop, 241st Meeting of the American Astronomical Society, 2023 January 8
- **Leader**: Astropy For Heliophysicists, Python in Heliophysics Summer School, ESAC, Madrid, Spain, 2022 May 30
- **Instructor**: Introduction to Astropy Workshop, 238th Meeting of the American Astronomical Society, 2021 June 4
- **Instructor**: Introduction to Astropy Workshop, 237th Meeting of the American Astronomical Society, 2021 January 7-8
- **Leader**: Queens University Belfast, 2019 November 21 ([resources/debrief](#))
- **Leader**: Geneva Observatory, 2019 November 14 ([resources/debrief](#))
- **Leader**: University of Bern, 2019 October 28 ([resources/debrief](#))

– **Certified** [Software Carpentry](#) Instructor (2019-present)

## Honors And Awards

- University of Washington Distinguished Dissertation Award in Math, Physical Sciences & Engineering (2019)
- University of Washington Astronomy Department Graduate Student Research Prize (2018)
- Poster competition winner at the NASA Kepler Science Conference IV (earned [prize talk](#))
- Astrobiology Fellow, University of Washington, 2013-2014.

## Publications *Summary:*

17 peer-reviewed first-author articles, five short publications (RNAAS, JOSS) as lead author, one sole-author article. *h*-index = 25 ([Google Scholar](#)). >2600 citations (excluding astropy papers).

### *First author works:*

17. [Physically-motivated basis functions for temperature maps of exoplanets](#)  
**Morris, B.M.**; Heng, K.; Jones, K; Piaulet, C; Demory, B.-O.; Kitzmann, D.; Hoeijmakers, H.J. A&A (2022)
16. [CHEOPS Precision Phase Curve of the Super-Earth 55 Cnc e](#)  
**Morris, B.M.**; Delrez, L.; Brandeker, A.; Cameron, A. C.; et al. A&A (2021)
15. [A CHEOPS White Dwarf Transit Search](#)  
**Morris, B.M.**; Heng, K.; Brandeker, A.; Swan, A.; Lendl, M. A&A (2021)
14. [Hunt for Starspots in HARPS Spectra of G and K Stars](#)  
**Morris, B.M.**; Hoeijmakers, H.J.; Kitzmann, D.; Demory, B.-O. ApJ (2020)
13. [A Relationship Between Stellar Age and Spot Coverage](#)  
**Morris, B.M.** ApJ (2020)
12. [The Stellar Variability Noise Floor for Transiting Exoplanet Photometry with PLATO](#)  
**Morris, B.M.**; Bobra, M.G.; Agol, E.; Lee, Y.J.; Hawley, S.L., MNRAS (2020)
11. [Stellar Properties of Active G and K Stars: Exploring the Connection between Starspots and Chromospheric Activity](#)  
**Morris, B.M.**; Curtis, J.L.; Sakari, C.; Hawley, S.L.; Agol, E., AJ (2019)
10. [The Solar Benchmark: Rotational Modulation of the Sun Reconstructed from Archival Sunspot Records](#)  
**Morris, B.M.**; Davenport, J.R.A.; Giles, H.A.C.; Hebb, L.; Hawley, S.L.; Angus, R.; Gilman, P.; Agol, E., MNRAS (2019)
9. [Are Starspots and Planets Co-Located on Active G and K Stars?](#)  
**Morris, B.M.**; Curtis, J.L.; Douglas, S.T.; Hawley, S.L.; Agüeros, M.A.; Bobra, M.G.; Agol, E. ApJL (2018)
8. [Non-detection of Contamination by Stellar Activity in the Spitzer Transit Light Curves of TRAPPIST-1](#)  
**Morris, B.M.**, Agol E., Hebb L., Hawley S.L., Gillon M., Ducrot E., Delrez L., Ingalls J., Demory B.-O. ApJL 863, L32 (2018)
7. [Robust Transiting Exoplanet Radii in the Presence of Starspots from Ingress and Egress Durations](#)  
**Morris, B.M.**, Agol E., Hebb, L., Hawley, S.L., AJ 156, 91 (2018)
6. [Possible Bright Starspots on TRAPPIST-1](#)  
**Morris, B.M.**, Agol, E., Davenport, J.R.A., Hawley, S.L. ApJ 857, 1 (2018)
5. [Spotting stellar activity cycles in Gaia astrometry](#)  
**Morris, B.M.**, Agol, E.; Davenport, J.R.A., Hawley, S.L. MNRAS 476 4 (2018)
4. [astroplan: An Open Source Observation Planning Package in Python](#)  
**Morris, B.M.**, Tollerud E., Sipocz B., Deil C., Douglas S.T., Medina J.B., Vyhmeister K., Smith T.R., Littlefair S., Price-Whelan A.M., Gee W.T., Jeschke E. AJ 155, 128 (2018)

3. [Chromospheric Activity of HAT-P-11: an Unusually Active Planet-Hosting K Star](#)  
**Morris, B.M.**, Hawley S.L., Hebb L., Saraki C., Davenport J.R.A., Isaacson H., Howard A.W., Montet B.T., Agol E., *ApJ*, 846, 99 (2017)
2. [The Starspots of HAT-P-11: Evidence for a Solar-like Dynamo](#)  
**Morris, B.M.**, Hebb L., Davenport J.R.A., Rohn G., Hawley S.L., *ApJ*, 846, 2 (2017)
1. [Kepler's Optical Secondary Eclipse of HAT-P-7b and Probable Detection of Planet-induced Stellar Gravity Darkening.](#)  
**Morris, B.M.**, Mandell, A.M., & Deming, D. *ApJL*, 764, L22 (2013)

*Contributed significantly to:*

16. [Investigating the visible phase curve variability of 55 Cnc e](#)  
Meier Valdés, E.A.; **Morris, B.M.**, et al. *A&A* (2023)
15. [The stable climate of KELT-9b](#)  
Jones, K.; **Morris, B.M.**, et al. *A&A* (2022)
14. [Weak evidence for variable occultation depth of 55 Cnc e with TESS](#)  
Meier Valdés, E.A.; **Morris, B.M.**, et al. *A&A* (2022)
13. [Spi-OPS: Spitzer and CHEOPS confirm the near-polar orbit of MASCARA-1 b and reveal a hint of dayside reflection](#)  
Hooton, M.J., Hoyer, S., Kitzmann, D., **Morris, B.M.**, et al. *A&A* (2021)
12. [Closed-form ab initio solutions of geometric albedos and reflected light phase curves of exoplanets](#)  
Heng, K., **Morris, B.M.**, and Kitzmann, D., *NatAs* (2021)
11. [Monitoring precipitable water vapour in near real-time to correct near-infrared observations using satellite remote sensing](#)  
Meier Valdés, E.A., **Morris, B.M.**, and Demory, B.-O., *A&A* (2021)
10. [Refining the Transit-timing and Photometric Analysis of TRAPPIST-1: Masses, Radii, Densities, Dynamics, and Ephemerides](#)  
Agol, E., Dorn, C., Grimm, S.L., Turbet, M., Ducrot, E., Delrez, L., Gillon, M., Demory, B.-O., Burdanov, A., Barkaoui, K., Benkhaldoun, Z., Bolmont, E., Burgasser, A., Carey, S., de Wit, J., Fabrycky, D., Foreman-Mackey, D., Haldemann, J., Hernandez, D.M., Ingalls, J., Jehin, E., Langford, Z., Leconte, J., Lederer, S.M., Luger, R., Malhotra, R., Meadows, V.S., **Morris, B.M.**, Pozuelos, F.J., Queloz, D., Raymond, S.N., Selsis, F., Sestovic, M., Triaud, A.H.M.J., and Van Grootel, V., *PSJ* (2021)
9. [RotNet: Fast and Scalable Estimation of Stellar Rotation Periods Using Convolutional Neural Networks](#)  
Johnson, J.E., Sundaresan, S., Daylan, T., Gavilan, L., Giles, D.K., Ishitani Silva, S., Jungbluth, A., **Morris, B.**, and Muñoz-Jaramillo, A., *NeurIPS* (2020)
8. [Exploring the Atmospheric Dynamics of the Extreme Ultrahot Jupiter KELT-9b Using TESS Photometry](#)  
Wong, I., Shporer, A., Kitzmann, D., **Morris, B.M.**, et al. *AJ* (2020)
7. [Kepler Object of Interest Network. III. Kepler-82f: a new non-transiting 21  \$M\_{\oplus}\$  planet from photodynamical modelling](#)  
Freudenthal, J., von Essen, C., Ofir, A., Dreizler, S., Agol, E., Wedemeyer, S., **Morris, B.M.**, Becker, A.C., Deeg, H.J., Hoyer, S., Mallonn, M., Poppenhaeger, K., Herrero, E., Ribas, I., Boumis, P., and Liakos, A., *A&A* (2019)
6. [Diffuser-assisted Photometric Follow-up Observations of the Neptune-sized Planets K2-28b and K2-100b](#)  
Stefansson, G., Li, Y., Mahadevan, S., Wisniewski, J., Hebb, L., **Morris, B.M.**, Huehnerhoff, J., and Hawley, S., *AJ* (2018)
5. [The 0.8-4.5  \$\mu\text{m}\$  Broadband Transmission Spectra of TRAPPIST-1 Planets](#)  
Ducrot, E., Sestovic, M., **Morris, B.M.**, et al. *AJ* (2018)
4. [Kepler Object of Interest Network. II. Photodynamical modelling of Kepler-9 over 8 years of transit observations](#)

Freudenthal, J., von Essen, C., Dreizler, S., Wedemeyer, S., Agol, E., **Morris, B.M.** et al., A&A (2018)

3. [Extreme precision photometry from the ground with beam-shaping diffusers for K2, TESS, and beyond](#)  
Stefansson, G., Mahadevan, S., Wisniewski, J., Li, Y., Hebb, L., **Morris, B.M.**, Halverson, S., Monson, A., and Robertson, P., SPIE (2018)
2. [Kepler Object of Interest Network. I. First results combining ground- and space-based observations of Kepler systems with transit timing variations](#)  
von Essen, C., Ofir, A., Dreizler, S., Agol, E., Freudenthal, J., Hernández, J., Wedemeyer, S., Parkash, V., Deeg, H.J., Hoyer, S., **Morris, B.M.** et al., A&A (2018)
1. [Toward Space-like Photometric Precision from the Ground with Beam-shaping Diffusers](#)  
Stefansson, G., Mahadevan, S., Hebb, L., Wisniewski, J., Huehnerhoff, J., **Morris, B.M.** et al., ApJ (2017)

*Short works:*

- [fleck: Fast approximate light curves for starspot rotational modulation](#)  
**Morris, B.M.** Journal of Open Source Software (2020)
- [arcesetc: ARC Echelle Spectrograph Exposure Time Calculator](#)  
**Morris, B.M.**, Dorn-Wallenstein T., Levesque E., Sakari C., Gies D., Lester K., Notsu Y., Youngblood A., McMillan, R. Journal of Open Source Software (2019)
- [aesop: ARC Echelle Spectroscopic Observation Pipeline](#)  
**Morris, B.M.** & Dorn-Wallenstein T. Journal of Open Source Software (2018)
- [Pre-MAP Search for Transiting Objects Orbiting White Dwarfs](#)  
Wallach, A, **Morris, B.M.**, et al. RNAAS 2 1 (2018)
- [Large Starspot Groups on HAT-P-11 in Activity Cycle 1](#)  
**Morris, B.M.**, Hawley, S.L., Hebb, L. RNAAS 2 1 (2018)
- [Photometric Analysis and Transit Times of TRAPPIST-1 b and c](#)  
**Morris, B.M.**, Agol, E., Hawley S.L. RNAAS, 2, 1 (2018)

**Observing Experience**

- **Principal investigator** of an 84 orbit [Guest Observer program](#) on the CHEOPS space telescope (2020)
- **Principal investigator** on >180 half-nights on the Astrophysical Research Consortium (ARC) 3.5 m Telescope at Apache Point Observatory (APO, 2013-present), with experience using many instruments including: ARCES (echelle spectrograph), ARCTIC (optical imager), Agile (frame-transfer imager), NICFPS (IR imager)
- **Principal investigator** on Keck Observatory/MOSFIRE proposal: “[Probing Giant Planet Formation with MOSFIRE Exoplanet Transmission Spectroscopy](#)”, awarded 2 nights (2014)
- **Principal investigator** on University of Maryland Observatory, 152 mm campaign: >100 hours collecting photometry of transiting exoplanets and asteroids (2010-2013)

**Past Employment**

**Software Engineer** in Digital Holographic Microscopy November 2016 – 2019  
Software consultant position in the UW Department of Oceanography under Prof. Jody Deming and Dr. J. Kent Wallace.  
– Developed and maintained the [shampoo](#) digital holographic microscopy numerical reconstruction toolkit in Python.  
– This software enables efficient reconstruction of holograms for bacterial motility studies, with applications in life-detection for astrobiology.

**Consultant** for Center for Inquiry Science at the Institute for Systems Biology 2014-2015  
STEM curriculum consulting for middle school science teachers

- Worked with school science teachers in Renton School District to adapt their curriculum to comply with new state standards as part of the Partnership in Science and Engineering Practices project.
- Collaborated with science teachers at Meeker Middle School (Tacoma, WA) to update a Sun-Moon-Earth system lab as part of the Observing for Evidence of Learning professional development model.

**Research Assistant** at NASA's Goddard Space Flight Center Jan 2013 – Aug 2013  
Post-baccalaureate research assistantship with advisor Dr. Avi Mandell at the Goddard Center for Astrobiology.

- Prepared a Python data reduction pipeline for near-infrared differential spectrophotometric observations with Keck/MOSFIRE and Keck/NIRSPEC of transiting exoplanet atmospheres.

### Selected Professional Presentations

- **Plenary talk:** [“The Activity Cycle of HAT-P-11.”](#) Cool Stars 20. Boston, MA. July 31, 2018.
- **Prize talk:** “The Active Latitudes of HAT-P-11” Kepler & K2 Science Conference IV, Mountain View, CA. June 19, 2017 (poster competition prize winner)
- Contributed talk: [“astroplan: Observation Planning for Astronomers.”](#) Python in Astronomy Conference 2016. Seattle, WA. March 25, 2016.

### Invited Presentations

- **Seminar**, “Phase Curves of Giant Exoplanets,” Université de Montréal, Canada, April 2023
- **WE-Heraeus Seminar**, “Fading Memories of Magnetic Youths,” Physikzentrum Bad Honnef, Germany, January 2023
- **Colloquium**, “Phase curves of giant exoplanets: clear or cloudy?” University of Washington, Seattle, WA, Nov 2022
- **ISSI Plenary**, “New and old benchmarks for stellar magnetic activity,” ISSI Workshop on “Solar and stellar dynamos”, Bern, Switzerland, June 2022
- **Colloquium**, “Phase curves of giant exoplanets: clear or cloudy?” Ludwig Maximilian University of Munich (LMU), Germany, April 2022
- **Seminar**, “A practical introduction to leave-one-out cross-validation,” ORIGINS Data Science Lab, Munich, Germany, March 2022
- **ISSI Plenary**, “The Stellar Variability Noise Floor,” ISSI Workshop on “Getting Ultra-Precise Planetary Radii with PLATO: The Impact of Limb Darkening and Stellar Activity on Transit Light Curves,” Bern, Switzerland, September 2021
- **Seminar**, “Issues of Replicability in Astrophysics,” Philosophy of Science Cafe, Bern, Switzerland, August 2019
- **Seminar**, “The Effects of Stellar Magnetic Activity and Variability on Observations of Exoplanets,” University of Exeter, England, October 2019

### Teaching Experience

- Course instructor (full teaching responsibilities): ASTR192 Pre-Major in Astronomy Program (Pre-MAP) in Fall 2016, developed [open-source Python curriculum](#)
- Academic mentor ASTR192 Pre-Major in Astronomy Program (Pre-MAP) in Fall 2015
- Instructor of UW Astro/Phys Python Bootcamp, 2016 (and co-instructor in 2015)
- Teaching assistant for ASTR150 The Planets (three quarters) ASTR101 Intro Astronomy (one quarter), Intro to Observational Astronomy (one semester)

## Mentorship

- Primary day-to-day supervisor to PhD student Kathryn Jones (Bern, 2020-2022)
- Lead mentor in the [Google Summer of Code](#) program for improvements to [astropy-affiliated packages](#) (mentees: Karl Vyhmeister 2016, Tiffany Jansen 2019)
- 2014-2019: Formed the Search for Planets Around post-Main Sequence stars (SPAMS) research group with five undergraduates in the University of Washington's Pre-Major in Astronomy Program ([Pre-MAP](#)), which searches for transiting planetary material orbiting white dwarfs

## Public Outreach

- Co-founder and co-host of over forty events of the Seattle satellite branch of [Astronomy on Tap](#) (2015-2019).
- [Science Communication Fellow](#) at the [Pacific Science Center](#) (2016-2019)

## Press

- Feature article: "[Counting Starspots](#)", Astronomy Magazine. January 17, 2018.
- Science outreach TwitterBots that I created and maintain have been featured by [Popular Mechanics](#) and [Vocativ](#)
- Press release: "[NASA-funded Program Helps Amateur Astronomers Detect Alien Worlds](#)". NASA Goddard Space Flight Center, Greenbelt, Md. September 4, 2013.

## Service

- Reviewer: ApJ, AJ, MNRAS, A&A, JOSS
- Telescope Allocation Committees: University of Washington/Apache Point Observatory