BRETT M. MORRIS

morrisbrettm@gmail.com

GitHub: @bmorris3

http://brettmorr.is

Interests

I characterize exoplanets and their host stars with observations from the ground and from space, with a focus on astrobiology. In the process, I develop and maintain open source software in Python.

Employment

Universität Bern, Switzerland — July 2019 - present
NCCR PlanetS Postdoctoral Research Fellow

Education

University of Washington, Seattle, WA, USA — June 2014 – April 2019
PhD in Astronomy and Astrobiology

University of Washington, Seattle, WA, USA — Sep 2013 – June 2014
M.Sci. in Astronomy

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:

- Workshops Coordinator for astropy (2019-present)
- OpenAstronomy Steering Committee member (2018-present)
- Manager of the Exoclime Simulation Platform (2020-present)

Selected projects:

- **Co-creator and maintainer** of astroplan: an astropy-affiliated package for astronomical observation planning (top contributor, 2015-present)
- **Creator and maintainer** of shampoo: numerical reconstruction toolkit for digital holographic microscopy for microbiology and astrobiology (top contributor, 2015-present)
- **Contributor** to astropy (in the top 40 of $>$300 contributors, 2015-present)
- **Contributor** to Exoclimes Simulation Platform (2019-present)
- **Creator** of pedagogical statistics tutorials for data science on Markov Chain Monte Carlo, Gaussian Process regression, and Approximate Bayesian Computation

Software Workshops

- **Instructor**: Introduction to Astropy Workshop, 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)

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.

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 presentation)

– Astrobiology Fellow, University of Washington, 2013-2014.

Observing Experience

– **Principle investigator** of an 84 orbit Guest Observer program on the CHEOPS space telescope (2020)

– **Principle investigator** on more than 90 half-nights on the Astrophysical Research Consortium (ARC) 3.5 m Telescope at Apache Point Observatory (APO), with experience using many instruments including: ARCES, ARCTIC, Agile, NICFPS (2013-present)

– **Principle investigator** on Keck Observatory/MOSFIRE proposal: "Probing Giant Planet Formation with MOSFIRE Exoplanet Transmission Spectroscopy", awarded 2 nights (2014)

– **Principle investigator** on University of Maryland Observatory, 152 mm campaign: $>$100 hours collecting photometry of transiting exoplanets and asteroids (2010-2013)

Publications

First author works:

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 Plages 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)

Research Notes:

- 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)

Professional Presentations

- **Plenary talk**: "The Activity Cycle of HAT-P-11." Cool Stars 20. Boston, MA. July 31, 2018.
- Contributed talk: "The Active Latitudes of HAT-P-11." Northwest Astronomy Meeting 2016. Bellingham, WA. October 29, 2016.
- Contributed talk: "astroplan: Observation Planning for Astronomers." Python in Astronomy Conference 2016. Seattle, WA. March 25, 2016.

Teaching Experience

- PhD student advising: Kathryn Jones (Bern)
- 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) and ASTR101 Intro Astronomy (one quarter).

Mentorship

- 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).
- Former Science Communication Fellow at the Pacific Science Center

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*