

- Interests** I am interested in characterizing exoplanets, and their host stars. I study how stellar activity affects planet characterization via observations from the ground and from space.
- Education**
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|---|----------------|
| University of Washington, Seattle, WA<br>Graduate student in Astronomy and Astrobiology (dual-title PhD program)  | 2014 – present |
| University of Washington, Seattle, WA<br>M.S. in Astronomy  | 2013 – 2014    |
| University of Maryland, College Park, MD<br>B.S. with High Honors in Astronomy<br>B.S. in Physics (double degree) | 2009 – 2012    |
- Selected Graduate Research**
- Stellar active latitudes of HAT-P-11** 2015 – present  
Using Kepler transit observations of active star HAT-P-11 to study the latitude distribution of spots, with Prof. Leslie Hebb, Prof. Suzanne Hawley and Dr. Jim Davenport
- Modeling starspot positions along transit chord in 200 transits using an original photometric inversion model and a forward modelling approach developed by Prof. Hebb
  - Measured starspot positions and radii, characterized properties of active latitudes
  - Observed spectroscopic activity indicators to verify the phase in the activity cycle deduced from spot occultation photometry
- KOINet: High-Speed Photometry for Transit Timing Variations** 2014 – present  
Using APO/ARC 3.5 m’s high-speed camera Agile for transit timing follow-up of Kepler targets with Prof. Eric Agol and Dr. Carolina von Essen
- Optimized observing techniques for high-precision transit timing observations from the ground
- Astrobiology Research Rotation: Digital holographic microscopy* Spring 2016  
Developed numerical reconstruction and specimen tracking algorithms for life-detection with Prof. Jody Deming and Dr. Jay Nadeau
- Developed an open source Python numerical hologram reconstruction pipeline called **shampoo**<sup>1</sup>
  - Algorithmically measured motility in psychrophilic bacteria
- Principle Investigator: Two nights at Keck Observatory (MOSFIRE)* 2014  
On transit transmission spectroscopy of giant exoplanet atmospheres in the near-infrared with Dr. Avi Mandell and Dr. Daniel Angerhausen
- Developed observing, data reduction, and analysis techniques for transmission spectroscopy of giant exoplanet atmospheres
  - Achieved spectrophotometric precision of  $<2\times$  the photon noise floor (Morris et al. 2016, in prep.)
- Google Summer of Code: Developer, maintainer of astroplan*<sup>2</sup> 2015 – present  
Co-wrote and presently maintain an **astropy**-affiliated package for observation planning with Dr. Erik Tollerud, Eric Jeschke, Dr. Christoph Deil and Dr. Adrian Price-Whelan
- Provides the first observation planning toolkit in Python built on the open source **astropy** ecosystem of Python packages for astronomers
  - Funded by the Python Software Foundation, **astroplan** was presented at the .Astronomy conference in Sydney, Australia in November 2015
- Principle Investigator: White dwarf photometry for 70+ nights at APO* 2014 – present  
Pulsation photometry and transiting planet search targeting metal-polluted white dwarfs (“SPAMS”)
- Monitoring newly classified, metal-polluted, ZZ Ceti white dwarfs for pulsations and transiting planets/planetary debris with the ARC 3.5 m and ARCSAT 0.5 m telescopes

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<sup>1</sup><https://github.com/bmmorris3/shampoo>

<sup>2</sup><https://github.com/astropy/astroplan>

- Mentoring undergraduate [Pre-MAP](#) students to reduce, analyze the data for credit

**Employment Professional Assistantship in Holographic Microscopy** November 2016 – present  
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, which was created during my Astrobiology Rotation project.
- This software enables efficient reconstruction of holograms for bacterial motility studies, with applications in life-detection for astrobiology.
- **shampoo** has become the lab-standard reconstruction software for our collaborators in the [SHAMU](#) lab (PI Jay Nadeau, Caltech)

**Consultant: 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.

**NASA Goddard Space Flight Center Research Assistantship** 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.

**Publications** *First author:*

- **Morris, B.M.**, Mandell, A.M., Deming, D. “[Kepler’s Optical Secondary Eclipse of HAT-P-7b and Probable Detection of Planet-Induced Stellar Gravity Darkening.](#)” *The Astrophysical Journal Letters*, Volume 764, Issue 2, article id. L22, 5 pp. (2013).

*n<sup>th</sup> author:*

- Hallakoun, N.; Maoz, D.; Kilic, M.; Mazeh, T.; Agol, E.; Bell, K. J.; Bloemen, S.; Brown, W. R.; Debes, J.; Faigler, S.; Gianninas, A.; Kull, I.; Kupfer, T.; Loeb, A.; **Morris, B. M.**; Mullally, F. “[SDSS J1152+0248: An eclipsing double white dwarf from the Kepler K2 campaign.](#)” Submitted, arXiv:1507.06311.

**Honors  
And  
Awards**

- Pacific Science Center Science Communication Fellow (2016)
- Chambliss Astronomy Achievement Graduate Student Award Honorable Mention. 225<sup>th</sup> AAS, Seattle, WA (2015), and 222<sup>nd</sup> AAS, Indianapolis, IN (2013).
- Astrobiology Fellow, University of Washington, 2013-2014.

**Observing  
Experience**

- **Principle investigator** on Keck Observatory/MOSFIRE proposal: “Probing Giant Planet Formation with MOSFIRE Exoplanet Transmission Spectroscopy”, awarded 2 nights (2014)
- **Co-investigator** on Very Large Telescope/KMOS proposal: “Exoplanet transits with KMOS: Is GJ 1214b a water-world Super Earth or a cloudy Mini-Neptune?”, awarded 2 nights (PI: D. Angerhausen, 2014)
- **Co-investigator** on Keck Observatory/MOSFIRE proposal: “Comprehensive Characterization of CoRoT-2b and XO-1b with Keck Observatory/MOSFIRE”, awarded 2 nights (PI: A. Mandell, 2013)
- **Co-investigator** on Kitt Peak National Observatory 2.1m/FLAMINGOS proposal: “A Near-infrared Exoplanet Transit and Eclipse Survey”, awarded 6 nights (PI: D. Deming, 2012)

- Undergraduate research at the University of Maryland Observatory, 152 mm (2010-2013): > 100 hours collecting photometry of transiting exoplanets and asteroids.

## Workshops

- Sagan Summer Workshop: “Is There a Planet in My Data? Statistical Approaches to Finding and Characterizing Planets in Astronomical Data.” Caltech, 2016.

## Professional Presentations

- 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.
- Poster: “[Exoplanet Transmission Spectroscopy in the Near-Infrared with Keck/MOSFIRE](#).” 225<sup>th</sup> American Astronomical Society Meeting. Seattle, WA. January 6, 2015.
- Poster: “[Kepler’s Optical Secondary Eclipse of HAT-P-7b and Probable Detection of Planet-Induced Stellar Gravity Darkening](#).” Second Kepler Science Conference, NASA Ames Research Center, Mountain View, CA. November 6, 2013.
- Talk: “[Kepler’s Optical Secondary Eclipse of HAT-P-7b and Probable Detection of Planet-Induced Stellar Gravity Darkening](#)”. AbGradCon 2013, McGill University, Montreal, Canada. June 11, 2013.

## Teaching Experience

- Course instructor (full teaching responsibilities): ASTR192 Pre-Major in Astronomy Program (Pre-MAP) in Fall 2016
- 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

- 2014-present: 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
- 2015-2016: Academic mentor (paid position) for Pre-MAP Cohort 11

## Public Outreach

- Co-founder and co-host of over twenty events of the Seattle branch of Astronomy on Tap (2015-present).
- Given many Seattle-area public science talks at the Pacific Science Center, Seattle Astronomical Society, Boeing Astronomical Society
- Developed open source differential photometry routine with educational documentation for amateur transiting exoplanet observations (OSCAAR).

## Press

- 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.
- Feature article in the UMD “[Scholars Newsletter](#)” for research achievements (Feb 2012).