Brett M. Morris

Curriculum Vitae

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Education

University of Washington, Seattle, WA — 2013 – present
Graduate student in Astronomy and Astrobiology (dual-title PhD program)
Astrobiology Fellow (2013)

University of Maryland, College Park, MD — 2009 – 2012
B.S. with High Honors in Astronomy
B.S. in Physics (double degree)

Research

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.

NASA Goddard Space Flight Center Research Associateship in Astrobiology — Jun 2012 – Aug 2012
Undergraduate research associateship with mentor Dr. Avi Mandell at the Goddard Center for Astrobiology.

- Wrote original Python algorithms to compute differential photometry of transiting exoplanet HAT-P-7b to detect the secondary eclipse using near-infrared observations from the Hale Telescope at the Palomar Observatory.
- Generated composite light curves with Kepler photometry to measure the orbital parameters and atmospheric properties of HAT-P-7b, with original analysis code in Python and IDL.
- Proposed the first evidence for planet-induced stellar gravity darkening in the HAT-P-7 system.

Undergraduate Research with Professor Drake Deming — Aug 2011 – Dec 2012
Independent research for credit (ASTR498), three semesters.

- Traveled to Arizona to act as co-investigator on an observing campaign on the 2.1m telescope at Kitt Peak National Observatory for transiting exoplanet observations in the near-infrared.
- Developed observing techniques and wrote Python algorithms to compute differential photometry of transiting extrasolar planets using observations obtained at the UMD Observatory, Kitt Peak National Observatory and Palomar Observatory.
- Made the first exoplanet transit light curves produced at the UMD Observatory.
- Released and maintain an open source differential photometry code for undergraduate and serious amateur astronomers called "OSCAAR[1]".
- Submitted transit light curves to the Czech Astronomical Society Exoplanet Transit Database recorded at the University of Maryland Observatory.

Department of Astronomy Senior Honors Thesis — Aug 2010 – Dec 2012
"Numerical Modeling of Rotational Fission of Contact Binary Asteroids" with Professor Derek Richardson, five semesters.

- Modeled binary asteroid systems in Python and interfaced with an N-body integrator to probe the relative configuration equilibria of continuously torqued contact binary asteroid systems. Used resources at the Department of Astronomy's Center for Theory and Computation and UMD's High Performance Computing Cluster, computed for more than 4 years of CPU time.
- Cited with "High Honors" by the Department of Astronomy for this work.

Undergraduate Research with Prof. Christopher Reynolds and Dr. Sean O'Neill — Spring 2010
Visualization of magneto-rotational instability in model black hole accretion disks, one semester.

[1] http://oscaar.github.io

- Produce visualizations with VisIt to emphasize relevant astrophysical processes in model black hole accretion disks in Python.

Honors And Awards

- Astrobiology Graduate Fellow, University of Washington, 2013-2014.
- "Audience Choice Award" at the *Astrobiology Speaks!* public outreach speaking competition. AbGradCon 2013, McGill University, Montreal, Canada.
- Chambliss Astronomy Achievement Graduate Student Award Honorable Mention. 222nd AAS, Indianapolis, IN.
- Invited to present thesis for Department of Astronomy Honors, awarded High Honors citation (2012).
- UMD Presidential Scholar, 2009-2012.
- College Park Scholar in the Science, Discovery and the Universe track, 2009-2011 (a two-year honors college program at UMD).

Publications

- **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).
- **Morris, B.M.** "Observations of Transiting Exoplanets with Differential Photometry." Scientific Terrapin, Vol. III, Issue I. Fall 2011.

Press

- "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).

Professional Presentations

- 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.
- Poster: "Differential Photometry with OSCAAR: Open Source Differential Photometry Code for Amateur Astronomical Research". AbGradCon 2013, McGill University, Montreal, Canada. June 12, 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.
- Poster: "Differential Photometry with OSCAAR: Open Source Differential Photometry Code for Amateur Astronomical Research". 222nd American Astronomical Society Meeting. Indianapolis, IN. June 4, 2013.
- Talk: "Secondary Eclipse and Transiting Timing of Extra-Solar Planet HAT-P-7b." 2012 NASA Goddard Space Flight Center Summer Research Associate Symposium. Goddard Center for Astrobiology, NASA Goddard Space Flight Center, Greenbelt, MD, August 9, 2012.
- Thesis defense: "Numerical Simulations of Rotational Fission of Contact Binary Asteroids." Department of Astronomy, University of Maryland, College Park, MD. May 4, 2012.
- Abstract: Springmann, S., Dalba, P., Marchis, F., Vachier, F., Berthier, J., Descamps, P., **Morris B.**, Marciniak, A., Ros, S., Kryszczynska, A. "Physical and orbital properties of the (22) Kalliope system from mutual eclipse observations." Asteroids, Comets, Meteors. Japan, May 2012.

Observing Experience

- Kitt Peak National Observatory, 2.1 m (June 2012): Co-investigator for 6 nights observing transiting extrasolar planets in the near-infrared.
- University of Maryland Observatory, 152 mm (2010-2013): $>$ 100 hours collecting photometry of transiting exoplanets and asteroids.

Teaching Experience

University of Washington

- Teaching assistant for two sections of ASTR150 The Planets (Fall 2013, Spring 2014).
- Teaching assistant for two sections of ASTR101 Intro Astronomy (Winter 2014).

University of Maryland

- Teaching assistant for ASTR310 Observational Astronomy for majors, experienced teaching night labs at the campus observatory (Fall 2011).
- Teaching assistant for ASTR100 Introduction to Astronomy for non-majors (Fall 2012).
- Research and service mentor to five undergraduates in the College Park Scholars students, collaborating to build/improve an open source differential photometry code in Python (OSCAAR).

Public Outreach

- Developed open source differential photometry routine with educational documentation for amateur transiting exoplanet observations (OSCAAR).
- President of the "AstroTerps" (2011-2012), the UMD Astronomical Society.
- Volunteer for Visitor Services at the Smithsonian Air and Space Museum in Washington, D.C., May – Aug 2011

Public Talks

- "Exoplanets: How to find them and their inhabitants." Boeing Employee Astronomical Society. April 10, 2014.
- "Transiting Exoplanets: The Meek Telescopes Shall Inherit The Earths." Seattle Astronomical Society. December 18, 2013.
- "Astrobiology In The Age Of Kepler." TEDxRainier "after-day" at the University of Washington Planetarium, Seattle, WA. November 10, 2013.
- "Exoplanets: How To Find Them And Their Inhabitants." Kopernik Observatory and Science Center, Vestal, NY. July 17, 2013.
- "Earthlings: Get Over Yourselves." *Astrobiology Speaks!* Series, Redpath Museum, McGill University, Montreal, Canada. June 11, 2013.
- "Studying Transiting Exoplanets with the Biggest and Smallest Telescopes On and Off of Earth." University of Maryland Observatory Open House Public Talk. College Park, MD. March 5, 2013.