Benjamin V. Rackham

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EDUCATION

2012–2018 *University of Arizona, Tucson, AZ*
Ph.D. in Astronomy & Astrophysics
Astrobiology Minor
Advisor: Dr. Dániel Apai

2005–2009 *Westminster College, Salt Lake City, UT*
B.S. in Neuroscience, Honors Degree
Social Science Minor

EMPLOYMENT

2018–present Postdoctoral Research Associate, University of Arizona, Tucson, AZ

2017–2018 Graduate Research Assistant, University of Arizona, Tucson, AZ

2014–2017 NSF Graduate Research Fellow, University of Arizona, Tucson, AZ

2014–2014 Graduate Teaching Assistant, University of Arizona, Tucson, AZ

2012–2013 Graduate Research Assistant, University of Arizona, Tucson, AZ

2010–2012 Biological Technician, WestLand Resources, Inc., Tucson, AZ

2009–2010 Wildlife Technician, Utah Division of Wildlife Resources, Salt Lake City, UT

HONORS AND AWARDS

2014 *Graduate Research Fellowship*, National Science Foundation

2009 *The Trustees' Character Award*, Westminster College Board of Trustees
(One of only three student awards given at graduation)

2008 *The Dr. Barry Quinn and Dr. Bob Warnock Endowed Science Scholarship*, Westminster College

2007 *The Barnett Honors Scholarship*, Westminster College

REFEREED PUBLICATIONS

9 total (2 in review), 3 first-author, 92 total citations, ADS: https://goo.gl/T1Dzwf

First-author publications:

1. **Rackham, B. V.**, Apai, D., & Giampapa, M. S. *The Transit Light Source Effect II: The Impact of Stellar Heterogeneity on Transmission Spectra of Planets Orbiting Broadly Sun-like Stars.* Under review at AJ, resubmitted after receiving a favorable referee report, expected publication in Dec. 2018. Available at: https://brackham.github.io/publications/TLSE_II_submitted.pdf

2. **Rackham, B. V.**, Apai, D., & Giampapa, M. S. 2018. *The Transit Light Source Effect: False Spectral Features and Incorrect Densities for M-dwarf Transiting Planets.* ApJ 853, 122.
3. **Rackham, B. V.**, Espinoza, N., Apai, D., et al. 2017. *ACCESS I: An Optical Transmission Spectrum of GJ 1214b Reveals a Heterogeneous Stellar Photosphere.* ApJ 834, 151.

Second-author publications:

4. Bixel, A., **Rackham, B. V.**, Apai, D., et al. *ACCESS: Ground-based Optical Transmission Spectroscopy of the Hot Jupiter WASP-4b.* Under review at AJ, expected publication in Dec. 2018. Available at: https://brackham.github.io/publications/WASP4_submitted.pdf
5. Espinoza, N., **Rackham, B. V.**, Jordán, A. et al. 2019. *ACCESS: A Featureless Optical Transmission Spectrum for WASP-19b from Magellan/IMACS.* MNRAS 482, 2065.
6. Pinhas, A., **Rackham, B. V**, Madhusudhan, N., & Apai, D. 2018. *Retrieval of planetary and stellar properties in transmission spectroscopy with AURA.* MNRAS 480, 5314.

Co-authored publications:

7. Schlawin, E. et al. (including **Rackham, B. V.,** author 6 of 8) 2018. *Back to "Normal" for the Disintegrating Planet Candidate KIC 12557548 b.* AJ, in press. arXiv:1810:10012
8. Zhang, Z., Zhou, Y., **Rackham, B. V.**, & Apai, D. *The Near-Infrared Transmission Spectra of the TRAPPIST-1 Planets b, c, d, e, f, and g and Stellar Contamination in Multi-Epoch Transit Spectra*. AJ 156, 178.
9. Spake, J. J. et al. (including **Rackham, B. V.**, author 7 of 23) 2018. *Helium in the eroding atmosphere of an exoplanet.* Nature 557, 68.

Publications in preparation:

Rackham, B. V., Apai, D., López-Morales, M., et al. ACCESS: A Ground-based Optical Transmission Spectrum of the Ultra-hot Jupiter WASP-103b. *Submission expected in Dec. 2018.*

Rackham, B. V., Apai, D., López-Morales, M., et al. ACCESS: A Ground-based Optical Transmission Spectrum of WASP-80b. *Submission expected in Feb. 2019.*

WHITE PAPERS

Apai, D., **Rackham, B. V.**, Giampapa, M. S., et al. 2018. Understanding Stellar Contamination in Exoplanet Transmission Spectra as an Essential Step in Small Planet Characterization. White paper submitted to the NAS Committee on Exoplanet Science Strategy. https:/arxiv.org/abs/1803.08708

Fortney, J., Kataria, T., Stevenson, K. et al. (including **Rackham, B. V.**) 2018. The Origins Space Telescope: Towards an Understanding of Temperate Planetary Atmospheres. White paper submitted to the NAS Committee on Exoplanet Science Strategy. https:/arxiv.org/abs/1803.07730

CONFERENCE TALKS

Aug 2018 Rackham, B. V. et al. Constraining M-dwarf Photospheres through the Transit Light Source Effect. Cool Stars 20, Boston, MA.

Jul 2018 Rackham, B. V. et al. The Transit Light Source Effect. ExoPAG 18, Cambridge, MA.

Jul 2018 Rackham, B. V. et al. The Fault in Our Stars: Towards Constraining Stellar Contamination in Exoplanet Transmission Spectra. Exoplanets II, Cambridge, UK.

Nov 2017 Rackham, B. V. et al. The Light Source Problem: The Effect of Heterogeneous Stellar Photospheres on Searches for Transiting Exoplanet Biosignatures. Habitable Worlds 2017, Abstract #4032. Laramie, WY.

Apr 2017 Rackham, B. V. et al. The Effect of Heterogeneous Stellar Photospheres on Searches for Transiting Exoplanet Biosignatures. Astrobiology Science Conference 2017, Abstract #3610. Mesa, AZ.

Dec 2016 Rackham, B. V. et al. An Optical Transmission Spectrum of GJ 1214b Suggesting a Heterogeneous Stellar Photosphere. Magellan Science Symposium 2016. Washington, DC.

Oct 2016 Rackham, B. V. et al. An Optical Transmission Spectrum of GJ 1214b Suggesting a Heterogeneous Stellar Photosphere. 48th Annual DPS Meeting, Abstract #302.03. Pasadena, CA.

Jun 2015 Rackham, B. V. et al. How Can Ground-based Efforts Complement JWST Follow-up of Exciting TESS Planets? Astrobiology Science Conference 2015, Abstract #7491. Chicago, IL.

Oct 2014 Rackham, B. V. et al. An Optical Transmission Spectrum (4000-10000 Å) of the Super-Earth GJ 1214b. 46th Annual DPS Meeting, Abstract #104.07. Tucson, AZ.

INVITED TALKS

Nov 2018 Stars & Planets Seminar. Harvard-Smithsonian Center for Astrophysics. Cambridge, MA.

Nov 2018 Special Exoplanets Seminar. Massachusetts Institute of Technology. Cambridge, MA.

Nov 2018 Astrophysics Luncheon Talk. Jet Propulsion Laboratory. Pasadena, CA.

Nov 2017 Lunch Talk. ESO Vitacura. Santiago, Chile

Jul 2017 Special Exoplanet Seminar. Institute of Astronomy, University of Cambridge. Cambridge, UK.

OTHER SEMINARS AND LECTURES

Nov 2018 Disentangling stellar and planetary signals in exoplanet transmission spectra. Origins Lecture. Lunar and Planetary Laboratory, University of Arizona. Tucson, AZ.

Oct 2018 Disentangling stellar and planetary signals in transmission spectra. Special Talk. Center for Space and Habitability, University of Bern. Bern, Switzerland.

Aug 2018 Exoplanet transmission spectroscopy and the transit light source effect. Earth in Other Solar Systems All-Hands Meeting. Tucson, AZ.

May 2018 Disentangling stellar and planetary signals in transmission spectra. Origins Lecture. Department of Astronomy, University of Arizona. Tucson, AZ.

Sep 2017 The transit light source problem: the effect of stellar contamination on transmission spectra of low-mass exoplanets. Earths in Other Solar Systems All-Hands Meeting. Tucson, AZ.

May 2017 ACCESSing exoplanet atmospheres & constraining stellar photospheres. Origins Lecture. Department of Astronomy, University of Arizona. Tucson, AZ.

Mar 2017 An optical transmission spectrum of GJ 1214b reveals a heterogeneous stellar photosphere. Steward Internal Symposium. Department of Astronomy, University of Arizona. Tucson, AZ.

Sep 2016 Arizona-CfA-Católica Exoplanet Spectroscopy Survey update. Earths in Other Solar Systems All-Hands Meeting. Tucson, AZ.

Sep 2015 Transmission spectroscopy of transiting exoplanets. Earths in Other Solar Systems All-Hands Meeting. Tucson, AZ.

Oct 2014 Exoplanet atmospheres. Steward Internal Symposium. Department of Astronomy, University of Arizona. Tucson, AZ.

Jan 2014 How will we characterize habitable exoplanets? Origins Debate. Department of Astronomy, University of Arizona. Tucson, AZ.

POSTER PRESENTATIONS

Sep 2018 Rackham, B. V., Apai, D., Giampapa, M., Espinoza, N., Pinhas, A., Madhusudhan, N., Zhang, Z., Zhou, Y., and the ACCESS Team. Disentangling Stellar and Planetary Features in Transmission Spectra. Cloud Academy, Les Houches, France.

May 2016 Rackham, B. V., Apai, D., López-Morales, M., et al. ACCESS: Exploring exoplanet atmospheres through ground-based transmission spectroscopy. NExSS Face-to-Face Meeting. Washington, DC.

Dec 2015 Espinoza, N., Jordán, A., Apai, D., et al. (including Rackham, B. V.). Exploring the diversity of exoplanet atmospheres from the ground with the ACCESS Survey. Extreme Solar Systems III, Abstract #111.21. Waikoloa Village, HI.

Jan 2015 Wells, R. López-Morales, M., Lewis, N., et al. (including Rackham, B. V.). Constraining the atmospheric composition of WASP-18b. AAS Meeting #225, Abstract #257.01. Seattle, WA.

Jun 2014 López-Morales, M., Apai, D., Jordán, A., et al. (including Rackham, B. V.). ACCESS: The Arizona-CfA-Católica Exoplanet Spectroscopy Survey. AAS Meeting #224, Abstract #120.14. Boston, MA.

Mar 2014 Rackham, B. V. Espinoza, N., Apai, D., et al. Exploring the hot Neptune / super-Earth transition via ground-based transmission spectroscopy. Search for Life Beyond the Solar System: Exoplanets, Biosignatures, & Instruments, Abstract #P3.55. Tucson, AZ.

Mar 2014 Espinoza, N., Jordán, A., Rackham, B. V., et al. A ground-based optical transmission spectrum of WASP-31b. Search for Life Beyond the Solar System: Exoplanets, Biosignatures, & Instruments, Abstract #P3.53. Tucson, AZ.

ACCEPTED PI TELESCOPE PROPOSALS

2018B	"ACCESS: Probing exoplanet atmospheres and enabling TESS follow-up." Magellan 6.5 m, 1.5 nights; MMT 6.5 m, 1 night
2018A	"ACCESS: Probing exoplanet atmospheres from the ground and enabling TESS follow-up from the North and the South." Magellan 6.5 m, 1 night; MMT 6.5 m, 1 night
2014–2016	"ACCESS: Probing exoplanet atmospheres from the ground." Magellan 6.5 m, 2.5 nights
2013A	"Exploring the haze in the nearby super-Earth GJ 1214b." VATT 1.8 m, 6 nights

SELECTED CO-I TELESCOPE PROPOSALS

2013–2018	"ACCESS: The Arizona-CfA-Católica Exoplanet Spectroscopy Survey." (10+ programs, PIs: M. López-Morales, D. Apai, A. Jordán, D. Osip, N. Espinoza, N. Lewis). Magellan 6.5 m, 58 nights
2015B	"Inspecting the atmosphere of a transiting hot Jupiter." (PI: F. Rodler). LBT 2 × 8.4 m, 2 nights
2015B	"Variability monitoring of ACCESS targets: towards a precise and accurate view of exoplanetary atmospheres." (PI: N. Espinoza). LCOGT 1 m, 50 hours

OBSERVING EXPERIENCE

2014–2018	Kuiper 61"/Mont4k	9 nights
2013–2017	Magellan/IMACS	14 nights
2013–2017	VATT/VATT4K	30 nights
2017B	NTT/SOFI	7 nights
2016A	VATT/VATTSpec	5 nights
2013B	Magellan/MMIRS	4 nights
2013A	Magellan/MIKE	1 night
2012B	MMT/Hectospec	1 night
2012B	KPNO 2.1-m/IR Camera	2 nights

TEACHING EXPERIENCE

Spring 2014	Teaching Assistant for ASTR 170B1, The Physical Universe, University of Arizona. Developed and delivered three lectures and led 100+ students in four lab sessions.
Fall 2013	Teaching Assistant for ASTR 202, Life in the Universe, University of Arizona. Developed and delivered three lectures and an in-class lab for 100+ students.

MENTORING EXPERIENCE

2018	Postdoc mentor to senior graduate student Nicolas Garavito
2018	Co-advisor (with Dániel Apai) of undergraduate summer student Jose Perez Chavez
2015–2016	Senior graduate student mentor to junior graduate student Peter Senchyna
2014–2015	Senior graduate student mentor to junior graduate student Jianwei Lyu
2015	Co-advisor (with Dániel Apai) of undergraduate summer student Xiao Han
2013	Co-advisor (with Dániel Apai) of undergraduate summer student William Nolan
2013	Alumni mentor of Westminster College Honors Undergraduate Hannah Zweifel

OUTREACH ACTIVITIES

Jun 2018	Developed and led activity as part of Project POEM for 12 middle and high school students with visual impairments, which used sonified light curves to explore properties of transiting exoplanets. Mt. Lemmon, AZ.
2016–2017	Partnered with teacher Ramon Muñoz at Changemaker High School to develop and lead activities on exoplanets in math classes through the NOAO Project ASTRO Program. Tucson, AZ.
Jan 2015	Astronomy Activity Leader at Family Science Night at Senita Valley Elementary School. Tucson, AZ.
Nov 2014	Developed and instructed activity on exoplanets with Dániel Apai for the Osher Lifelong Learning Institute. Tucson, AZ.
Sep 2013	Invited public lecture for the Sonora Astronomical Society. Green Valley, AZ.
Jun 2013	Invited public lecture for the Tucson Amateur Astronomy Association. Tucson, AZ.
Mar 2013	Career Day presenter at Southside Community School. Tucson, AZ.

PROFESSIONAL SERVICE

2016	Prospective Student Visit Coordinator, University of Arizona Department of Astronomy
2015–2016	Graduate Editor, University of Arizona NSF GRFP Application Support Program
2013–2014	Local Organizing Committee, Search for Life Beyond the Solar System: Exoplanets, Biosignatures, & Instruments.

PROFESSIONAL REFERENCES

Current Advisor
Dr. Dániel Apai
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PI, EOS Team
Departments of Astronomy
and Planetary Sciences
The University of Arizona
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