Jessica L. Birky

Contact

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Research Interests

Stars, binary stars, stellar populations.
Large scale surveys, data analysis and modeling, machine learning and data-driven models.

Education

PhD in Astronomy – University of Washington — 2019 —
Interdisciplinary Data Science Track

MS in Astronomy – University of Washington — 2019 – 2021
BS in Physics – University of California, San Diego — 2015 – 2019

Research Positions

Graduate Student Researcher – University of Washington — Aug 2019 – Present
DIRAC Institute ; Advisor : James Davenport — *Seattle, WA*
Virtual Planet Laboratory ; Advisor : Rory Barnes

Topic : Inferring tidal evolution of binary stars using `VPLanet` and eclipsing binaries in open clusters

Undergraduate Researcher – University of California, San Diego — May 2016 – May 2019
Cool Star Lab ; Advisor : Adam Burgasser — *La Jolla, CA*

Topic : Implemented a forward modelling pipeline `apogee_tools` for inferring atmospheric and kinematic parameters of low-mass stars and brown dwarfs from high resolution spectra

Research Intern – Max Planck Institute für Astronomie — Summer 2017 & 2018
Stars & Milky Way groups ; Advisor : David Hogg — *Heidelberg, Germany*

Topic : Trained machine learning models of M dwarf spectra using `The Cannon` to precisely predict temperatures and metallicities of M dwarfs

Honors and Awards

NSF Graduate Research Fellowship	2019 – 2024
MPIA Summer Intern Fellowship	2017, 18
UCSD Provost Honors	2018, 19
Frances Hellman Research Scholarship *(declined)*	2017
Physics Chair Challenge Award *(×3)*	2016, 17, 18

Publications

First-author :

[2] **Birky, J.**, Barnes, R. K., Fleming, D. P., 2021, *Improved Constraints for Trappist-1 XUV Luminosity Evolution*, RNAAS, 5, 122 (arXiv :2105.12562) [paper] [code]

[1] **Birky, J.**, Hogg, D. W., Mann, A., Burgasser, A. J., 2020, *Temperatures and Metallicities for M dwarfs in the APOGEE Survey*, ApJ, 892, 1 (arXiv :2001.04962) [paper] [code]

Co-author :

[3] Hsu, C., Burgasser, A. J., et. al (incl. **Birky, J.**) 2021, *The Brown Dwarf Kinematics Project (BDKP). V. Radial and Rotational Velocities of T Dwarfs From Keck/NIRSPEC High-Resolution Spectroscopy* (arXiv :2107.01222) [paper] [code]

[2] Davenport, J. R. A., Windemuth, D., et. al (incl. **Birky, J.**) 2021, *The Rise and Fall of the Eclipsing Binary, HS Hydra*, *ApJL* (arXiv :2107.10954) [paper]

[1] Martin, D. V., El-Badry, K., et al. (incl. **Birky, J.**) 2021, *TOI-1259Ab–a gas giant with 2.6% deep transits and a bound white dwarf companion*, *Accepted MNRAS* (arXiv :2101.02707) [paper]

Conference Presentations

Birky, J., Davenport, J. R. A, Brandt, T. (2020 January). *Systematic Classification of TESS Eclipsing Binaries.* Poster presentation at AAS Meeting 235, Honolulu HI [poster]

Birky, J., Hogg, D. W., Mann, A. W., Burgasser, A. (2019 January). *Precise Stellar Parameters for 10,000+ APOGEE M dwarfs.* Poster presentation at AAS Meeting 233, Seattle, WA [poster]

Birky, J., Hogg, D. W., Burgasser, A. (2018 January). *Data-Driven Spectral Models for APOGEE M Dwarfs.* Poster presentation at AAS Meeting 231, Washington DC [poster]

Birky, J., Aganze, C., Burgasser, A., Theissen, C., Schmidt, S., Stassun, K., Teske, J., Bird, J. (2017 January). *Modeling Stellar Parameters for High Resolution Late-M and Early-L Dwarf SDSS/APOGEE Spectra.* Poster presentation at AAS Meeting 229, Grapevine TX [poster]

Birky, J., Aganze, C., Burgasser, A., Theissen, C., Schmidt, S., Stassun, K., Teske, J. (2016 October). *Identification of H-band Absorption Lines in High Resolution APOGEE Spectra of the Lowest Mass Stars.* Poster presentation at the national SACNAS Conference, Long Beach CA

Talks

Physical Parameters for 10,000+ M dwarfs in the APOGEE Survey — 2019
Sloan Digital Sky Survey Collaboration Meeting — *Ensenada, Mexico*

Data Driven Models for APOGEE M dwarfs — 2017
Stars Meeting & Milky Way Meeting, MPIA — *Heidelberg, Germany*

Identification of H-band Absorption Lines in APOGEE Spectra of the Lowest Mass Stars — 2016
Summer Undergraduate Research Conference, UCSD — *La Jolla, CA*

Telescope Time Awarded

Co-I : **IRTF iShell** – 6 nights (PI : Adam Burgasser) — 2018A – 2019B
Training the Cannon : Calibrating APOGEE Observations of Ultracool Dwarfs

Co-I : **APOGEE 2.5-meter** – Fibers for ancillary survey (PI : Adam Burgasser) — 2017 – 2018
APOGEE-2 Survey of the Lowest-Mass Stars and Brown Dwarfs : Composition, Chemistry and Companions

Observing Experience

Apache Point Observatory 3.5m
2 nights (remote training), Instruments : ARCES, TripleSpec, DIS, NICFPS, ARCTIC — Q4 2020

Teaching Positions

Teaching Assistant :
ASTR 150 : The Planets (Instructors : Nicole Kelly) — Spring 2021
ASTR 150 : The Planets (Instructors : Nicole Kelly, Eric Agol) — Winter 2021
ASTR 102 : Introduction to Astronomy (Instructor : Scott Anderson) — Fall 2020

Mentorship

Research Mentor :
Peter Gwartney (UW undergrad) — Summer 2021
Rachel Wong (UW undergrad) — Summer 2021

Service

Apache Point Observatory – Telescope Allocation Committee — Fall 2020 – Present

Engineering Experience

UCSD Human Powered Submarine Team — Sept 2015 – Mar 2017
Propulsion and Hull Design Teams — *La Jolla, CA*
Role : designed submarine drive train and hull profile; perfomed fluid dynamics simulations

Software Contributions

Burgasser, A. J., Splat Development Team (incl. **Birky, J.**), The SpeX Prism Library Analysis Toolkit (SPLAT) : A Data Curation Model, Bull. Astr. Soc. India, 00, 1-6, 2017 (arXiv:1707.00062)

Professional Development

Cool Stars 20.5 – *Virtual Conference* — Mar 2021
NExSS Quantitative Habitability Science Workshop – *Online workshop* — Dec 2020
online.tess.science – *Online workshop* — Sep 2020
TESS Ninja 3 : Expanding the Science of TESS – *Sydney, Australia* — Feb 2020

	ZTF Collaboration Meeting – *UW Seattle, WA*	Sept 2019
	Caltech FUTURE of Physics Workshop – *Pasadena, CA*	Nov 2018
	M33 HST Survey Meeting – *Ringberg Castle, Tegernsee, Germany*	Jul 2018
	Conference for Undergraduate Women in Physics – *Cal Poly Pomona, CA*	Jan 2018
	Gaia Sprint – *Internationales Wissenschaftsforum Heidelberg, Germany*	Jul 2017
	Conference for Undergraduate Women in Physics – *UC Los Angeles, CA*	Jan 2017

Professional Affiliations

American Astronomical Society (AAS) Member	2016 – Present
Society for the Advancement of Chicanos and Native Americans in Science	2016 – Present
Sloan Digital Sky Survey (SDSS) – Faculty and Student Team (FAST) Member	2016 – 2019

Skills

Programming	*Proficient :* Python, C++, Mathematica *Familiar :* Matlab, Processing
Software	*Proficient :* LaTeX, Unix, Git *Familiar :* SQL, Solidworks, Illustrator
Languages	English *(fluent)*, German *(limited working proficiency)*

Graduate Coursework

Radiative Processes, Thermo/hydrodynamics, Stellar Structure and Evolution, Explanets, Interstellar & Intergalactic Medium, Galactic Structure & Dynamics, Astrostatistics, Machine Learning

References

Prof. Rory Barnes (UW/VPL)	rkb9@uw.edu
Prof. James Davenport (UW/DIRAC)	jrad@uw.edu
Prof. David Hogg (NYU/MPIA/Flatiron)	david.hogg@nyu.edu
Prof. Adam Burgasser (UCSD)	aburgasser@ucsd.edu
Dr. Christopher Theissen (UCSD)	ctheissen@ucsd.edu