Jessica L. Birky

Contact

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Research Interests

Large stellar surveys, low mass stars & brown dwarfs, galactic archaeology within the Milky Way. Computational physics, data analysis and modeling, machine learning and data-driven models. Developing open source tools/code.

Education

University of California, San Diego 2015 - 2019
B.S. Physics (Honors program) & minor in Math
GPA : 3.75 *(major)* ; 3.34 *(cumulative)*

Scholarships and Awards

Frances Hellman Research Scholarship *(declined)*	2017
Physics Chair Challenge Award *(×2)*	2016, 2017
SJND Mathematics Award	2015
Denise Cervelli - Maddix Mathematics Scholarship	2014
M.M. Holm Science Scholarship	2013

Research Experience

Max Planck Institute für Astronomie *Heidelberg, Germany*
Advisor : David Hogg (NYU/MPIA/Flatiron) Summer 2018
Combined APOGEE and Gaia DR2 observations to classify and determine physical parameters for all of the M dwarfs in APOGEE. Explored potential for projects related to improving data driven models of stellar spectra, and catalog application for exoplanet studies, probing local structure of the Milky Way, and binary studies.

Advisor : David Hogg (NYU/MPIA/Flatiron) Summer 2017
Trained and tested data-driven spectral models for M dwarfs in the APOGEE survey using The Cannon ; successfully trained models for determining spectral type, temperature and metallicity to very high precisions, analyzed model trends with spectral features, and compared to existing work.

University of California, San Diego *La Jolla, CA*
Advisor : Adam Burgasser (UCSD) May 2016 - Present
Leading the development of apogee_tools, a flexible forward-modeling pipeline for determining 6+ atmospheric and kinematic parameters from high resolution spectra using MCMC ; also tested a variety of different models and other empirical techniques for extracting fundamental parameters from M/L dwarf spectra.

University of California, Berkeley *Berkeley, CA*
Advisors : Desire Whitmore (IVC), Stephen Leone (UCB) Summer 2014
Assisted the preparation of quantum dot samples for laser spectroscopy experiments ; programmed python scripts for basic data analysis.

Publications

Birky, J., Hogg, D. W., Mann, A., Burgasser, A. J., Temperatures and Metallicities for 10,000+ M dwarfs in the APOGEE Survey (*In Prep.*)

Conference Presentations

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.

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.

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.

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.

Software Contributions

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

Telescope Time Awarded

Co-I : **IRTF iShell** - 2 nights (PI : Adam Burgasser) 2018A
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

Talks

Physical Parameters for 10,000+ M dwarfs in the APOGEE Survey 2018
Stars Meeting, MPIA

Data Driven Models for APOGEE M dwarfs 2017
Stars Meeting & Milky Way Meeting, MPIA

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

Organizations

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

Meetings Attended

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

Engineering Experience

UCSD Human Powered Submarine Team *La Jolla, CA*
Propulsion and Hull Design Teams Sep 2015 - Mar 2017
Designed 3D hull profiles using Matlab and Solidworks, performed fluid analysis using Xfoil. Also designed double scotch-yoke propulsion mechanism, CADed Solidworks models, and prototyped using 3D printing. Worked on manufacturing and testing of submarine hull and drive train prototype, and performed underwater mechanical tests.

Skills

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

Relevant Coursework

Physics
Classical Mechanics (4A, 110A-B)
Thermodynamics/Statistical Mechanics (4B)
Electricity & Magnetism (4C, 2CL lab, 100A-B)
Optics & Special Relativity (4D, 2DL lab)
Quantum Mechanics (4E, 130A-B)
Mathematical/Computational Phys (105A-B, 142)
Stellar Astrophysics (160)
Observational Astrophysics Lab (164)

Mathematics
Multivariable Calculus (20C)
Vector Calculus (20E)
Linear Algebra (31AH)
Differential Equations (20D)
Numerical Methods (170A)
Probability Theory (180A)
Computational Statistics (139)
Mathematical Reasoning (109)

References

Prof. Adam J. Burgasser (UCSD) - aburgasser@ucsd.edu
Prof. David W. Hogg (NYU/MPIA/Flatiron) - david.hogg@nyu.edu
Dr. Christopher Theissen (UCSD) - ctheissen@ucsd.edu