Joe Zalesky

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OBJECTIVE

Highly motivated Computational Astrophysicist with extensive experience in statistical data analysis and developing high-parameter atmospheric models. Achievements include development of a novel computational solution on high-performance/GPU architecture; 9+ peer-reviewed publications; and, multiple approved funding proposals.

SKILLS

STATISTICAL & MACHINE LEARNING/AI: Bayesian Inference || Markov Chain Monte Carlo (emcee, dynesty) || MCMC Sampling (MH, Affine Invariant, Nested) || Model Comparison (Bayes Factor, BIC) || Parametric & Non-Parametric Tests (Student's t, KS, Wilcoxon, etc.) || Supervised Learning (Random Forest, SVM) || Unsupervised Learning (PCA, K-means)
LANGUAGES: Python || C++ || FORTRAN || SQL || IDL || Bourne Shells (bash, tcsh, zsh) || HTML || CSS
SOFTWARE & PACKAGES: High Performance/Distributed/GPU Computing (MPI4Py, Slurm, Numba, CUDA) || NumPy || SciPy || Pandas || scikit-learn || Matplotlib || Boketh || Astropy || Git (GitHub, GitLab, BitBucket) || LaTeX

CURRENT POSITION

Postdoctoral Fellow, UT Austin — Austin, TX

- Modeling and analyzing observational data on helium outflow rates of giant extrasolar planets using time-domain data from ground-based telescopes in Texas and Hawaii as well as the James Webb Space Telescope (JWST).
- Simulating the atmospheric physics and chemistry of brown dwarfs.
- Collaborating with diverse and international teams on multiple projects at universities across the world.
- Recently awarded 20,000 SUs on a GPU-enabled cluster.

EDUCATION

Arizona State University — Tempe, AZ
Ph.D., Astrophysics — Aug 2016 - July 2022
Dissertation: A Uniform Atmospheric Retrieval Analysis of Ultra-Cool Brown Dwarfs
Advisors: Profs. Michael R. Line & Jennifer Patience
Committee Members: Profs. P. Young, C. Groppi, & M. Bose

University of California, Berkeley — Berkeley, CA
B.A., Astrophysics & Physics Double Major — Sept 2012-May 2016

PUBLICATIONS

ORCID ID

Zalesky, J.; Morley, C.; Gully-Santiago, M.; et al. *The HPF Helium Exospheres Survey: Results from 19 Exoplanets*, in-prep

Zalesky, J.; Line, M. R.; Liu, M. C.; et al. *A Uniform Retrieval Analysis of Ultra-cool Dwarfs. V. Investigating Condensate Clouds in Early-T and L-Dwarfs*, in-prep

Zalesky, J.; Kezman, S.; Line, M. R.; et al. *A Uniform Retrieval Analysis of Ultra-cool Dwarfs. IV. A Statistical Census from 50 Late T-dwarfs*, 2022ApJ, 936, 44Z

Zalesky, J.; Line, M. R.; Schneider, A.; et al. *A Uniform Retrieval Analysis of Ultracool Dwarfs III: Properties of Y-Dwarfs*, 2019ApJ, 877, 24Z

Brogi, M; Emeka-Okafor, V.; Line, M. R.; et al. (including **Zalesky, J.**) *The Roasing Marshmallows Program with IGRINS on Gemini South I: Composition and Climate of the Ultrahot Jupiter WASP-18b*, 2023AJ, 165, 91B

Line, M. R.; Brogi, M.; Bean, J. L.; Gandhi, S.; **Zalesky, J.**; et al. *A Carbon and Oxygen Abundance Measurement in an Exoplanet Atmosphere*, Nature 598, 580–584 (2021)

Duchene, G.; Rice, M.; Hom, J.; **Zalesky, J.**; et al. *The Gemini Planet Imager View of the HD 32297 Debris Disk*, 2020AJ, 159, 251D

Jackson, J.; Dawson, R.; **Zalesky, J.**; *The Origin of Kepler 419b: A Path to Tidal Migration Through Secular Eccentricity Modulation*, 2019ApJ, 157, 166J

Wolff, S. G. Ward-Duong, K., **Zalesky, J.**, Greenbaum, A. Z., Perrin, M. D., Graham, J. R., *Gemini planet imager observational calibration XIII: wavelength calibration improvements, stability, and nonlinearity* Proc. SPIE 9908, Ground-based and Airborne Instrumentation for Astronomy VI, 990838 (2016)

SELECTED CONFERENCE PRESENTATIONS

The HET Survey of Helium Exosphere Outflows, *ExoClimes IV* — Exeter, UK (2023)

Constraining the Diversity of Brown Dwarfs with Atmospheric Retrieval. *SESE Colloquium* — Tempe, AZ (2021)

Constraining the Diversity of Brown Dwarfs with Atmospheric Retrieval. *SPLAT* — Honolulu, HI (2021)

HRCCS, Cross Sections, Multinesting, and Likelihood Functions.
High-Res Infrared Spectroscopy for Exoplanet Characterization Hackathon — Pasadena, CA (2020)

Atmospheric Characterization of HD209458b and HD189733b with High Resolution Cross Correlation Spectroscopy. *235th AAS Meeting* — Honolulu, HI (2019)

Atmospheric Characterization with HRCCS. *Extreme Solar Systems IV* — Reykjavík, IS (2019)

Brown Dwarfs, Hot Jupiters, & GPUs. *OWL Summer Workshop* — Santa Cruz, CA (2019)

Atmospheric Retrieval of Cool Y Dwarfs. *BDExoCon* — Newark, DE (2017)

SELECTED PROPOSALS, HONORS, & AWARDS

TACC Research Proposal: Atmospheric Modeling of Brown Dwarfs with GPUs — 2022 - 2024

- Awarded 20,000 SUs (core-hours) of computation time to carry out both primary and secondary research objectives at UT.

NASA FINESST Characterizing the Atmospheres of Brown Dwarfs with Spectral Retrieval — 2019 - 2022

- ($100,000) Awarded competitive (∼5% award rate) research fellowship to provide funding for my graduate work (salary, travel, etc.) for 3 years.

IGRINS Gemini South Proposal PI: Investigating Thermal Inversions in Hot Jupiters with HRCCS — 2020

- Led a successful observational proposal to explore a new regime in the atmospheres of "Hot Jupiter" exoplanets. Awarded several nights of observational time. Resulted in a strong Nature publication.

JWST GO Program 2327, Co-I: Water Ice Clouds and Weather on the Coldest Brown Dwarf — 2020

- Co-Investigator on a successful proposal to obtain data of the coldest Brown Dwarf in the first observational cycle of JWST. Observations begin fall semester, 2023.

ASU College of Liberal Arts and Sciences Graduate Excellence Award — 2021

ASU SESE Summer Exploration Graduate Fellowship ($3000) — 2018

ASU SESE First Year Award ($5000) — 2016

NSF Graduate Research Fellowship Honorable Mention (10,000 core-hours on XSEDE) — 2016

TEACHING & MENTORING EXPERIENCE

Arizona State University

Assisted Mentoring Master's Student: Kezman Saboi — Spring 2018 - Fall 2020

Sundial Graduate Mentor — Fall 2017 & 2018

SESE Open House Committee — Fall 2017 - 2019

SES 593: An Introduction to Astrostatistics, Guest Lecturer — Fall 2018 & 2019

Astronomy 113, TA — Fall 2016

University of California, Berkeley

IDL Decal, Lead Instructor — Fall 2014 & 2015

Astronomy 120: Optical Lab, TA — Fall 2015

REFERENCES AVAILABLE UPON REQUEST