

James Mang

PH.D. CANDIDATE · NSF GRADUATE RESEARCH FELLOW

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Research Interest

My work focuses on studying the physical and chemical processes in the atmospheres of brown dwarfs and temperate giant planets using 1-D atmospheric models. I investigate cloud microphysics and cloud parameterization in ultra-cool substellar objects ($T_{\text{eff}} < 400$ K) and their impact on observables from JWST. Additionally, I work on the development of **PICASO**, an open-source Python package to provide the essential tools for the community to study exoplanetary atmospheres.

Education

Ph.D. in Astronomy, The University of Texas at Austin

Expected 2026

Dissertation: *Understanding Ultra-Cool Substellar Atmospheres in the Era of JWST*

Advisor: Caroline V. Morley

Spring 2024

M.A. in Astronomy, The University of Texas at Austin

Thesis: *Microphysical Prescriptions for Parameterized Water Cloud Formation on Ultra-cool Substellar Objects*

Advisor: Caroline V. Morley

B.A. in Astrophysics & B.Sc. in Chemistry, University of California, Berkeley

2017 - 2021

Research Experience

UT Austin Astronomy Department

Austin, TX

NSF GRADUATE RESEARCH FELLOW

2023 - 2026

GRADUATE RESEARCH ASSISTANT

2021 - 2023

- Advisor: **Caroline V. Morley**
- Research on water clouds in the coolest Y dwarfs and temperate giant exoplanets. Analyzing JWST observations of ultra-cool substellar objects to characterize their atmospheric properties. Contributing to the development of **PICASO**, an open-source Python package for atmospheric and spectral modeling. Generating new grids of substellar atmospheric and evolutionary models.

UC Berkeley Astronomy Department

Berkeley, CA

UNDERGRADUATE RESEARCHER

2019 - 2021

- Advisor: **Peter Gao**
- Investigated water clouds in Hydrogen/Helium-dominated atmospheres, as applied to temperate, mid-sized exoplanets and cold brown dwarfs utilizing the 1-D Community Aerosol and Radiation Model for Atmospheres (CARMA).

NASA Goddard Space Flight Center

Greenbelt, MD

RESEARCH ASSOCIATE

Summer 2020

- Advisor: **Avi Mandell**
- Modeled M-Earth atmospheres in transit utilizing the **Planetary Spectrum Generator (PSG)** as the radiative transfer suite to create over 26,000 atmospheric profiles for K2-18b and developed a pipeline used for our HST program and application for future JWST observations using our designated retrievals machine learning and nested sampling modules.

Dunlap Institute for Astronomy

SUMMER UNDERGRADUATE RESEARCHER

Toronto, ON

Summer 2019

- Advisor: Carl Ziegler
- Identified long-period TESS planet candidates through a ground-based follow-up survey for further atmospheric study of cooler exoplanets utilizing high-resolution imaging from the MMT observatory. Tested and calibrated a 0.5m telescope, including 3 observational nights, which was deployed to New Mexico in September 2019 for a 3-year mission to recover approximately 60 planets.

Space Sciences Laboratory

EXPERIMENTAL ASTROPHYSICS RESEARCHER

Berkeley, CA

2018 - 2021

- Advisor: Nathan Darling, Travis Curtis, Oswald Siegmund
- Directed the R&D effort to evaluate over 50 microchannel plates (MCPs) produced using atomic layer deposition (ALD) for future spaceflight and ground-based applications.

Publications (First-Author Publications: 2, Total Publications: 11)

11. *Simulations of Electron Beam Interactions in Brown Dwarf Atmospheres*
Zuckerman A., Pineda S.J., Brain D., **Mang J.**, Morley C., 2025 ApJ, submitted
10. *A Deep Search for Exomoons around WISE 0855 with JWST*
Wilson M.J., Limbach M.A., Skemer A.J., Vos J.M., et al. (incl. **Mang J.**) [13/14 total] 2025 ApJ, submitted
9. *JWST Coronagraphic Images of 14 Her c: a Cold Giant Planet in a Dynamically Hot, Multi-planet System*
Bardalez Gagliuffi D.C., Balmer W.O., Pueyo L., Brandt T.D., et al. (incl. **Mang, J.**) [10/19 total] 2025 ApJL, accepted
8. *Follow-up Exploration of the TWA 7 Planet-Disk System with JWST NIRCam*
Crotts K.A., Carter A.L., Lawson K., **Mang J.**, et al. 2025 ApJL 987, L41
7. *NIRCam yells at cloud: JWST MIRI imaging can directly detect exoplanets of the same temperature, mass, age, and orbital separation as Saturn and Jupiter*
Bowens-Rubin R., **Mang J.**, Limbach M., Carter A.L., et al. 2025 ApJL 986, L26
6. *Thermal Emission and Confirmation of the Frigid White Dwarf Exoplanet WD 1856+534 b*
Limbach M., Vanderburg A., MacDonald R. J., Stevenson K., et al. (incl. **Mang, J.**) [10/15 total] 2025 ApJL 984, L28
5. *The transmission spectrum of the potentially rocky planet L 98-59c*
Barclay T., Sheppard K., Latouf N., Mandell A., et al. (incl. **Mang, J.**) [27/35 total] 2025 AJ 169, 241
4. *Protosolar D-to-H abundance and one part-per-billion PH₃ in the coldest brown dwarf*
Rowland, M. J., Morley, C. V., Miles, B. E., Suarez, G., et al. (incl. **Mang, J.**) [24/27 total] 2024 ApJL 977, L49
3. *Microphysical Prescriptions for Parameterized Water Cloud Formation on Ultra-cool Substellar Objects*
Mang J., Morley C. V., Robinson T. D., Gao P. 2024 ApJ 974, 190
2. *Microphysics of Water Clouds in the Atmospheres of Y Dwarfs and Temperate Giant Planets*
Mang J., Gao P., Hood C.E., Fortney J.J., Batalha N., Yu X., de Pater I. 2022 ApJ 927, 184
1. *SOAR TESS Survey. I: Sculpting of TESS planetary systems by stellar companions*
Ziegler C., Tokovinin A., Briceno C., **Mang J.**, Law N., Mann A. (2019) AJ 159, 19

Scientific Presentations & Posters

Conference Talks

- Jun 27 **New Atmospheric Models for Cold Directly-Imaged Planets and** *Cork, Ireland*
2025 **Brown Dwarfs**, EAS 2025 (Contributed)
- Jun 24 **Models for Substellar Objects in Chemical Disequilibrium with Water** *San Diego, CA*
2024 **and Ammonia Clouds**, Cool Stars 22 (Contributed)
- Jan 14 **Microphysics of Water Clouds in the Atmospheres of Brown Dwarfs** *Virtual*
2021 **and Temperate Giant Planets**, AAS 237 (Contributed)

Colloquia & Seminar Talks

- Apr 22 **New Atmospheric Models for the Coldest Directly-Imaged Planets** *University of*
2025 **and Brown Dwarfs**, Planets & Star Formation Seminar (Invited) *Michigan*
- Apr 12 **Modeling Water Clouds in Substellar Atmospheres in the Era of** *Virtual*
2024 **JWST**, ExoExplorer's Science Series (Invited)
- Aug 8 **Modeling M-Earth Atmospheres in Transit**, NASA Goddard URAA *Virtual*
2020 Summer Series (Invited)
- Jul 5 **One Hit Wonders: Searching for Single Transit TESS Planets**, Dunlap *University of Toronto*
2019 Institute Summer Series (Invited)

Posters

- Aug 15 **Models for Substellar Objects in Chemical Disequilibrium with Water** *UT San Antonio*
2024 **and Ammonia Clouds**, TAPS II
- Mar 16 **Microphysical Prescriptions for Simplified Water Cloud Formation** *Christchurch, NZ*
2024 **on Ultra-cool Substellar Objects**, Extreme Solar Systems V
- Aug 17 **Microphysical Water Cloud Models in the Era of JWST**, TAPS I *UT San Antonio*
2023
- Jun 19 **Microphysical Water Cloud Models in the Era of JWST**, ERES *Yale University*
2023
- May 1 **Microphysics of Water Clouds in the Atmospheres of Brown Dwarfs** *Las Vegas, NV*
2022 **and Temperate Giant Planets**, Exoplanets IV

Observational Programs

Cycle 4	JWST DD 9431 , First Images of our Young Jupiter Neighbor (Co-I)
Cycle 4	JWST GO 9157 , Probing the Dynamical History of a White Dwarf Planet (Co-I)
Cycle 4	JWST GO 9056 , Imaging the Coldest Planets Around the Nearest Accelerating Stars (Co-I)
Cycle 4	JWST GO 6915 , Direct Detection and Characterization of a Nearby Temperate Giant Planet (Co-I)
Cycle 28	HST GO 16448 , Confirming a tentative detection of an atmosphere around a potentially rocky planet (Co-I)

Honors & Awards

2025	OWL Communications Fellow , Other Worlds Laboratory
2023	NSF Graduate Research Fellowship , National Science Foundation

Teaching & Mentorship

2022 - Present	Undergraduate Mentor , UT Austin Astronomy Department
2023 - 2024	NSF REU Informal Mentor , UT Austin Astronomy Department
Summer 2022	TAURUS Mentor , UT Austin Astronomy Department
Spring 2022	Graduate Teaching Assistant , UT Austin Astronomy Department, AST 309R
2020 - 2021	Peer Advisor , UC Berkeley Office of Undergraduate Research
2020 - 2021	Course Reader , UC Berkeley Astronomy Department, ASTRON C12
Fall 2018	Teacher-Scholar , UC Berkeley College of Chemistry, CHEM 1AL

Leadership, Service & Outreach

2025 - Present	Alumni Organizer , NASA ExoExplorers
2023 - Present	Co-Lead , Center for Planetary Systems Habitability Joint Reading Group
2023 - Present	Organizing Committee Member , Astronomy on Tap ATX
2024 - 2025	Graduate Student Representative , UT Austin Astronomy Department