

Jerry Xuan

51 Pegasi b Fellow
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Employment

51 Pegasi b Fellow , University of California, Los Angeles	Oct 2025-Present
Postdoctoral Scholar , California Institute of Technology	2025 (7 months)

Education

Ph.D. in Astrophysics	2020-2025
California Institute of Technology	
“Probing the Origins of Directly Imaged Planets and Brown Dwarfs: From Atmospheric Compositions to Binarity”	
M.Phil. in Astronomy	2019-2020
University of Cambridge	
“Constraining 3D orbital architectures in systems with giant planets”	
B.A. in Physics	2015-2019
Pomona College (Cum Laude, Downing Scholar)	

Awards & Distinctions

Total External Funding as PI: \$600k

Heising Simons Foundation 51 Pegasi b Fellow (\$450k)	2025-
NASA Hubble Fellowship Program Sagan Fellowship	2025 (declined)
Future Investigators in NASA Earth and Space Science and Technology (\$150k)	2023-2025
Phi Beta Kappa	2019
Sigma Xi	2019
Downing Scholarship (for M.Phil. at Cambridge)	2019
The Brackett Prize in Astronomy, Pomona College	2019
Tileston Physics Prize, Pomona College	2018

Grants and Telescope Time

James Webb Space Telescope (Total JWST Grants: \$430k)

PI GO 8714 (19.8 hours, \$159,288)	JWST Cycle 4
Combining isotopic and elemental abundances to unveil the formation and accretion history of a cold Jupiter	
PI GO 5342 (13.2 hours, \$150,900)	JWST Cycle 3
Spectroscopic characterization of the lowest-mass imaged Jupiter analog	
PI GO 3762 (3.8 hours, \$74,911)	JWST Cycle 2
Stringent tests of atmospheric and evolutionary models with a benchmark T dwarf companion	
Co-I GO 8063 (59.0 hours, atmospheric analysis lead)	JWST Cycle 4
Beyond C/O and metallicity: Can refractory abundances reveal the origin of the largest planets?	
Co-I GO 4982 (19.3 hours, \$42,619)	JWST Cycle 3
First image and spectrum of a true Jupiter-Saturn analog	
Co-I GO 6362 (30.3 hours)	JWST Cycle 3
Breaking the degeneracy: substellar anchors for evolutionary models	

Co-I GO 8877 (25.9 hours)	JWST Cycle 4
The core of the matter: Constraining the formation history of a super-Jupiter	
ESO Very Large Telescope	
Total of 41 hours as PI on VLTI/GRAVITY & CRIRES+	P112-115
Gemini Observatory	
Total of 17 hours as PI on IGRINS	2023
Keck Observatory	
Total of 2 nights as PI on KPIC, NIRSPEC	2025
Over 50 nights as co-I on KPIC, NIRC2	2018-2025

Service & Outreach

Keck AO Working Group & NGS Performance Subgroup Member	2025-Present
Keck/HISPEC Science Team Member	2025-Present
Keck/SCALES Science Team Member	2024-Present
Keck/KPIC Instrument Team Member	2020-Present
Referee for MNRAS, A&A, AAS Journals, Scientific Reports (reviewed 17 papers total)	2021-Present
Habitable Worlds Observatory Working Group; Spectral Processing Focus Group	2024-Present
Teaching and Residential Assistant for the Summer Science Program (six weeks)	2019
Astronomy Outreach at Partial Solar Eclipse	2023
Public Open Evenings at Institute of Astronomy, Cambridge	2020

Mentoring experience

Gavin Wang , undergraduate at JHU, Caltech SURF	2024-Present
Sage Santomenna , undergraduate at Pomona College, Caltech SURF	2025-Present
Co-mentoring Aniket Sanghi , PhD student at Caltech, former Caltech SURF	2021-Present
Co-mentoring Carrie He , PhD student at UCLA	2025-Present
Co-mentoring Samuel Whitebook , PhD student at Caltech	2024-Present
Co-mentoring Yurou Liu , undergrad at Yale, Caltech SURF	2024-2025
Co-mentoring Joshua Liberman , post-bacc at Caltech	2022-2023
Aylin García Soto , PhD student at Dartmouth, advising for postdoc applications	2025-Present
Jacob Schimp , undergraduate at UIUC, advised for grad school applications	2024
Luke Handley , PhD student at Caltech, department peer mentoring	2023-2024

Teaching experience

Teaching Assistant at Caltech	2021
Bayesian Statistics	
High Energy Astrophysics	
Teaching Assistant at Pomona College	2016-2018
Techniques in Observational Astronomy (×2)	
Spacetime, Quanta, and Entropy	
Intro to Stars and Galaxies	
General Physics Lab	

Publications

Refereed Journal Articles

Total: 54 First-author: 11 Second-author: 9 Third-author: 8

First-author publications

1. Xuan, J.W., Mérand, A., Thompson, W. et al. 2024, *Nature* 634, 1070–1074. “The cool brown dwarf Gliese 229B is a close binary”
2. Xuan, J.W., Perrin, M., Mawet, D. et al. 2024, *ApJL* 977, L32. “Atmospheric abundances and bulk properties of the binary brown dwarf Gliese 229 Bab from JWST/MIRI spectroscopy”
3. Xuan, J.W., Hsu, C-C., Finnerty, L., et al. 2024, *ApJ* 970, 71. “Are These Planets or Brown Dwarfs? Broadly Solar Compositions from High-resolution Atmospheric Retrievals of \sim 10–30 MJup Companions”
4. Xuan, J.W., Wang, J., Finnerty, L., et al. 2024, *ApJ* 962, 10. “Validation of elemental and isotopic abundances in late-M spectral types with the benchmark HIP 55507 AB system”
5. Xuan, J.W., Wang, J., Ruffio, J.-B., et al. 2022, *ApJ* 937, 54. “A Clear View of a Cloudy Brown Dwarf Companion from High-Resolution Spectroscopy”
6. Xuan, J.W., Bryan, M.L., Knutson, H.A., Bowler, B.P., Morley, C.V., Benneke, B, 2020, *AJ* 159, 97. “A Rotation Rate for the Planetary-mass Companion DH Tau b”
7. Xuan, J.W. & Wyatt, M.C., 2020, *MNRAS* 497, 2096. “Evidence for a high mutual inclination between the cold Jupiter and transiting super Earth orbiting π Men”
8. Xuan, J.W., Kennedy, G.M., Wyatt, M.C., Yelverton, B., 2020, *MNRAS* 499, 5059. “Mutual inclinations between giant planets and their debris discs in HD 113337 and HD 38529”
9. Xuan, J.W., Mawet, D., Ngo, H. et al. 2018, *AJ* 156, 156. “Characterizing the Performance of the NIRC2 Vortex Coronagraph at W. M. Keck Observatory”
Accepted or submitted
10. Xuan, J.W., Ruffio, J.-B. (shared first authorship) et al. 2025, submitted to *ApJ*. “The volatile-to-refractory abundances of the HR 8799 planets traced by carbon, oxygen, sulfur, and nitrogen”
11. Ruffio, J.-B., Xuan, J.W. (shared first authorship) et al. 2025, *Nature Astronomy*, in press. “Jupiter-like uniform metal enrichment in a system of multiple giant exoplanets”

Second and third author publications

(** student paper supervised by J.W.X.)

1. **Sanghi, A., Xuan, J.W., Wang, J., et al. 2024, *AJ* 168, 215. “Efficiently Searching for Close-in Companions around Young M Dwarfs using a Multi-year PSF Library”
2. **Wang, G., Xuan, J.W. et al. submitted to *ApJ*. “Atmospheric Retrievals of a Cloudy L Dwarf with the Keck Planet Imager and Characterizer”
3. Zhang, Y., Xuan, J.W., Mawet, D., et al. 2024, *AJ* 168, 131. “Atmospheric characterization of the super-Jupiter HIP 99770 b with KPIC”
4. Finnerty, L., Xuan, J.W., Xin, Y., et al. 2024, *AJ* 167, 43. “Atmospheric metallicity and C/O of HD 189733 b from high-resolution spectroscopy”
5. Hejazi, N., Xuan, J.W., Cristofari, P., et al. 2024, *ApJ*, 978, 42. “Chemical Links between a Young M-type T Tauri star and its Substellar Companion: Spectral Analysis and C/O Measurement of DH Tau A”
6. Costes, J., Xuan, J.W., Vigan, A., et al. 2024, *A&A* 686, A294. “Fresh view of the hot brown dwarf HD 984 B through high-resolution spectroscopy”
7. Echeverri, D., Xuan, J.W., Monnier, J., et al. 2024, *ApJL* 965, L15. “Vortex Fiber Nulling for Exoplanet Observations: First Direct Detection of M Dwarf Companions around HIP 21543, HIP 94666, and HIP 50319”
8. Xin Y., Xuan, J.W., Mawet, D., Wang, J. et al. 2023, *JATIS* 9(3), 035001. “On-sky speckle nulling through a single-mode fiber with the Keck Planet Imager and Characterizer”

9. Echeverri, D., **Xuan J.W.**, Jovanovic, N. et al. 2023, *JATIS* 9(3), 035002. “Vortex Fiber Nulling for Exoplanet Observations: Implementation and First Light”
10. Thompson W., Blakely D., **Xuan J. W.** et al. 2025, *AJ*, 169, 193. “On the Orbit of the Binary Brown Dwarf Companion GL229 Ba and Bb”
11. Inglis, J., Wallack, N., **Xuan, J.W.** et al. 2024, *AJ* 167, 218. “Atmospheric Retrievals of the Young Giant Planet ROXs 42B b from Low- and High-resolution Spectroscopy”
12. Hsu C.-C., Wang J. J., **Xuan J. W.** et al. 2024, *ApJ* 971, 9. “Rotation and Abundances of the Benchmark Brown Dwarf HD 33632 Ab from Keck/KPIC High-resolution Spectroscopy”
13. Finnerty, L., Xin, Y., **Xuan, J. W.** et al. 2025, *AJ*, 169, 333. “Water Dissociation and Rotational Broadening in the Atmosphere of KELT-20 b from High-resolution Spectroscopy”
14. Finnerty, L., Xin, Y., **Xuan, J. W.** et al. 2024, *AJ*, 169, 94. “True mass and atmospheric composition of the non-transiting hot Jupiter HD 143105 b”
15. Mawet, D., Ruane, G., **Xuan, J. W.** et al. 2017, *ApJ* 838, 92. “Observing Exoplanets with High-dispersion Coronagraphy. II. Demonstration of an Active Single-mode Fiber Injection Unit”
16. Hsu C.-C., Wang J. J., **Xuan J. W.** et al. 2025, submitted to *AJ*. “Distinct Rotational Evolution of Giant Planets and Brown Dwarf Companions”
17. **Liu Y., Zhang, Y., **Xuan J. W.** et al. 2025, submitted to *AJ*. “Chemistry and Isotope Ratios of Substellar Atmospheres in the β Pictoris Young Moving Group”

Communications

1. **Xuan, J.W.** & Oppenheimer, R. 2024, Nature Research Briefing. *Brown dwarf in neighbouring solar system is actually a spinning duo*

Press

A brown dwarf discovered 30 years ago is actually twins circling each other. AP News	Oct 2024
Three decades later, first brown dwarf ever found offers a surprise. Reuters	Oct 2024
The first known brown dwarf is actually twins. Astronomy Magazine	Oct 2024
It's Twins! Mystery of Famed Brown Dwarf Solved. Caltech	Oct 2024
First Brown Dwarf Discovered is Actually Twins. AMNH	Oct 2024
Inventing Tools for Detecting Life Elsewhere. Caltech	March 2017

Talks

Invited

Astronomy Seminar at Carnegie EPL, Washington DC	2025
“Atmospheric compositions and binarity of directly imaged exoplanets and brown dwarfs”	
Astrocoffee at Institute for Astronomy, Honolulu, HI	2024
“A modern view of Gliese 229 B: binarity and atmospheric analysis with JWST/MIRI”	
UCSD/SDSU Astronomy & Astrophysics Colloquium , San Diego, CA	2024
“Atmospheric compositions and binarity of directly imaged exoplanets and brown dwarfs”	
UCLA Tuesday Seminar, Los Angeles, CA	2024
Ibid.	
Workshop talk at Cloud Zwei Con, Ringberg Castle, Bavaria, Germany	2023
“Retrieving Atmospheric Compositions of Directly Imaged Companions with High-Resolution Spectroscopy”	
Other Worlds Laboratory Summer Program, Santa Cruz, CA	2023, 2024, 2025

“Atmospheric abundances of directly imaged companions from KPIC and JWST”		
Exocoffee at Max Planck Institute for Astronomy, virtual		2022
“A Clear View of a Cloudy Brown Dwarf Companion from High-Resolution Spectroscopy”		
Exit Talk at Keck Visiting Scholars Program, Waimea, HI		2022
“Unlocking the Science Potential of Keck Planet Imager and Characterizer (KPIC) Phase II”		
Exoplanet Seminar at Ohio State University, virtual		2022
“A Clear View of a Cloudy Brown Dwarf Companion from High-Resolution Spectroscopy”		
Astrophysics Seminar at American Museum of Natural History, New York, NY		2022
<i>Ibid.</i>		
<u>Plenary and Contributed</u>		
Contributed talk at Aspen Center for Physics, Aspen, CO		2025
“Mapping volatile-to-refractory abundance ratios for the four giant planets in HR 8799”		
Plenary talk at Cool Stars 22, San Diego, CA		2024
“The first methane brown dwarf Gliese 229 B is a close binary”		
Plenary talk at Exoplanets 5, Leiden, Netherlands		2024
“High-resolution spectroscopy of imaged planets and brown dwarfs with KPIC: abundances, spins, and RVs”		
Contributed talk at ExSoCal 2023, Pasadena, CA		2023
“Are These Planets or Brown Dwarfs? Elemental Abundances in the Atmosphere of Substellar Companions”		
Contributed talk at Keck Science Meeting, Berkeley, CA		2023
<i>Ibid.</i>		
Contributed talk at Keck Science Meeting, Pasadena, CA		2022
“Early Science Results from Phase II of the Keck Planet Imager and Characterization”		
Contributed talk at Spirit of Lyot, Leiden, Netherlands		2022
“High resolution spectroscopy of directly imaged exoplanets with KPIC”		
Contributed talk at Keck Science Meeting, San Diego, CA		2021
“Atmospheric composition of a cloudy brown dwarf companion from high and low resolution spectroscopy”		
Contributed talk at Exoplanets Orbit and Dynamics workshop, virtual		2021
“Mutual inclinations between giant planets and their debris discs with Hipparcos, Gaia, and radial velocity”		