Wenhao (Jerry) Xuan

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EDUCATION

Ph.D. in Astrophysics, California Institute of Technology Expected: June 2025
- Advisor: Prof. Dimitri Mawet

M. Sc. Astrophysics, California Institute of Technology, USA June 2023

M.Phil. in Astronomy, University of Cambridge Oct 2020
- Advisor: Prof. Mark Wyatt
- Thesis: Constraining 3D orbital architectures in systems with giant planets

B.A. in Physics, Pomona College May 2019
- Graduated cum laude, GPA: 3.91/4.00

SELECTED PUBLICATIONS

Summary: 18 refereed publications. 5 first author, 2 second author. 483 citations. ADS

- **Xuan, W.J.**, Wang, J., Ruffio, J.-B., et al., 2022, ApJ, 937, 54. *A Clear View of a Cloudy Brown Dwarf Companion from High-Resolution Spectroscopy*
- **Xuan, W.J.** & Wyatt, M.C., 2020, MNRAS, 497, 2096. *Evidence for a high mutual inclination between the cold Jupiter and transiting super Earth orbiting π Men*
- **Xuan, W.J.**, 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*
- **Xuan, W.J.**, 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*
- **Xuan, W.J.**, Mawet, D., Ngo, H., Ruane, G., Bailey, V.P., Choquet, É., Absil O., et al., 2018, AJ, 156, 156. *Characterizing the Performance of the NIRC2 Vortex Coronagraph at W. M. Keck Observatory*
- Xin Y., **Xuan, W.J.**, Mawet, D., Wang, J., Ruane, G., Echeverri, D., Jovanovic, N., et al., 2023, JATIS 9(3), 035001. *On-sky speckle nulling through a single-mode fiber with the Keck Planet Imager and Characterizer*
- Echeverri, D., **Xuan W.J.**, Jovanovic, N., Ruane G., Delorme, J.-R., Mawet, D., Mennesson, B., et al., 2023, JATIS. *Vortex Fiber Nulling for Exoplanet Observations: Implementation and First Light*
- Mawet, D., Ruane, G., **Xuan, W.**, Echeverri, D., Klimovich, N., Randolph, M., et al., 2017, ApJ, 838, 92. *Observing Exoplanets with High-dispersion Coronagraphy. II. Demonstration of an Active Single-mode Fiber Injection Unit.* The Astrophysical Journal 838, 92

REFEREE EXPERIENCE

- Monthly Notices of the Royal Astronomical Society: 2
- Astronomical Journal: 2
- Astronomy & Astrophysics: 1

TALKS AND CONFERENCES

Research talk at the Keck Science Meeting, Berkeley, California	Sept 2023
Invited talk at the Cloud Zwei Con, Ringberg Castle, Bavaria, Germany	Jan 2023
Invited talk at the MPIA exocoffee, virtual	Nov 2022
Research talk at the Keck Science Meeting, Pasadena, CA	Sept 2022
Research talk at the Spirit of Lyot, Leiden, Netherlands	June 2022
Research talk at Exoplanets IV Splinter Session, Las Vegas, NV	May 2022

Invited talk at the AMNH Astrophysics seminar, New York, NY — March 2022
Invited talk at the Caltech Planetary Science Seminar, Pasadena, CA — Feb 2022
Research talk at the Keck Science Meeting, San Diego, CA — Sept 2021
Research talk at the Cloud Nine Con workshop, virtual — July 2021
Research talk at Exoplanets Orbit and Dynamics workshop, virtual — Jan 2021
Poster presentation at Exoplanets III, virtual — July 2020
Research talk at the 2018 VORTEX yearly meeting, Liége, Belgium — Aug 2018

HONORS & AWARDS

Future Investigators in NASA Earth and Space Science and Technology — Sept 2023-Sept 2026
Keck Visiting Scholars Program (funded visit from July-Oct 2022) — 2022
Caltech Center for Comparative Planetary Evolution Fellow — 2021
Phi Beta Kappa — May 2019
Sigma Xi — May 2019
Downing Scholarship (Full scholarship for M.Phil. at Cambridge) — May 2019
The Brackett Prize in Astronomy, Pomona College — May 2019
Tileston Physics Prize, Department of Physics and Astronomy, Pomona College — Nov 2018
Summer Undergraduate Research Fellowship from Caltech — Apr 2016, 2017, 2018

SELECTED RESEARCH PROJECTS

California Institute of Technology, Mentor: Dimitri Mawet — **Pasadena, CA**
Atmospheric composition of a cloudy brown dwarf companion — Oct 2021 - Sept 2022

- Analyzed the high-resolution spectra of the benchmark brown dwarf companion HD 4747 B using a free retrieval framework based on `petitRADTRANS` and measured its atmospheric abundances.
- Detected CO, CH_4, and H_2O with the high-resolution spectra to constrain disequilibrium chemistry and determine the vertical mixing rate.
- Extracted low-resolution spectra for the brown dwarf companion from archival data sets to jointly model them with the high-resolution data.
- First author paper published in *The Astrophysical Journal*.

University of Cambridge, Mentor: Mark Wyatt — **Cambridge, UK**
A high mutual inclination between planets in the π Men system — Oct 2019 - July 2020

- Made the first direct measurement of mutual orbital inclination between a giant planet and super Earth using radial velocity and astrometry from Gaia and Hipparcos.
- Studied the dynamics of the system with analytic models and numerical N-body simulations.
- First author paper published in *Monthly Notices of the Royal Astronomical Society*.

California Institute of Technology, Mentor: Heather Knutson — **Pasadena, CA**
Measuring the Rotation Rate of a Giant Exoplanet — June 2018 - Jan 2020

- Processed and modeled Keck/NIRSPEC high-resolution spectra of exoplanet DH Tau b to measure its rotation rate. Performed statistical analysis of exoplanet and brown dwarf rotation rates to constrain the formation pathway of giant planets.
- First-author paper published in *The Astronomical Journal*.

Pomona College, Mentor: Dimitri Mawet — **Claremont, CA**
Characterizing the Performance of the NIRC2 Vortex Coronagraph — Sept 2017 - Aug 2018

- Systematically reprocessed data from $\sim$ 350 stars observed with the Keck/NIRC2 Vortex Coronagraph, an exoplanet imager. Discovered promising planet candidates for follow-up observations.
- Performed a statistical study of the instrument's performance.
- First-author paper published in *The Astronomical Journal*.