

# Dr. Yifan Zhou

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## Employment

### 2023- Assistant Professor

Department of Astronomy, The University of Virginia

### 2021-2023 51 Pegasi b Fellow

Department of Astronomy, The University of Texas at Austin

### 2019-2021 Harlan J. Smith McDonald Observatory Postdoctoral Fellow

McDonald Observatory/Department of Astronomy, The University of Texas at Austin

## Education

### 2014-2019 Ph.D. in Astronomy and Astrophysics

Department of Astronomy, The University of Arizona

*Time-resolved observations of directly-imaged planetary-mass companions and exoplanets.*

Advisor: Dániel Apai.

### 2010-2014 B.Sc. in Astronomy

Department of Astronomy, Peking University

## Awards and Honors

### 2021–2023 51 Pegasi b Fellowship

### 2019–2021 Harlan J. Smith McDonald Observatory Fellowship

### 04/2019 University of Arizona College of Science Excellence in Teaching Award

### 2015–2018 NASA Earth and Space Science (NESSF) Fellowship

### 2015–2016 University of Arizona Technology & Research Initiative Funding (TRIF) Fellowship

### 09/2013 First Lin-Qiao Prize for Excellent Undergraduate Research Projects in Astronomy and Astrophysics, Peking University & KIAA

## Grants Awarded

**Total grants as principal investigator (PI) or science PI (Sci PI): \$ 1.0M (Jul. 2023).**

- 2021-2024 51 Pegasi b Fellowship, Heising-Simons Foundation (Sci PI, \$ 375k),  
*Investigating the Formation, Evolution, and Atmospheres of Exoplanets with Time-Resolved Direct-Imaging Observations.*
- 2023 James Webb Space Telescope GO-03181, STScI (PI, pending),  
*Monitor a variable planetary mass companion with NIRSpec IFU*
- 2023 James Webb Space Telescope GO-03375, STScI (co-PI, pending),  
*Dancing 1 - 14 micron spectra to solve the cloudy and chemical puzzle of brown dwarf variability*

- 2022 Hubble Space Telescope GO-17280, STScI (Sci PI, 87k),  
*Validating and Characterizing the Protoplanet Candidate AB Aur b with WFC3/UVIS UV and Optical Photometry*
- 2021 Hubble Space Telescope GO-16651, STScI (Sci PI, \$ 133k),  
*A Search for Accreting Protoplanets within Transition Disk Gaps.*
- 2023B NASA/Keck Observing Support (PI, \$ 13k)  
*Monitor a variable planetary mass companion with NIRSpec IFU*
- 2023A NASA/Keck Observing Support (Sci PI, \$ 13k)  
*Characterizing the Atmosphere of a Benchmark T Dwarf Companion.*
- 2021 NASA/Keck Observing Support (Sci PI, \$ 12k)  
*The Angular Momentum Archetecture of the VHS1256 Planetary System.*
- 2019 Hubble Space Telescope GO-16036, STScI (Sci PI, \$ 116k),  
*Mapping Clouds on a Variable Planetary-Mass Companion.*
- 2019 Hubble Space Telescope GO-15830, STScI (Sci PI, \$ 130k),  
*A Planet is Born: Investigating the Accretion Process of PDS70b with WFC3/UVIS Direct Imaging Observations.*
- 2017 Hubble Space Telescope AR-15060, STScI (Sci PI, \$ 150k),  
*Unleashing the Charges: An Improved Reduction of Key Exoplanet Datasets and a Tool for Ramp Effect Correction.*

## Selected Observing Programs

### As principal investigator:

- JWST Cycle 2 (GO-03181), *Monitor a variable planetary mass companion with NIRSpec IFU*
- JWST Cycle 2 (GO-03375, co-PI), *Dancing 1 - 14 micron spectra to solve the cloudy and chemical puzzle of brown dwarf variability*
- HST Cycle 30 (GO-17280), *Validating and Characterizing the Protoplanet Candidate AB Aur b with WFC3/UVIS UV and Optical Photometry*
- HST Cycle 30 (GO-17168), *Confirming the Protoplanet Candidate AB Aur b with Accretion Light Echoes (co-PI)*
- HST Cycle 29 (GO-16651), *A Search for Accreting Protoplanets within Transition Disk Gaps.*
- HST Cycle 27 (GO-16036), *Mapping Clouds on a Variable Planetary-Mass Companion.*
- HST Cycle 27 (GO-15830), *A Planet is Born: Investigating the Accretion Process of PDS70b with WFC3/UVIS Direct Imaging Observations.*
- HST Cycle 25 (AR-15060), *Unleashing the Charges: An Improved Reduction of Key Exoplanet Datasets and a Tool for Ramp Effect Correction.*
- Spitzer DDT program (14312), *Rotational modulations of a highly variable planetary-mass companion.*
- Keck 2023B, *High-contrast imaging observations of substellar companions of an accelerating star*
- Keck 2023A, *Characterizing the Atmosphere of a Benchmark T Dwarf Companion*
- Keck 2021A, *The Angular Momentum Archetecture of the VHS1256 Planetary System.*
- McDonald Observatory 2022-1, *Monitoring variable brown dwarfs with DIAFI.*

- McDonald Observatory 2021-3, *DIAFI z-band monitoring of four highly variable brown dwarfs.*

### **As co-Investigator:**

- JWST Cycle 2 (GO-03947, PI: B. Bowler), *Testing the Giant Planet Hypothesis for Spiral-driven Arms in Protoplanetary Disks*
- JWST Cycle 2 (GO-02965, PI: B. Biller), *Clouds or Chemistry?: Pinpointing the drivers of variability across the L/T transition via the benchmark L/T binary WISE 1049AB*
- JWST Cycle 1 (GO-02640, PI: W. Best), *A Census to the Bottom of the IMF in Westerlund 2: Atmospheres, Disks, Accretion, and Demographics.*
- JWST Cycle 1 (GO-02311, PI: Y. Wu/B. Bowler), *JWST MIRI Imaging Survey of Planetary-mass Companions: Testing the Compact Disk Hypothesis.*
- JWST Early Release Science Program (ERS-1386, PI: S. Hinkley), *High Contrast Imaging of Exoplanets and Exoplanetary Systems with JWST.*
- HST Cycle 30 (GO-17136, PI: E. Gaidos), *Photometry of a Young Planetary-Mass Companion to a Taurus M Dwarf Star*
- HST Cycle 30 (GO-17127, PI: Y. Aoyama), *Testing models of accretion onto the Young Planetary System PDS 70*
- HST Cycle 29 (GO-16754, PI: S. Casewell), *Decoding the clouds on an irradiated inflated brown dwarf.*
- HST Cycle 29 (GO-16721, PI: B. Bowler), *The Angular Momentum Architecture of Long-Period Giant Planets and Brown Dwarf Companions.*
- HST Cycle 28 (GO-16302, PI: Y. Wu), *Accretion Rates as a Diagnostic Tool for the Origin of Planetary-mass Companions.*
- HST Cycle 27 (GO-15947, PI: D. Apai), *Dancing with the Dwarfs: Very High Quality Spatial and Spectral Maps of Hot Jupiters Proxies.*
- HST Cycle 25 (GO-15301, PI: L. Carone), *Now You See Me – the WASP-117b Version.*
- HST Cycle 23 (GO-14241, PI: D. Apai), *Cloud Atlas: Vertical Cloud Structure and Gravity in Exoplanet and Brown Dwarf Atmospheres.*

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### **Service and Committees**

- Referee for AAS Journals (AJ, ApJ, ApJL), A&A, MNRAS, Nature Astronomy, 3–5 manuscripts per year.
- NASA Exoplanet Research Program panel reviewer
- Canadian Time Allocation (CanTAC) Committee
- 2021 UT Austin Department of Astronomy graduate admission committee
- James Webb Space Telescope Proposal Reviewer (Cycle 2)
- Hubble Space Telescope Proposal Reviewer (Cycles 27, 29, 30)
- 2020 NASA FINESST Fellowship Reviewer
- 2018 University of Arizona Department of Astronomy graduate admission committee

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### **Teaching Experience**

- Guest lecturer for graduate-level exoplanet class. Two 75 min lectures.

- Teaching Assistant for Dr. Laird Close, course name: *Life in the Universe*  
Gave three 50 min Lectures.
- Teaching Assistant for Dr. Serena Kim, course name: *Life in the Universe*  
Organized in-class activities; Gave two 75 min Lectures; Built course website.

## Student Mentoring

- Destiny Howell, UT Austin TAURUS scholar, 2022-
- Mateo Guerra Toro, UT Austin TAURUS scholar, 2021-
- Aniket Sanghi, UT Austin undergraduate student, 2021-. Two student-leading papers have been published.
- Zhanbo Zhang, University of Arizona summer student, 2018. One student-leading paper was published.

## Recent Talks

- 2023 Colloquium, Herzberg Astronomy & Astrophysics, National Research Council of Canada
- 2/2023 Colloquium, University of Virginia, Charlottesville, VA
- 2/2023 SPF Seminar, University of Michigan, Ann Arbor, MI
- 1/2023 Origins Seminar, University of Arizona, Tucson, AZ
- 12/2022 Caltech Tea talk, Caltech, Pasadena, CA
- 11/2022 SPF Seminar, UT Austin
- 8/2022 51 Pegasi b Fellowship Summit, San Francisco, CA, USA
- 7/2022 UCSC OWL seminar, Santa Cruz, CA, USA
- 5/2022 Contribute talk, Exoplanet IV, Las Vegas, NV, USA
- 1/2022 SPF Seminar, UT Austin
- 9/2021 Twinkle conference (online)
- 8/2021 51 Pegasi b Fellowship Summit (online)
- 6/2021 MPIA Exo-coffee (online)
- 4/2021 UC Berkeley Planetary Science Seminar, UC Berkeley (online)
- 2/2021 Carnegie EPL Seminar, Carnegie Institute (online)
- 2/2021 Origins Seminar, University of Arizona (online)
- 12/2020 KIAA Lunch Talk, Peking University (online)
- 11/2020 SPF Seminar, UT Austin (online)
- 10/2020 MIT Exoplanet Tea, MIT (online)
- 10/2020 AMNH Astrophysics Seminar, American Museum of Natural History (online)
- 02/2020 Seminar talk, University of Texas, Austin, TX, USA

## Publications

 [ADS](#),  [Google scholar](#).

**11 published first-author papers (+1 submitted). 2 student-led papers.**

**36 total publications (Jul 2023). Total citations: 1167.**

**First-author papers:**

1. Yifan Zhou, Brendan P. Bowler, Haifeng Yang, et al.  
*UV-Optical Emission of AB Aur b is Consistent with Scattered Stellar Light.* In: AAS Journals, submitted (2023)
2. Yifan Zhou, Brendan P. Bowler, Dániel Apai, et al.  
*Roaring Storms in the Planetary-mass Companion VHS 1256-1257 b: Hubble Space Telescope Multiepoch Monitoring Reveals Vigorous Evolution in an Ultracool Atmosphere.* In: AJ 164.6, 239 (Dec. 2022), p. 239.  
[ADS]
3. Yifan Zhou, Aniket Sanghi, Brendan P. Bowler, et al.  
*HST/WFC3 H $\alpha$  Direct-imaging Detection of a Pointlike Source in the Disk Cavity of AB Aur.* In: ApJL 934.1, L13 (July 2022), p. L13.  
[ADS]
4. Yifan Zhou, Dániel Apai, Xianyu Tan, et al.  
*HST/WFC3 Complete Phase-resolved Spectroscopy of White-dwarf-brown-dwarf Binaries WD 0137 and EPIC 2122.* In: AJ 163.1, 17 (Jan. 2022), p. 17.  
[ADS]
5. Yifan Zhou, Brendan P. Bowler, Kevin R. Wagner, et al.  
*Hubble Space Telescope UV and H $\alpha$  Measurements of the Accretion Excess Emission from the Young Giant Planet PDS 70 b.* In: AJ 161.5, 244 (May 2021), p. 244.  
[ADS]
6. Yifan Zhou, Dániel Apai, Luigi R. Bedin, et al.  
*Cloud Atlas: High-precision HST/WFC3/IR Time-resolved Observations of Directly Imaged Exoplanet HD 106906b.* In: AJ 159.4, 140 (Apr. 2020), p. 140.  
[ADS]
7. Yifan Zhou, Dániel Apai, Luigi R. Bedin, et al.  
*Cloud Atlas: High-precision HST/WFC3/IR Time-resolved Observations of Directly Imaged Exoplanet HD 106906b.* In: AJ 159.4, 140 (Apr. 2020), p. 140.  
[ADS]
8. Yifan Zhou, Dániel Apai, Ben W. P. Lew, et al.  
*Cloud Atlas: High-contrast Time-resolved Observations of Planetary-mass Companions.* In: AJ 157.3, 128 (Mar. 2019), p. 128.  
[ADS]
9. Yifan Zhou, Dániel Apai, Stanimir Metchev, et al.  
*Cloud Atlas: Rotational Modulations in the L/T Transition Brown Dwarf Companion HN Peg B.* in: AJ 155.3, 132 (Mar. 2018), p. 132.  
[ADS]
10. Yifan Zhou, Dániel Apai, Ben W. P. Lew, et al.  
*A Physical Model-based Correction for Charge Traps in the Hubble Space Telescope's Wide Field Camera 3 Near-IR Detector and Its Applications to Transiting Exoplanets and Brown Dwarfs.* In: AJ 153.6, 243 (June 2017), p. 243.  
[ADS]
11. Yifan Zhou, Dániel Apai, Glenn H. Schneider, et al.  
*Discovery of Rotational Modulations in the Planetary-mass Companion 2M1207b: Intermediate Rotation*

- Period and Heterogeneous Clouds in a Low Gravity Atmosphere.* In: ApJ 818.2, 176 (Feb. 2016), p. 176. [\[ADS\]](#)
12. Yifan Zhou, Gregory J. Herczeg, Adam L. Kraus, et al.  
*Accretion onto Planetary Mass Companions of Low-mass Young Stars.* In: ApJL 783.1, L17 (Mar. 2014), p. L17. [\[ADS\]](#)
- Student-led papers:**
13. Aniket Sanghi, Yifan Zhou, and Brendan P. Bowler.  
*Efficiently Imaging Accreting Protoplanets from Space: Reference Star Differential Imaging of the PDS 70 Planetary System Using the HST/WFC3 Archival PSF Library.* In: AJ 163.3, 119 (Mar. 2022), p. 119. [\[ADS\]](#)
14. Zhanbo Zhang, Yifan Zhou, Benjamin V. Rackham, et al.  
*The Near-infrared Transmission Spectra of TRAPPIST-1 Planets b, c, d, e, f, and g and Stellar Contamination in Multi-epoch Transit Spectra.* In: AJ 156.4, 178 (Oct. 2018), p. 178. [\[ADS\]](#)
- Co-author papers:**
15. Aarynn L. Carter, Sasha Hinkley, Jens Kammerer, et al.  
*The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems I: High-contrast Imaging of the Exoplanet HIP 65426 b from 2 to 16  $\mu$ m.* In: ApJL 951.1, L20 (July 2023), p. L20. [\[ADS\]](#)
16. Kyle Franson, Brendan P. Bowler, Yifan Zhou, et al.  
*Astrometric Accelerations as Dynamical Beacons: A Giant Planet Imaged inside the Debris Disk of the Young Star AF Lep.* In: ApJL 950.2, L19 (June 2023), p. L19. [\[ADS\]](#)
17. Rachael C. Amaro, Dániel Apai, Yifan Zhou, et al.  
*Hotter than Expected: Hubble Space Telescope (HST)/WFC3 Phase-resolved Spectroscopy of a Rare Irradiated Brown Dwarf with Strong Internal Heat Flux.* In: ApJ 948.2, 129 (May 2023), p. 129. [\[ADS\]](#)
18. Brendan P. Bowler, Quang H. Tran, Zhoujian Zhang, et al.  
*Rotation Periods, Inclinations, and Obliquities of Cool Stars Hosting Directly Imaged Substellar Companions: Spin-Orbit Misalignments Are Common.* In: AJ 165.4, 164 (Apr. 2023), p. 164. [\[ADS\]](#)
19. Zhoujian Zhang, Brendan P. Bowler, Trent J. Dupuy, et al.  
*The McDonald Accelerating Stars Survey: Architecture of the Ancient Five-planet Host System Kepler-444.* In: AJ 165.2, 73 (Feb. 2023), p. 73. [\[ADS\]](#)
20. Brittany E. Miles, Beth A. Biller, Polychronis Patapis, et al.  
*The JWST Early-release Science Program for Direct Observations of Exoplanetary Systems II: A 1 to 20  $\mu$ m Spectrum of the Planetary-mass Companion VHS 1256-1257 b.* In: ApJL 946.1, L6 (Mar. 2023), p. L6. [\[ADS\]](#)
21. Elspeth K. H. Lee, Joshua D. Lothringer, Sarah L. Casewell, et al.  
*Sunbathing under white light – 3D modelling of brown dwarf - white dwarf atmospheres with strong UV irradiation.* In: arXiv e-prints, arXiv:2203.09854 (Mar. 2022), arXiv:2203.09854. [\[ADS\]](#)

22. Sasha Hinkley, Aarynn L. Carter, Shrishmoy Ray, et al.  
*The JWST Early Release Science Program for the Direct Imaging and Spectroscopy of Exoplanetary Systems.* In: PASP 134.1039, 095003 (Sept. 2022), p. 095003. [\[ADS\]](#)
23. Kayli Glidic, Everett Schlawin, Lindsey Wiser, et al.  
*Atmospheric Characterization of Hot Jupiter CoRoT-1 b Using the Wide Field Camera 3 on the Hubble Space Telescope.* In: AJ 164.1, 19 (July 2022), p. 19. [\[ADS\]](#)
24. Elspeth K. H. Lee, Joshua D. Lothringer, Sarah L. Casewell, et al.  
*Sunbathing under white light – 3D modelling of brown dwarf - white dwarf atmospheres with strong UV irradiation.* In: arXiv e-prints, arXiv:2203.09854 (Mar. 2022), arXiv:2203.09854. [\[ADS\]](#)
25. Taichi Uyama, Chen Xie, Yuhiko Aoyama, et al.  
*Keck/OSIRIS Paβ High-contrast Imaging and Updated Constraints on PDS 70b.* In: AJ 162.5, 214 (Nov. 2021), p. 214. [\[ADS\]](#)
26. Patricio E. Cubillos, Dylan Keating, Nicolas B. Cowan, et al.  
*Longitudinally Resolved Spectral Retrieval (ReSpect) of WASP-43b.* In: ApJ 915.1, 45 (July 2021), p. 45. [\[ADS\]](#)
27. Brendan P. Bowler, Michael Endl, William D. Cochran, et al.  
*The McDonald Accelerating Stars Survey (MASS): Discovery of a Long-period Substellar Companion Orbiting the Old Solar Analog HD 47127.* In: ApJL 913.2, L26 (June 2021), p. L26. [\[ADS\]](#)
28. Ludmila Carone, Paul Mollière, Yifan Zhou, et al.  
*Indications for very high metallicity and absence of methane in the eccentric exo-Saturn WASP-117b.* In: A&A 646, A168 (Feb. 2021), A168. [\[ADS\]](#)
29. Ben W. P. Lew, Dániel Apai, Mark Marley, et al.  
*Cloud Atlas: Unraveling the Vertical Cloud Structure with the Time-series Spectrophotometry of an Unusually Red Brown Dwarf.* In: ApJ 903.1, 15 (Nov. 2020), p. 15. [\[ADS\]](#)
30. Brendan P. Bowler, Yifan Zhou, Caroline V. Morley, et al.  
*Strong Near-infrared Spectral Variability of the Young Cloudy L Dwarf Companion VHS J1256-1257 b.* In: ApJL 893.2, L30 (Apr. 2020), p. L30. [\[ADS\]](#)
31. Ben W. P. Lew, Dániel Apai, Yifan Zhou, et al.  
*Cloud Atlas: Weak Color Modulations Due to Rotation in the Planetary-mass Companion GU Psc b and 11 Other Brown Dwarfs.* In: AJ 159.3, 125 (Mar. 2020), p. 125. [\[ADS\]](#)
32. Paulo A. Miles-Páez, Stanimir Metchev, Dániel Apai, et al.  
*Cloud Atlas: Variability in and out of the Water Band in the Planetary-mass HD 203030B Points to Cloud Sedimentation in Low-gravity L Dwarfs.* In: ApJ 883.2, 181 (Oct. 2019), p. 181. [\[ADS\]](#)
33. Elena Manjavacas, Dániel Apai, Ben W. P. Lew, et al.  
*Cloud Atlas: Rotational Spectral Modulations and Potential Sulfide Clouds in the Planetary-mass, Late T-type Companion Ross 458C.* in: ApJL 875.2, L15 (Apr. 2019), p. L15. [\[ADS\]](#)
34. Elena Manjavacas, Dániel Apai, Yifan Zhou, et al.  
*Cloud Atlas: Hubble Space Telescope Near-infrared Spectral Library of Brown Dwarfs, Planetary-mass Companions, and Hot Jupiters.* In: AJ 157.3, 101 (Mar. 2019), p. 101. [\[ADS\]](#)

35. J. J. Spake, D. K. Sing, T. M. Evans, et al.  
*Helium in the eroding atmosphere of an exoplanet*. In: *Nature* 557.7703 (May 2018), pp. 68–70. [\[ADS\]](#)
36. Elena Manjavacas, Dániel Apai, Yifan Zhou, et al.  
*Cloud Atlas: Discovery of Rotational Spectral Modulations in a Low-mass, L-type Brown Dwarf Companion to a Star*. In: *AJ* 155.1, 11 (Jan. 2018), p. 11. [\[ADS\]](#)
37. Ben W. P. Lew, Daniel Apai, Yifan Zhou, et al.  
*Cloud Atlas: Discovery of Patchy Clouds and High-amplitude Rotational Modulations in a Young, Extremely Red L-type Brown Dwarf*. In: *ApJL* 829.2, L32 (Oct. 2016), p. L32. [\[ADS\]](#)