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# Dr. Yifan Zhou

## Employment

2021- **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– 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 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): $ 929k (Sep. 2022).**

- 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.*
- 2022 Hubble Space Telescope GO-17280, STScI (Sci PI, pending),
  *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.*
- 2023 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.*

## Select Observing Programs

**As principal investigator:**

- 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 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 1 (GO-2640, PI: W. Best), *A Census to the Bottom of the IMF in Westerlund 2: Atmospheres, Disks, Accretion, and Demographics.*
- JWST Cycle 1 (GO-2311, 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.*

## Service and Committees

- Referee for AAS Journals (AJ, ApJ, ApJL), A&A, MNRAS, 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
- Hubble Space Telescope Proposal Reviewer (Cycles 27, 29, 30)
- 2020 NASA FINESST Fellowship Reviewer
- 2018 University of Arizona Department of Astronomy graduate admission committee

## 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

2/2023 Colloquium, University of Virginia, Charllottesville, 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
11/2018 Seminar talk, Jet Propulsion Laboratory, Pasadena, CA, USA
11/2018 Seminar talk, University of Texas, Austin, TX, USA
09/2018 Seminar talk, University of Bern, Bern, Switzerland
09/2018 Seminar talk, IPAC lunch talk, Pasadena, CA, USA
07/2018 Contributed talk, Exoplanet II, Cambridge, UK
04/2018 Seminar talk, Origin Seminar, Tucson, AZ, USA
03/2018 Contributed talk, Star and Planet Formation in the Southwest II, Oracle, AZ, USA
02/2018 Seminar talk, CPSX Lunch Forum at Western University, London, ON, Canada
01/2018 Seminar talk, KIAA Lunch Talk, Beijing, China
12/2017 Seminar talk, PSF coffee, MPIA, Heidelberg, Germany
10/2017 Contributed talk, BDEXOCON conference, Newark, DE, USA
05/2017 Seminar talk, Origin Seminar, Tucson, AZ, USA
08/2016 Contributed talk, Exoclime II, Squamish, Canada

## Publications

**ADS**, **Google scholar.**

**11 published first-author papers. 2 student-led papers. 35 total publications (Mar 2023). Total citations: 984.**

**First-author papers:**

1. Yifan Zhou, Brendan Bowler, Daniel Apai, et al.
*Roaring Storms in the Planetary-Mass Companion VHS 1256-1257 b: Hubble Space Telescope Multi-epoch Monitoring Reveals Vigorous Evolution in an Ultra-cool Atmosphere*,
*AJ*, 164:239, 2022
2. Yifan Zhou, Aniket Sanghi, Brendan Bowler et al.
*HST/WFC3 Hα Direct-imaging Detection of a Pointlike Source in the Disk Cavity of AB Aur*,
*ApJL*, 934:L13, 2022
3. 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*,
*AJ*, 163:17, 2022
4. Yifan Zhou, Brendan Bowler, Kevin Wagner, et al.
*Hubble Space Telescope UV and Hα Measurements of the Accretion Excess Emission from the Young Giant Planet PDS 70 b*,
*AJ*, 161:244, may 2021.
5. Yifan Zhou, Brendan Bowler, Caroline Morley, et al.
*Spectral Variability of VHS J1256–1257b from 1 to 5 μm*,
*AJ*, 160:77, jul 2020.
6. Yifan Zhou, Dániel Apai, Luigi Bedin, et al.
*Cloud Atlas: High-precision HST/WFC3/IR Time-resolved Observations of Directly Imaged Exoplanet HD 106906b*,
*AJ*, 159:140, mar 2020.
7. Yifan Zhou, Dániel Apai, Ben W. P. Lew, et al.
*Cloud Atlas: High-Contrast Time-Resolved Observations of Planetary-Mass Companions*,
*AJ*, 157:128, jan 2019
8. Yifan Zhou, Dániel Apai, Stanimir Metchev, et al.
*Cloud Atlas: Rotational Modulations in the L/T Transition Brown Dwarf Companion HN Peg B*,
*AJ*, 155(3):132, jan 2018.
9. Yifan Zhou, Dániel Apai, Ben W. P. Lew, and Glenn H Schneider.
*A Physical Model-based Correction for Charge Traps in the Hubble Space Telescope's Wide Field Camera 3 Near-IR Detector and Applications to Transiting Exoplanets and Brown Dwarfs*,
*AJ*, 153(6):243, mar 2017.
10. Yifan Zhou, Dániel Apai, Glenn H Schneider, Mark S Marley, and Adam P. Showman.
*Discovery Of Rotational Modulations in the Planetary-Mass Companion 2M1207b: Intermediate Rotation Period and Heterogeneous Clouds in a Low Gravity Atmosphere*,
*ApJ*, 818(2):176, feb 2016.
11. Yifan Zhou, Gregory J Herczeg, Adam L Kraus, Stanimir Metchev, and Kelle L Cruz. *Accretion onto Planetary Mass Companions of Low-Mass Young Stars*,
*ApJ*, 783(1):L17, feb 2014.

**Student-led papers:**

12. Sanghi, Zhou, and Bowler
*Efficiently Imaging Accreting Protoplanets from Space: Reference Star Differential Imaging of the PDS 70 Planetary System Using the HST/WFC3 Archival PSF Library AJ*, 163, 119, feb, 2022
13. Zhang, Zhou, Rackham, and Apai.
*The near-infrared transmission spectra of trappist-1 planets b, c, d, e, f, and g and stellar contamination in multi-epoch transit spectra.*
*AJ*, 156, 178, oct 2018.

**Co-author papers:**

14. Franson, Bowler, Zhou et al.
*Astrometric Accelerations as Dynamical Beacons: A Giant Planet Imaged Inside the Debris Disk of the Young Star AF Lep*
*ApJL, submitted*, arXiv:2302.05420
15. Bowler et al. (incl. Zhou)
*Rotation Periods, Inclinations, and Obliquities of Cool Stars Hosting Directly Imaged Substellar Companions: Spin-Orbit Misalignments are Common*
*AJ, in press*, arXiv:2301.04692
16. Zhang et al. (incl. Zhou)
*The McDonald Accelerating Stars Survey (MASS): Architecture of the Ancient Five-Planet Host System Kepler-444*
*AJ*, 165:73, 2023
17. Carter et al. (incl. Zhou)
*The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems I: High Contrast Imaging of the Exoplanet HIP 65426 b from 2-16 $\mu$m ApJL, submitted*, arXiv:2208.14990
18. Miles et al. (incl. Zhou)
*The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems II: A 1 to 20 Micron Spectrum of the Planetary-Mass Companion VHS 1256-1257 b ApJL, in press*, arXiv:2209.00620
19. Lee et al. (incl. Zhou)
*Sunbathing under white light – 3D modelling of brown dwarf - white dwarf atmospheres with strong UV irradiation*
*MNRAS, submitted,* arXiv:2203.09854
20. Hinkley et al. (incl. Zhou)
*The JWST Early Release Science Program for the Direct Imaging & Spectroscopy of Exoplanetary Systems PASP*, 134, 095003, 2022
21. Glidic et al. (incl. Zhou)
*Atmospheric Characterization of Hot Jupiter CoRoT-1 b Using the Wide Field Camera 3 on the Hubble Space Telescope AJ*, 164:19, jul 2022
22. Lew, Apai, Zhou et al.
*Mapping the pressure-dependent day-night temperature contrast of a strongly irradiated atmosphere with HST spectroscopic phase curve AJ* 163:8, 2022
23. Uyama et al. (incl. Zhou)
*Keck/OSIRIS Pa$\beta$ High-contrast Imaging and Updated Constraints on PDS 70b AJ*, 162:214, nov 2021
24. Cubillos et al. (incl. Zhou)
*Longitudinally Resolved Spectral Retrieval (ReSpect) of WASP-43b ApJ*, 915:45, jul 2021
25. Bowler et al. (incl. Zhou)
*The McDonald Accelerating Stars Survey (MASS): Discovery of a Long-period Substellar Companion Orbiting the Old Solar Analog HD 47127 ApJL*, 913L:28, jun 2021
26. Ludmila Carone, Paul Mollière, Yifan Zhou, et al.

*Indications for very high metallicity and absence of methane in the eccentric exo-Saturn WASP-117b*
*A&A*, 646:43, feb 2021

27. Bew W. P. Lew, et al. (incl. Yifan Zhou)
*Cloud Atlas: Unraveling the Vertical Cloud Structure with the Time-series Spectrophotometry of an Unusually Red Brown Dwarf*
*ApJ*, 903:1, oct 2020
28. Brendan P. Bowler, Yifan Zhou et al.
*Strong Near-infrared Spectral Variability of the Young Cloudy L Dwarf Companion VHS J1256-1257 b*
*ApJL*, 893L:30, apr 2020
29. 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*
*AJ*, 159:125, feb 2020
30. Paulo A. Miles-Páez, Dániel Apai, Stanimir Metchev, Yifan Zhou 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*
*ApJ*, 883:181, oct 2019
31. Elena Manjavacas, Dániel Apai, Ben W.P. Lew, Yifan Zhou et al.
*Cloud Atlas: Rotational Spectral Modulations and Potential Sulfide Clouds in the Planetary-mass, Late T-type Companion Ross 458C*
*ApJL*, 875:L15, apr 2019
32. 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*
*AJ*, 157:101, feb 2019
33. J. Spake *et al.* (incl. Y. Zhou).
*Helium in the eroding atmosphere of an exoplanet*.
*Nature*, 557:68–70, May 2018.
34. Elena Manjavacas, Dániel Apai, Yifan Zhou, Theodora Karalidi, Ben W. P. Lew, et al.
*Cloud Atlas: Discovery of Rotational Spectral Modulations in a Low-mass, L-type Brown Dwarf Companion to a Star*.
*AJ*, 155(1):11, dec 2017.
35. Ben W P Lew, Dániel Apai, Yifan Zhou, Glenn H Schneider, et al.
*Cloud Atlas: Discovery of Patchy Clouds and High-Amplitude Rotational Modulations in a Young, Extremely Red L-Type Brown Dwarf*.
*ApJ*, 829(2):L32, sep 2016.