Dr. Yongda Zhu

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RESEARCH INTERESTS

Galaxy formation and evolution; Reionization; Intergalactic medium (IGM); Quasars; Dark Matter

EDUCATION

Mar. **2024**	**Ph.D. in Physics**; University of California, Riverside *Constraining the IGM during the Later Stages of Reionization Using QSO Spectra* Advisor: Prof. George Becker
Dec. 2019	M.Sc. in Physics; University of California, Riverside
Jun. 2018	B.Sc. in Astronomy; University of Science and Technology of China *Test of Gravity Theories on the Galaxy Scale.* Advisor: Prof. Xiao-Bo Dong

POSITIONS & PROFESSIONAL SERVICE

- **JASPER Scholar** (University of Arizona) 2025–
  - Mentors: Prof. Eiichi Egami & Prof. Xiaohui Fan
  - Investigating gas–galaxy interactions across multiple scales using JWST data.
- **Postdoctoral Research Associate** (University of Arizona) 2024–
  - Mentors: Prof. Marcia Rieke & Prof. George Rieke
  - Member of the JWST NIRCam Science Team and the MIRI U.S. Team.
  - Analyzing multi-band imaging of galaxies from NIRCam.
  - Built the first systematic sample of galaxies with extended emission lines and potential outflows using deep NIRCam medium-band imaging.
  - Leading the reduction and analysis of one of the largest JWST/NIRSpec MSA datasets targeting cosmic noon galaxies and dust-obscured AGN candidates.
- **Graduate Student Researcher** (UC Riverside) 2019–2024
  - Mentor: Prof. George Becker
  - Led Keck and ALMA observations of the IGM via high-z quasars.
  - Modeled the Lyα and Lyβ forest using cosmological simulations.
  - Provided robust evidence that cosmic reionization ended significantly later than previously thought.
- **Teaching Assistant** (UC Riverside) 2018–2019
  - Taught intensive summer review course for PhD students preparing for the Comprehensive Exam. *Classical Mechanics, Electromagnetism, Thermal and Statistical Physics*
  - Led undergraduate general physics laboratory courses.
- **Teaching Assistant** (USTC) 2016
  - Taught computer programming in `C/C++`, including data structures and algorithms.
- **Peer Reviewer:**
  The Astrophysical Journal, *The Astrophysical Journal Letters*, *Open Research Europe* (European Commission); telescope proposals (ALMA, Gemini).

- **Collaborations:** JADES, XQR-30, Roman Science Collaboration, SAPPHIRES, COSMOS-3D, EREBUS

SELECTED GRANTS & AWARDS

- NSF | NRAO Student Observing Support Award ($40k) 2023
- UCR | HEERF Dissertation Year Program Award ($7.2k) 2022
- Benjamin C. Shen Memorial Award
  for Outstanding Achievement by a First Year Graduate Student Researcher, UCR 2019
- Dean's Distinguished Fellowship, UCR 2018
- Xingquan Fund Scholarship, USTC 2017
- Outstanding Student Scholarship, USTC 2015, 2017
- Student PI, "Properties of Barred Galaxies in Numerical Simulations" 2017
  Chinese Academy of Sciences (CAS)
  Innovation Training Programs for Undergraduates (1 yr, CNY 10k)
- First Prize in China Undergraduate Physics Tournament (USTC Competition Area). 2016
- Student PI, "Testing Gravity Theories on the Galactic Scale" 2015-2017
  - National Natural Science Foundation of China (NSFC)
  for Fostering Talented Students in Basic Sciences (2 yr, CNY 20k)
  - Chinese Academy of Sciences (CAS)
  Innovation Training Programs for Undergraduates (1 yr, CNY 10k)

OBSERVING EXPERIENCE & PROPOSAL INVOLVEMENT

*PI/leading person†

Selected projects:

- *ALMA - Cycle 11 – *Galaxy over/under-densities around IGM transmission at z=5.7: a robust constraint on reionization*
- *MMT-6.5m/Binospec IFU - 2024B – *Ionization and Enrichment in the Reionization Epoch: A Pilot Study with Binospec IFU*
- *ALMA - Cycle 9 – *The Mean Free Path of Ionizing Photons at $z = 5.6$: A Robust Constraint on Reionization*
- JWST/NIRCam WFSS - Cycle 2 (PI: Becker): *How Does Reionization End? A Search for [O III] Emitters in the Most Transparent Regions of the IGM Near Redshift Six*
- †Keck/ESI: [2021B_U036, 2022A_U035, 2022B_U042, 2023B_U049, 2023B_U049, 2024A_U281] *The Mean Free Path at $z = 5.6$: Insights into Ultra-Late Reionization*

Selected previous allocation:

- Keck/ESI: [2019A_U014, 2020A_U121, 2021A_U039] *Giant Lyα Troughs at $z < 6$: A Signature of Very Late Reionization?*: (PI: Becker) **Zhu, Y.**, et al. 2021, ApJ, 923, 223; **Zhu, Y.** et al. 2022, ApJ, 932, 76.
- Keck/LRIS [2019A_U147, 2019B_U147] *The Mean Free Path at $z = 5$: A Key Constraint on Reionization Models* (PI: Becker) Becker, G. D., et al. 2021; **Zhu, Y.** et al. 2023, ApJ, 955, 115

Other allocation includes Keck/ESI [2021A, 2021B], Keck/DEIMOS [2020A], Keck/LRIS [2023B], Subaru/HSC [2020B, 2021A, 2021B, 2023B]

† The PI of Keck proposals cannot be a UC student.

Other JWST programs as Co-I:

- 8544 - Rest-Frame Optical Nebular Emission Lines at Cosmic Dawn: MIRI/LRS Follow-Up for JADES-GS-z14-0
- 8060 - JWST Multi-Cycle Deep Transient Survey in GOODS-S
- 8018 - DIVER: Deep Insights into UV Spectroscopy at the Epoch of Reionization
- 7935 - Efficient Measurement of the Emergence Rate of AGN in Legacy Deep Field
- 7436 - The Last Neutral Islands at the End of Reionization? Characterizing the Nature of the Longest Dark Gaps in IGM Transmission at z∼5.3
- 7390 - Probing Pair-Instability Supernovae through the Triply-lensed MACS0647-JD at z=10.17
- 7345 - The Dragon survey: A Direct Probe of the Early Stellar Luminosity Function and Dark Matter through Multi-cycle Multi-cadence Microlensing at z=0.73
- 7336 - Commission a new R∼2500 `IFU` on JWST: Calibrating second-order spectra of NIRCam/WFSS through Hubble Ultra Deep Field
- 7335 - Forever Blowing Bubbles: What Powers a 24-kpc Ionized Gas Nebula Around a Normal Galaxy at z=6?

SELECTED SEMINARS / COLLOQUIA / CONFERENCE TALKS

* invited

- Galaxy Origins in the JWST Era, Toledo — May, 2025
- NIRCam Science Meeting, Biosphere2 — Mar, 2025
- ***** SO/NSF's NOIRLab Joint Colloquium, **University of Arizona** — Feb 27, 2025
- ***** Cosmology Seminar, **Arizona State University** — Feb 19, 2025
- Lyman-alpha Forest Workshop, **Ohio State University** — Oct, 2024
- JWST MIRI Science Meeting, Biosphere2 — Oct, 2024
- The First Gigayear(s), Hilo, Hawai'i — Sep, 2024
- JADES Collaboration Meeting, **University of Copenhagen** — Apr, 2024
- ***** Galaxy Group Talk, **University of Arizona** — Mar, 2024
- ***** Galaxy Seminar, **University of Michigan** — Nov, 2023
- Galaxy Formation and Evolution in Southern California (GalFRESCA 2023) — Sep, 2023
- ***** Special Kashiwa-Mitaka Meeting (KMM) Seminar, **University of Tokyo** — Aug, 2023
- ***** Lightning Talk, First Light Conference, **MIT** — Jun, 2023
- Reionisation in the Summer Conference, **MPIA**, Heidelberg — Jun, 2023
- ***** Talk at Galaxy Formation Group, **Northwestern University** (CIERA) — Dec, 2022

- * FLASH Seminar, **University of California, Santa Cruz** Nov, 2022
- * Astronomy Lunch Talk, **University of California, Los Angeles** Oct, 2022
- * Astro Lunch Talk, **University of California, Santa Barbara** Sep, 2022
- Reionization on a Blackboard Workshop, **CCA** Sep, 2022
- * Special arXiv Coffee Meeting, **University of California, Davis** May, 2022
- * Physics & Astronomy Student Seminar, **UC Riverside** Apr, 2022
- * High-z Group Talk, **Tsinghua University** Apr, 2022
- Reionization and Cosmic Dawn: Looking Forward to the Past, **UC Berkeley** Mar, 2022
- European Astronomical Society Annual Meeting (EAS 2021) Jul, 2021
- Summer All Zoom Epoch of Reionization Astronomy Conference (SAZERAC2) Jun, 2021
- * EURECA Seminar, **University of Arizona** Feb, 2021

MENTORING

- Undergraduate student mentored: Ms. G. Hernandez (UC Riverside) 2021
  - Project: Measuring the redshift evolution of the IGM effective optical depth.
- Graduate students (co-)mentored:
  - Ms. H.-X. Ma (PhD student at Nagoya University, Japan)
  Projects: *Density-based clustering algorithm for galaxy group/cluster identification*
  Projects: *Constraining the dark matter halo of the Milky Way with Gaia DR3*
  - Mr. Seyedazim Hashemi (PhD student at UC Riverside)
  Project: *Lyman-alpha visibility during the epoch of reionization*
- UCR International Students & Scholar Office:
  14 mentees with international backgrounds 2021-2023
- Graduate Student Mentorship Program: 2020
  - Dr. N Ahvazi (recently finished her PhD in Physics; dark matter and galaxies)
  - Mr. Q Wu (now pursuing his PhD in Physics; 2D materials)

SERVICE & PUBLIC OUTREACH

- Stargazing outreach events at Home Gardens Library, Corona, CA Oct. 2023
- Co-organizer: UCR Physics & Astronomy Student Seminar 2022-2023
- UCR Camp Highlander instructor Summer 2022
- Outreach courses designed for K-12 students: 2022
  - *Multiwavelength Universe*
  - *Gravity Simulator*
- Virtual Stargazing (UCR & Riverside Astronomical Society)
  monthly live public outreach on Youtube 2020-2021
- Serving for the Riverside County Science and Engineering Fair as judge 2021-2023
- UCR Astronomy Public Outreach: Mercury Transit Nov. 2019

SELECTED MEDIA COVERAGE

- "Astronomers Discover a Unique Quasi-Stellar Object–Dusty Star-Forming Galaxy System", **American Physical Society (APS)**
- "The End of the Cosmic Dawn: Settling a Two-Decade Debate", **SciTechDaily**
- "Can You Explain These Long, Dark Gaps in Your Cosmological Resume?", **AASNova**

TECHNICAL PROFICIENCIES

Programming	C(and some C++), Python, Julia, GDL/IDL, CUDA
Software	CASA, Gadget-4, GALAXY, FreeFem++, etc.
Hardware	Raspberry Pi, Arduino
Languages	English (professional), Chinese (native)

YONGDA ZHU - PUBLICATION LIST

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Google Scholar: https://scholar.google.com/citations?user=wDrSZWYAAAAJ

As of April 2025: >1500 citations | h-index: 22
Research Interest Score is higher than **99%** of ResearchGate members who first published in 2021.

First-author:

9. **Zhu, Y.**, Rieke, M. J., Ho, L. C., Sun, Y., Rieke, G. H., Yuan, F., Bakx, T. J. L. C., Becker, G. D., Yang, J., Bañados, E., Bischetti, M., Cain, C., Fan, X., Fudamoto, Y., Hashemi, S., Ikeda, R., Ji, Z., Jin, X., Liu, W., Liu, Y., Lyu, J., Ma, H.-X., Takeuchi, T. T., Umehata, H., Wang, F., and Tee, W. L., **2025**. *Nuclear Winds Drive Large-Scale Cold Gas Outflows in Quasars during the Reionization Epoch*, Nature Astronomy, under review, arXiv:2504.02305.

8. **Zhu, Y.**, Bakx, T. J. L. C., Ikeda, R., Umehata, H., Becker, G. D., Cain, C., Champagne, J. B., Fan, X., Fudamoto, Y., Jin, X., Ma, H.-X., Sun, Y., Takeuchi, T. T., and Tee, W. L., **2024**. *Discovery of a Unique Close Quasar-DSFG Pair Linked by a [C II] Bridge at* $z = 5.63$, RNAAS, 8, 284.

7. **Zhu, Y.**, Alberts, S., Lyu, J., Morrison, J., Rieke, G. H., Sun, Y., Helton, J. M., Ji, Z., Bhatawdekar, R., Bonaventura, N., Bunker, A. J., Lin, X., Rieke, M. J., Rinaldi, P., Shivaei, I., Willmer, C. N. A., and Zhang, J., **2024**. *SMILES: Potentially Higher Ionizing Photon Production Efficiency in Overdense Regions*, The Astrophysical Journal, in press.

6. **Zhu, Y.**, Rieke, M. J., Ji, Z., Simmonds, C., Sun, F., Sun, Y., Alberts, S., Bhatawdekar, R., Bunker, A. J., Cargile, P. A., Carniani, S., de Graaff, A., Hainline, K., Helton, J. M., Jones, G. C., Lyu, J., Rieke, G. H., Rinaldi, P., Robertson, B., Scholtz, J., Übler, H., Williams, C. C., and Willmer, C. N. A., **2024**. *A Systematic Search for Galaxies with Extended Emission Line and Potential Outflows in JADES Medium-Band Images*, The Astrophysical Journal, in press.

5. **Zhu, Y.**, Becker, G.D., Bosman, S. E. I., Cain, C., Keating, L. C., Nasir, F., D'Odorico, V., Bañados, E., Bian, F., Bischetti, M., Bolton, J. S., Chen, H., D'Aloisio, A., Davies, F. B., Davies, R. L., Eilers, A.-C., Fan, X., Gaikwad, P., Greig, B., Haehnelt, M. G., Kulkarni, G., Lai, S.,

Puchwein, E., Qin, Y., Ryan-Weber, E. V., Satyavolu, S., Spina, B., Walter, F., Wang, F., Wolfson, M., and Yang, J., **2024**. *Damping Wing-Like Features in the Stacked Lyα Forest: Potential Neutral Hydrogen Islands at $z < 6$.* Monthly Notices of the Royal Astronomical Society: Letters, 533, L49

4. **Zhu, Y.**, Becker, G.D., Christenson, H.M., D'Aloisio, A., Bosman, S.E.I., Bakx, T., D'Odorico, V., Bischetti, M., Cain, C., Davies, F.B., Davies, R.L., Eilers, A.-C., Fan, X., Gaikwad, P., Haehnelt, M.G., Keating, L.C., Kulkarni, G., Lai, S., Ma, H.-X., Mesinger, A., Qin, Y., Satyavolu, S., Takeuchi, T.T., Umehata, H., and Yang, J., **2023**. *Probing Ultra-late Reionization: Direct Measurements of the Mean Free Path over $5 < z < 6$.* The Astrophysical Journal, 955, 115.

3. **Zhu, Y.**, Ma, H.-X. (co-first author), Dong, X.-B., Huang, Y., Mistele, T., Peng, B., Long, Q., Wang T., Chang L., and Jin X., **2023**. *How Close Dark Matter Halos and MOND Are to Each Other: Three-Dimensional Tests Based on Gaia DR2.* Monthly Notices of the Royal Astronomical Society, 519, 4479.

2. **Zhu, Y.**, Becker G.D., Bosman S.E.I., Keating L.C., D'Odorico V., Davies R.L., Christenson H.M., Bañados E., Bian F., Bischetti M., Chen H., Davies F.B., Eilers A.-C., Fan X., Gaikwad P., Greig B., Haehnelt M.G., Kulkarni G., Lai S., Pallottini A., Qin Y., Ryan-Weber E.V., Walter F., Wang F., and Yang J., **2022**. *Long Dark Gaps in the Lyβ Forest at $z < 6$: Evidence of Ultra Late Reionization from XQR-30 Spectra.* The Astrophysical Journal, 932 76.

1. **Zhu, Y.**, Becker, G.D., Bosman, S.E.I., Keating, L.C., Christenson, H.M., Bañados, E., Bian, F., Davies, F.B., D'Odorico, V., Eilers, A.-C., Fan, X., Haehnelt, M.G., Kulkarni, G., Pallottini, A., Qin, Y., Wang, F., Yang, J., **2021**. *Chasing the Tail of Cosmic Reionization with Dark Gap Statistics in the Lyα Forest over $5 < z < 6$.* The Astrophysical Journal 923, 223.

Co-author:

48. Baker, W. M., Lim, S., D'Eugenio, F., Maiolino, R., Ji, Z., Arribas, S., Bunker, A. J., Carniani, S., Charlot, S., de Graaff, A., Hainline, K., Looser, T. J., Lyu, J., Rinaldi, P., Robertson, B., Schaller, M., Schaye, J., Scholtz, J., Übler, H., Williams, C. C., Willmer, C. N. A., Willott, C., and **Zhu, Y.**, **2025**. *The abundance and nature of high-redshift quiescent galaxies from JADES spectroscopy and the FLAMINGO simulations*, Monthly Notices of the Royal Astronomical Society, 539, 557.

47. Rinaldi, P., Pérez-González, P. G., Rieke, G. H., Lyu, J., D'Eugenio, F., Wu, Z., Carniani, S., Looser, T. J., Shivaei, I., Boogaard, L. A., Diaz-Santos, T., Colina, L., Östlin, G., Alberts, S., Álvarez-Márquez, J., Annuziatella, M., Aravena, M., Bhatawdekar, R., Bunker, A. J., Caputi, K. I., Charlot, S., Crespo Gómez, A., Curti, M., Eckart, A., Gillman, S., Hainline, K., Kumari, N., Hjorth, J., Iani, E., Inami, H., Ji, Z., Johnson, B. D., Jones, G. C., Labiano, Á., Maiolino, R., Melinder, J., Moutard, T., Peißker, F., Rieke, M., Robertson, B., Scholtz, J., Tacchella, S., van der Werf, P. P., Walter, F., Williams, C. C., Willott, C., Witstok, J., Übler, H., and **Zhu, Y.**, **2025**. *Deciphering the Nature of Virgil: An Obscured AGN Lurking Within an Apparently Normal Lyman-α Emitter During Cosmic Reionization*, arXiv e-prints, arXiv:2504.01852.

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45. Sun, Y., Rieke, G. H., Lyu, J., Stone, M. A., Ji, Z., Rinaldi, P., Willmer, C. N. A., and **Zhu, Y.**, **2025**. *Evolution of the M*/MBH Relation from $z \sim 6$ to the Present Epoch*, The Astrophysical Journal, 983, 165.

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43. D'Eugenio, F., Helton, J. M., Hainline, K., Sun, F., Maiolino, R., Pérez-González, P. G., Juodžbalis, I., Arribas, S., Bunker, A. J., Carniani, S., Curtis-Lake, E., Egami, E., Eisenstein, D. J., Johnson, B. D., Robertson, B., Tacchella, S., Willmer, C. N. A., Willott, C., Baker, W. M., Danhaive, A. L., Duan, Q., Fudamoto, Y., Jones, G. C., Lin, X., Liu, W., Perna, M., Puskás, D., Rinaldi, P., Scholtz, J., Sun, Y., Trussler, J. A. A., Übler, H., Venturi, G., Williams, C. C., and **Zhu, Y.**, **2025**. *JADES and SAPPHIRES: Galaxy Metamorphosis Amidst a Huge, Luminous Emission-line Region*, arXiv e-prints, arXiv:2503.15590.

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