Pengpei Zhu 朱芃佩

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Publication list on SciX

Research Interests

I study how massive galaxies quench and stay quiescent, measuring the gas outflows and stellar metallicities of massive quiescent galaxies out to $z \sim 5$ with JWST/NIRSpec spectroscopy.

Science	High-redshift galaxies • galaxy quenching • chemical enrichment • galaxy dynamics and interactions • galaxy formation and assembly
Methods	Near-infrared spectroscopy • integral-field spectroscopy • stellar-population and absorption-line analysis • photometry
Tools	AI agents for research workflows • catalog visualization • reproducible AI pipelines • open data

Education

Ph.D. in Astrophysics Nov. 2024 – Nov. 2027 (expected)
Cosmic Dawn Center (DAWN), DTU Space, Technical University of Denmark, Kgs. Lyngby, Denmark
Supervisor: Dr. Francesco Valentino.

M.Sc. in Astronomy (Astronomy Research) Sep. 2022 – Sep. 2024
Leiden University, Leiden, The Netherlands
Grade 8.2/10. Thesis awarded the KHMW Young Talent Award in Astronomy (EUR 3,000).

B.S. in Physics (Astrophysics) and B.A. in Philosophy Sep. 2017 – Mar. 2022
University of California, Santa Cruz, USA
Awarded the UCSC Dean's Scholarship (USD 40,000).

External Research Stay

INAF – Arcetri Astrophysical Observatory, Florence, Italy Oct. 2025 – Dec. 2025
Visiting Ph.D. researcher, hosted by Dr. Anna Gallazzi and Dr. Stefano Zibetti
Two-month stay that started my ongoing project on the stellar metallicities of high-redshift quiescent galaxies.

Research Experience

Stellar metallicities of high-z massive quiescent galaxies Oct. 2025 – present
DAWN & INAF – Arcetri; with A. Gallazzi, S. Zibetti, F. Valentino, K. Ito
Stellar metallicities and ages of over 100 quiescent galaxies from JWST/NIRSpec absorption features, with methods matched to SDSS and LEGA-C studies. Two first-author papers in preparation for *A&A*.

Neutral gas outflows in $z > 3$ massive quiescent galaxies Nov. 2024 – Feb. 2026
DAWN; supervisor F. Valentino; JWST `DeepDive` *programme*
Neutral outflows traced by Na I D in JWST/NIRSpec spectra of quiescent galaxies. First-author paper in *A&A* [1], featured by Phys.org.

M.Sc. thesis: galaxy interaction in compact groups with VLT/MUSE Aug. 2023 – Aug. 2024
Leiden Observatory; advisor A. Monreal Ibero
Multi-component emission-line fitting algorithms for MUSE IFU data. Awarded the KHMW Young Talent Award.

Gas-rich post-starburst galaxies at $z \sim 0.7$ Sep. 2022 – Jul. 2023
Leiden Observatory; advisor M. Kriek; SQuIGGLE collaboration
Keck/NIRES spectroscopy showing low star formation despite large gas reservoirs. First-author paper in *ApJ* [2].

Awards and Honors

2024	**KHMW Young Talent Award in Astronomy (EUR 3,000)**, Royal Holland Society of Sciences and Humanities: national Master's thesis prize, two awarded in astronomy each year (jury report)
UCSC	**Dean's Scholarship (USD 40,000)**: the highest scholarship for international undergraduates

Talks and Posters

Jun. 2026	Flash talk, GalFirenze 2026
Apr. 2026	Contributed talk, Charting Cosmic Dawn in Copenhagen: *DeepDive: Neutral gas outflows in $z \sim 3.5$ quiescent galaxies*
Mar. 2026	Contributed talk, Tokyo JWST 2026: *DeepDive: Neutral gas outflows in $z \sim 3.5$ quiescent galaxies*
Jun. 2026	ePoster, EAS Annual Meeting 2026: *There and back again? Neutral outflows in $z \sim 3.5$ quiescent galaxies*
May 2025	Poster, Annual Danish Astronomical Meeting: *Neutral gas outflows in $z \sim 3.5$ quiescent galaxies*

Media Coverage

Sep. 2026	"Webb measures extreme gas outflows from distant 'dead' galaxies", Phys.org: report on my first-author *A&A* paper on neutral outflows in quiescent galaxies [1]

Telescope Proposals and Observing

JWST Cycle 6	PI, GO proposal with NIRSpec IFU (submitted)
JWST Cycle 5	PI, GO proposal with NIRSpec MSA (rejected)
Observing	5 nights at the Nordic Optical Telescope, La Palma; 1 night at Lick Observatory (1-m Nickel and 3-m Shane)
Aug. 2025	NOT Summer School: one-week school on designing and carrying out NOT observations, La Palma

Teaching

Spring 2027	Teaching assistant (upcoming), 30121 Astrophysics, DTU Space
Spring 2026	Teaching assistant, 30121 Astrophysics, DTU Space: 13-week B.Sc. course (5 ECTS) on stars, galaxies and cosmology, with lectures, exercises and Python programming

Collaborations and Service

2024 – now	`DeepDive` (JWST GO 3567, PI: F. Valentino): massive quiescent galaxies at $z > 3$
2024 – 2026	MUSE Science Team (VLT/MUSE)
2022 – now	SQuIGGLE: massive post-starburst galaxies at $z \sim 0.7$ with multi-wavelength data (Keck, ALMA, HST, JWST and others)
2026 – 2027	DTU Space PhD Committee member, responsible for practical matters of the PhD School
2025 – 2026	Cosmic Dawn Center Committee member, on practical matters and future strategy
2025	Scientific Organizing Committee, DAWN Summit 2025
2022 – 2023	Outreach: observing committee of the Leiden astronomy club *L.A.D. "F. Kaiser"*, running public observing events at Leiden Observatory

Technical Skills

Programming	Python, IDL
Software	`pPXF`, `PypeIt`, `Bagpipes`, `BaStA`, `FADO`, `DS9`, LaTeX
Data	JWST/NIRSpec spectroscopy; VLT/MUSE and SDSS-MaNGA integral-field spectroscopy; Keck/NIRES near-infrared spectroscopy

Publications

19 papers: 2 first-author, 10 refereed, 9 submitted (1 accepted); 2 further first-author papers in preparation. Full list on SciX.

First-author and selected

[1] **P. Zhu**, K. Ito, F. Valentino, et al. "There and Back Again: Neutral Outflows in z ~ 3.5 Quiescent Galaxies". A&A 712 (2026), A169.

[2] **P. Zhu**, K. A. Suess, M. Kriek, et al. "SQuIGG$\vec{L}$E: Observational Evidence of Low Ongoing Star Formation Rates in Gas-rich Post-starburst Galaxies". ApJ 981 (2025), p. 60.

[3] M. Bao, Y. Chen, **P. Zhu**, et al. "Different Formation Scenarios for Counterrotating Stellar Disks in Nearby Galaxies". ApJL 926.2 (2022), p. L13.

In preparation

- **P. Zhu** et al., Stellar populations of massive quiescent galaxies over cosmic time, Papers I & II, to be submitted to *A&A*.

Co-authored

[4] W. M. Baker, F. Valentino, J. Hjorth, et al. "Leviathan: a very massive, extended sub-millimetre galaxy spectroscopically confirmed at $z = 4.05$". Submitted to A&A (Letter) (2026). arXiv: 2610.27101 (8th of 8 authors).

[5] V. R. D'Onofrio, J. S. Spilker, K. L. Smith, et al. "SQuIGG$\vec{L}$E: Radio AGN Found Predominantly in Young, Gas-rich Post-starburst Galaxies at $z \sim 0.7$". Submitted to ApJ (2026). arXiv: 2610.19146 (16th of 16 authors).

[6] R. Gottumukkala, G. Brammer, S. Toft, et al. "The DAWN JWST Archive: A spectroscopically-informed population study of the physical properties of galaxies at $z > 2$". Submitted to A&A (2026). arXiv: 2610.15901 (33rd of 33 authors).

[7] Y. Luo, J. S. Spilker, D. J. Setton, et al. "SQuIGG$\vec{L}$E: Ubiquitous Cool Gas Outflows with Large Mass-Loading Factors in $z \sim 0.7$ Post-starburst Galaxies". Revision submitted to ApJ (2026). arXiv: 2609.31308 (16th of 16 authors).

[8] D. J. Setton, J. E. Greene, R. Bezanson, et al. "SQuIGG$\vec{L}$E: Spatially resolved NIRSpec Paα reveals that the most CO-luminous, $z \sim 0.7$ post-starburst galaxies exhibit falling—but still active—star formation behind optically thick dust". Submitted to ApJ (2026). arXiv: 2609.31307 (16th of 16 authors).

[9] G. Scarpe, F. Valentino, K. Ito, et al. "Morphology, Sizes, and Scatter in a Large Sample of Distant Quiescent Galaxies". A&A 711 (2026), A177 (6th of 6 authors).

[10] K. Ito, F. Valentino, G. Brammer, et al. "DeepDive: A Deep Dive into the Physics of the First Massive Quiescent Galaxies in the Universe". A&A 710 (2026), A364 (7th of 29 authors).

[11] F. Valentino, A. Pensabene, A. Weibel, et al. "Extended [CII] gas emission in and around a massive quiescent galaxy at $z = 7.3$". Submitted to A&A (2026). arXiv: 2606.21361 (19th of 19 authors).

[12] F. Valentino, K. Ito, M. Farcy, et al. "High-ionization coronal lines trace quasar-like activity in recently quenched galaxies at high redshift". Submitted to A&A (2026). arXiv: 2605.30424 (11th of 34 authors).

[13] T. Kakimoto, M. Tanaka, K. Ito, et al. "DeepDive: Simultaneous Formation of Massive Quiescent Galaxies in High-Redshift Galaxy Overdensities". Accepted in ApJ (2026). arXiv: 2604.21007 (23rd of 23 authors).

[14] W. M. Baker, K. Ito, F. Valentino, et al. "Double Trouble: Two Spectroscopically Confirmed Low-Mass Quiescent Galaxies at z > 5 in Overdensities". A&A 706 (2026), A91 (4th of 9 authors).

[15] M. L. Hamadouche, K. E. Whitaker, F. Valentino, et al. "DeepDive: Tracing the early quenching pathways of massive quiescent galaxies at $z > 3$ from their star-formation histories and chemical abundances". Submitted to ApJ (2026). arXiv: 2602.02485 (7th of 24 authors).

[16] D. J. Setton, J. S. Spilker, R. Bezanson, et al. "SQuIGG$\vec{L}$E: Buried Star Formation Cannot Explain the Rapidly Fading CO(2-1) Luminosity in Massive, z ~ 0.7 Post-starburst Galaxies". AJ 170 (2025), p. 351 (15th of 15 authors).

[17] V. R. D'Onofrio, J. S. Spilker, R. Bezanson, et al. "Quenching through Tidal Gas Removal: Molecular Gas and Star Formation in Tidal Tails of z ~ 0.7 Post-starburst Galaxies". ApJ 990.2 (2025), p. 166 (13th of 13 authors).

[18] F. Valentino, K. E. Heintz, G. Brammer, et al. "Gas Outflows in Two Recently Quenched Galaxies at z = 4 and 7". A&A 699 (2025), A358 (36th of 36 authors).

[19] K. Ito, F. Valentino, M. Farcy, et al. "A Merging Pair of Massive Quiescent Galaxies at z = 3.44 in the Cosmic Vine". A&A 697 (2025), A111 (29th of 29 authors).