

Lingrui Lin, Ph.D. student

I am a Ph.D. student from the School of Astronomy and Space Science of Nanjing University (NJU). I am very easy-going and open-minded, so please feel free to contact me.

[Last update: Oct 7, 2025]

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Education

- 2021 – present ■ **Ph.D. student, School of Astronomy and Space Science, Nanjing University**
Goal: *Gas dynamics and star formation of galaxies across the near and far Cosmic time*
Supervisors: *Zhi-Yu Zhang (NJU), Federico Lelli (INAF), Carlos De Breuck (ESO)*
- 2017 – 2021 ■ **B.Sc., School of Astronomy and Space Science, Nanjing University**
Thesis: *Kinematics of atomic gas in supernova remnant IC 443*
Supervisor: *Zhi-Yu Zhang*

Research Experience

- Sep 8, 2025 – present ■ **Visiting Ph.D. student**, Arcetri Astrophysical Observatory (INAF), Florence, Italy
Topic: *Cold gas dynamics of rotating disk galaxies at redshift of 4 - 5*
Host: *Federico Lelli*
- Oct 1, 2023 – Dec 22, 2023 ■ **Early-Career Scientific Visitor**, European Southern Observatory (ESO), Garching bei München, Germany
Topic: *[C I] kinematics of a high-z radio galaxy: PKS 0529-549*
Host: *Carlos De Breuck*
- Sep 23, 2023 – Sep 30, 2023 ■ **Visitor**, Arcetri Astrophysical Observatory (INAF), Florence, Italy
Topic: *[C I] kinematics of a high-z radio galaxy: PKS 0529-549*
Host: *Federico Lelli*

Awards

- 2018-2020 ■ Top Talent Program Scholarship × 3
- 2018 ■ National Encouragement Scholarship
- National College Mathematics Competition (Second prize, Non-Mathematics Major)
- 2019 ■ Annual Scholarship of National Astronomical Observatory, Chinese Academy of Sciences
- Renmin Scholarship
- 2021 ■ Linqiao Scholarship (Linbridge Fund, Douglas Nelson Chao Lin)
- Outstanding Undergraduate Graduate
- President's Special Scholarship for Doctoral Students
- 2025 ■ China National Scholarship

Responsibilities

- 2017 – 2018
 - Publicity Department Member, Student Union of NJU Astronomy
 - Representative for Studies, NJU Astronomy Class 2017
- 2018 – 2021
 - Monitor, NJU Astronomy Class 2017
- 2018 – 2019
 - Leader, Academic Division of NJU Great Astronomy Fans Association (NJU GAFA)
 - Captain, NJU Astronomy Table Tennis team
- 2022 – 2023
 - Organization Member, Graduate Student Committee of NJU Astronomy
- 2024 Spring
 - Teaching Assistant of "Interstellar Medium", NJU Astronomy
- 2025 Spring
 - Teaching Assistant of "Astronomical Literature — Reading and Writing", NJU Astronomy

Publications

Refereed papers

- 1 L. Lin, F. Lelli, C. De Breuck, A. Man, Z.-Y. Zhang, P. Santini, A. Marasco, M. Castellano, N. Nesvadba, T. G. Bisbas, H.-T. Huang, and M. Lehnert, "Gas dynamics in an AGN-host galaxy at $z \simeq 2.6$: Regular rotation, noncircular motions, and mass models," *Astron. Astrophys.*, vol. 693, A91, A91, Jan. 2025.  DOI: 10.1051/0004-6361/202450814. arXiv: 2411.08958 [astro-ph.GA].
- 2 L. Lin, Z.-Y. Zhang, J. Wang, P. P. Papadopoulos, Y. Shi, Y. Gong, Y. Sun, Y. Sun, T. G. Bisbas, D. Romano, D. Li, H. B. Liu, K. Qiu, L. Liu, G. Luo, C.-W. Tsai, J. Wu, S. Feng, and B. Zhang, "Inadequate turbulent support in low-metallicity molecular clouds," *Nature Astronomy*, vol. 9, pp. 406–416, Mar. 2025.  DOI: 10.1038/s41550-024-02440-3. arXiv: 2501.07636 [astro-ph.GA].
- 3 W. Wang, C. De Breuck, D. Wylezalek, J. Vernet, M. D. Lehnert, D. Stern, D. S. N. Rupke, N. P. H. Nesvadba, A. Vayner, N. L. Zakamska, L. Lin, P. Kukreti, B. Dall'Agnol de Oliveira, and J. T. Groth, "JWST + ALMA ubiquitously discover companion systems within $\lesssim 18$ kpc around four $z \approx 3.5$ luminous radio-loud AGN," *Astron. Astrophys.*, vol. 696, A88, A88, Apr. 2025.  DOI: 10.1051/0004-6361/202553668. arXiv: 2502.20442 [astro-ph.GA].
- 4 H.-T. Huang, A. W. S. Man, F. Lelli, C. De Breuck, L. Ghodsi, Z.-Y. Zhang, L. Lin, J. Zhou, T. G. Bisbas, and N. P. H. Nesvadba, "Molecular Gas Mass Measurements of an Active, Starburst Galaxy at $z \approx 2.6$ Using ALMA Observations of the [C I], CO, and Dust Emission," *Astrophys. J.*, vol. 977, no. 2, 251, p. 251, Dec. 2024.  DOI: 10.3847/1538-4357/ad9021. arXiv: 2411.04290 [astro-ph.GA].
- 5 F. Li, Z.-Y. Zhang, J. Wang, G. Luo, L. Lin, and J. Zhou, "Dense gas properties around the centre of the Circinus galaxy," *Mon. Not. R. Astron. Soc.*, vol. 527, no. 1, pp. 531–543, Jan. 2024.  DOI: 10.1093/mnras/stad3241.
- 6 G. Luo, D. Li, Z.-Y. Zhang, T. G. Bisbas, N. Tang, L. Lin, Y. Sun, P. Zuo, and J. Zhou, "The CO-dark molecular gas in the cold H I arc," *Astron. Astrophys.*, vol. 685, L12, p. L12, May 2024.  DOI: 10.1051/0004-6361/202450067. arXiv: 2405.02055 [astro-ph.GA].
- 7 Y. Sun, Z.-Y. Zhang, J. Wang, L. Lin, P. P. Papadopoulos, D. Romano, S. Feng, Y. Sun, B. Zhang, and F. Matteucci, "An improved method to measure $^{12}\text{C}/^{13}\text{C}$ and $^{14}\text{N}/^{15}\text{N}$ abundance ratios: revisiting CN isotopologues in the Galactic outer disc," *Mon. Not. R. Astron. Soc.*, vol. 527, no. 3, pp. 8151–8192, Jan. 2024.  DOI: 10.1093/mnras/stad3643. arXiv: 2311.12971 [astro-ph.GA].
- 8 Y. Deng, Z.-Y. Zhang, P. Zhou, J. Wang, M. Fang, L. Lin, F. Bian, Z. Chen, Y. Shi, G. Chen, and H. Li, "Multiple gas phases in supernova remnant IC 443: mapping shocked H₂ with VLT/KMOS," *Mon. Not. R. Astron. Soc.*, vol. 518, no. 2, pp. 2320–2340, Jan. 2023.  DOI: 10.1093/mnras/stac3139. arXiv: 2210.16909 [astro-ph.GA].
- 9 F. Lelli, Z.-Y. Zhang, T. G. Bisbas, L. Lin, P. Papadopoulos, J. M. Schombert, E. Di Teodoro, A. Marasco, and S. S. McGaugh, "Cold gas disks in main-sequence galaxies at cosmic noon: Low turbulence, flat

rotation curves, and disk-halo degeneracy," *Astron. Astrophys.*, vol. 672, A106, A106, Apr. 2023. DOI: 10.1051/0004-6361/202245105. arXiv: 2302.00030 [astro-ph.GA].

- 10 G. Luo, Z.-Y. Zhang, T. G. Bisbas, D. Li, N. Tang, J. Wang, P. Zhou, P. Zuo, N. Yue, J. Zhou, and **L. Lin**, "Dependence of Chemical Abundance on the Cosmic-Ray Ionization Rate in IC 348," *Astrophys. J.*, vol. 942, no. 2, 101, p. 101, Jan. 2023. DOI: 10.3847/1538-4357/aca657. arXiv: 2211.13380 [astro-ph.GA].
- 11 L. Zhang, Z.-Y. Zhang, J. W. Nightingale, Z.-C. Zou, X. Cao, C.-W. Tsai, C. Yang, Y. Shi, J. Wang, D. Xu, **L.-R. Lin**, J. Zhou, and R. Li, "Discovery of a radio jet in the Cloverleaf quasar at $z = 2.56$," *Mon. Not. R. Astron. Soc.*, vol. 524, no. 3, pp. 3671–3682, Sep. 2023. DOI: 10.1093/mnras/stad2069. arXiv: 2212.07027 [astro-ph.GA].

Conference Proceedings

- 1 C. De Breuck, B. Emonts, W. Wang, D. Wylezalek, **L. Lin**, H. H. T. Huang, A. W. S. Man, and S. Kolwa, "ALMA observations of high redshift radio galaxies," in *ALMA at 10 years: Past, Present, and Future*, Dec. 2023, 50, p. 50. DOI: 10.5281/zenodo.10244516.

Telescope Projects

As the leading contributor

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|------------------|--|
| ALMA | ■ <i>An ACA census of Galactic metal-poor molecular clouds (2021)</i> |
| IRAM NOEMA | ■ <i>Resolving the gravity-dominated molecular clouds in the outer Galaxy (2023)</i> |
| SMA | ■ <i>Galactic metal-poor molecular clouds on sub-pc scales (2022)</i> |
| IRAM 30-m | ■ <i>Pebble-sized dust grains in Galactic metal-poor molecular clouds (2020)</i> |
| | ■ <i>Dynamic states of molecular clouds in the outer Galaxy (2022)</i> |
| JCMT | ■ <i>Exploring the low dust emissivity index of Galactic metal-poor molecular clouds (2021)</i> |
| | ■ <i>Dust in shocked regions of Supernova remnant IC 443 (2022)</i> |
| | ■ <i>Sub-virial molecular clouds in the outer Milky Way on core to parsec scales: Short-spacing for the SMA (2022)</i> |
| SMT | ■ <i>Dynamic states of molecular clouds in the outer Galaxy (2022)</i> |
| FAST | ■ <i>Measuring H I Fraction in Galactic Metal-poor Molecular Clouds (2021)</i> |
| | ■ <i>A HINSA census towards metal-poor molecular clouds in the Galactic far outer disk (2024)</i> |
| | ■ <i>First measurement of HINSA Zeeman effect in the metal-poor Galactic outer disk (2024)</i> |
| GBT 100-m | ■ <i>Mapping the CO-dark molecular gas in the outer Galaxy (2023)</i> |
| | ■ <i>Resolving the turbulence-deficient molecular clouds in the outer Galaxy (2024)</i> |
| Effelsberg 100-m | ■ <i>CO-dark molecular gas in the outer Galaxy (2023)</i> |

As an active collaborator (selected)

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|-----------|---|
| ALMA | ■ <i>Cold gas and dark matter in massive galaxies at $z = 4 - 5$</i> |
| | ■ <i>Ultradeep C II observations of rotating gas disks at $z = 4 - 5$</i> |
| | ■ <i>Measuring CNO isotopic ratios in the Galactic Outer Disk</i> |
| FAST | ■ <i>Atomic Clouds Driven by Galactic Nuclear Wind</i> |
| VLA | ■ <i>Cold gas and dark matter in massive galaxies at $z = 4 - 5$</i> |
| GBT 100-m | ■ <i>An OH and CH survey of the molecular clouds in the outer-disk of the Milky Way</i> |

Skills

Astronomical Expertise

- Radio astronomy
 - Observation (remote observation for SMT, GBT, and Effelsberg)
 - Data reduction (spectrometer and bolometer; single dish and interferometer)
 - Single dish and interferometry data combination in U-V plane
- Astronomical Tools
 - Proficient usage:* GILDAS/CLASS, CASA, CARTA, DS9, ^{3D}BAROLO, vcdisk, Astropy, Photutils, MONTAGE
 - Basic usage:* GILDAS/PIIC, Starlink, MIR, Glue
- Code development
 - See more on GitHub: [Astronlin](#)**
 - Highlight:* (a) A Python-based pipeline (FAST InterStellar H_i, FISH) to calibrate the raw data of FAST 500-m telescope; (b) An MCMC-based H_iNSA fitting code

Technical Skills

- Coding
 - Python (proficient), Fortran (basic), C++ (basic), IDL (basic), HTML (basic)
- Operating System
 - Linux (I am a maintainer of the Ubuntu/CentOS servers and the remote connection in the NJU group), Mac OS (PC), Windows (PC)
- Text Editor
 - Vim (proficient), L^AT_EX (proficient), Microsoft Word (proficient)

Miscellaneous

- Languages
 - Mandarin Chinese (Native), English (Fluent)
- Sports
 - Table tennis/ping-pong (advanced), Swimming (proficient), Basketball (competent), Badminton (competent), Tennis (novice)
- Photograph
 - Adobe Photoshop/Camera Raw, Adobe Premiere