Lingrui Lin, Ph.D. student

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

✉ Work: lingruiphd@smail.nju.edu.cn   lingruiism@gmail.com
Other: llrw@163.com
🌐 Web: https://astronlin.github.io/
⚙ GitHub: https://github.com/Astronlin
Bilibili UID: 399381595

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*
Supervisor: *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 23, 2023 – Sep 30, 2023   🔖 **Visitor,** Arcetri Astrophysical Observatory, Florence, Italy
Topic: *[C I] kinematics of a high-z radio galaxy: PKS 0529-549*
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*

Awards

2018-2020   🔖 Top Talent Program Scholarship $\times$ 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

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

Responsibilities (continued)

2022 – 2023   🔖   Organization Member, Graduate Student Committee of NJU Astronomy

2024 Spring   🔖   Teaching Assistant of Interstellar Medium Lecture, 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. 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].

4. 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.

5. 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].

6. 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 $^{12}C/^{13}C$ and $^{14}N/^{15}N$ 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].

7. 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 H_2 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].

8. 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].

9. 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].

10. 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

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

As an active collaborator (selected)

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

Skills

Astronomical Expertise

Radio astronomy	▮	Observation (online experience 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;

Skills (continued)

Technical Skills

Coding ◾ Python (proficient), Fortran (basic), C++ (basic), IDL (basic), Html (basic)

Operating System ◾ Linux (maintainer for the Ubuntu/CentOS servers and the remote connection in the NJU group), Mac OS (PC), Windows (PC)

Text Editor ◾ Vim (proficient), LaTeX (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