Curriculum Vitae

Fengwei Xu

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RESEARCH KEYWORDS

(*click for hyperlink to UAT keywords*)
Interstellar medium - Interstellar dynamics; Interstellar clouds; Interstellar molecules; Protostars; Stellar astronomy - Star clusters - Protoclusters.

EDUCATION

Kavli Institute for Astronomy and Astrophysics Sep. 2020 – Jun. 2025
(*expected*)
Ph.D. candidate, Astrophysics

School of Physics, Peking University Sep. 2016 – Jun. 2020
Bachelor of Science, Astrophysics

RESEARCH EXPERIENCE

Outflow identification by machine learning March. 2024 – Present
Machine learning to identify molecular outflows with Prof. Peter Schilke.

ALMA Mosaics of Central Molecular Zone Sep. 2023 – Present
Cloud-wide dust grain growth by ALMA in Central Molecular Zone with Prof. Xing Lu.

Mass assembly in high-mass star formation Sep. 2021 – Current
Graduate thesis project with Prof. Ke Wang at KIAA, PKU.

ISM relation with inner atomic gas Sep. 2020 – Jun. 2021
New calibration between inner HI+H_2 gas mass and dust mass with Prof. Jing Wang at KIAA, PKU.

Planck clumps at high Galactic latitudes Sep. 2018 – Jun. 2020
CO Census of high Galactic latitude clouds with Prof. Yuefang Wu at DoA, PKU.

PUBLICATIONS

Metrics: 49 published or accepted refereed articles, including 6 first-authored. They have in total 495 referred citations, and a referred h-index of 12.
(*Only first-authored or with major contributors here. See attached publication list last.*)

Xu, Wang, Liu, Zhu et al. "The ALMA-QUARKS Survey. II. The ACA 1.3 mm Continuum Source Catalog and the Assembly of Dense Gas in Massive Star-Forming Clumps" RAA, 24, 065011 (2024)

Xu, Wang, Liu, Eden et al. "On the Scarcity of Dense Cores ($n > 10^5$ cm^{-3}) in High-latitude Planck Galactic Cold Clumps" ApJL, 963, L9 (2024) **Xu**, Wang, Liu, Tang et al. "The ALMA Survey of Star Formation and Evolution in Massive Protoclusters with Blue Profiles (ASSEMBLE): Core Growth, Cluster Contraction, and Primordial Mass Segregation" ApJS, 270, 9 (2024)

Xu, Wang, He, Wu et al. "Clump-scale Gas Infall in High-mass Star Formation: A Multitransition View with James Clerk Maxwell Telescope HCN (4-3) Mapping" ApJS, 269, 38 (2023)
Xu, Wang, Liu, Goldsmith et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - XV. Steady accretion from global collapse to core feeding in massive hub-filament system SDC335" MNRAS, 520, 3259 (2023)
Xu, Wu, Liu, Liu et al. "Planck Galactic Cold Clumps at High Galactic Latitude-a Study with CO Lines" ApJ, 920, 103 (2021)
Jiao, Wang, **Xu**, Wang et al. "Relative alignment between gas structures and magnetic field in Orion A at different scales using different molecular gas tracers" A&A, 686, A202 (2024)
Wang, Wang, **Xu**, Sanhueza et al. "The role of turbulence in high-mass star formation: Subsonic and transonic turbulence are ubiquitously found at early stages" A&A, 681, A51 (2024)
Li, Wang, **Xu**, Kong et al. "The Interstellar Medium Scaling Relations Using Inner H I and an Application of Estimating Dust Mass" ApJ, 950, 84 (2023)

OBSERVING PROGRAMS

PI	Effelsberg/2024: 98-24	41.3 hours
PI	APEX/2024B: M9518C_114	15.6 hours
PI	ALMA/Cycle-10: 2023.1.01606.S	9.2 hours
PI	ALMA/Cycle-10: 2023.1.01082.S	47 hours
PI	JVLA/2023A: 23A-205	22 hours
PI	SMA/2023A: S021	5 nights
PI	SMA/2022A: S023	2 nights
PI	ATCA/2022: C3485	51 hours
PI	PMO/2022: A010	70 hours
PI	FAST/2022: SQB-2022-0108	35 hours
Co-I	APEX/2024B: M9518C_114	48 hours
Co-I	ALMA/Cycle-11: 2024.1.01198.S	23.7 hours
Co-I	ALMA/Cycle-11: 2024.1.00252.S	15.8 hours
Co-I	ALMA/Cycle-11: 2024.1.01419.S	21 hours
Co-I	ALMA/Cycle-9: 2021.1.00095.S	51.7 hours
Co-I	SMA/2024A: S029	1 night
Co-I	ATCA/2024: C3617	4 night
Co-I	IRAM30m/2022: 042-22	37.6 hours
Co-I	Yebes/2022B: 019	26.6 hours
Co-I	PMO/2022: A012	56 hours
Co-I	FAST/2022: SQB-2022-0020	20.5 hours
Co-I	JCMT/2022A: M22AP051	30.5 hours

INVITED & CONFERENCE TALKS

Sep. 2024	University of Cologne
Cologne, Germany	Annual Meeting of the Astronomische Gesellschaft
Sep. 2024	National Astronomical Observatory & Yebes Observatory
Madrid, Spain	Young European Radio Astronomers Conference

Feb. 2024 — Shanghai Astronomical Observatory
Shanghai, China — The Second Cross-trait Workshop on Radio Astronomy

Nov. 2023 — Chongqing University & Peking University
Chongqing, China — Annual Conference on Molecular Clouds and Star Formation

Sep. 2023 — Shandong University
Weihai, China — Chinese Astronomical Society Annual Meeting

May 2023 — University College London
London, UK — JCMT User Meeting
Nov. 2022 (*invited*) — Xinjiang Astronomical Observatory
Online — Astronomical Frontier Conference

Aug. 2022 — Nanjing University
Online — Annual Conference on Molecular Clouds and Star Formation
Sep. 2023 — Chinese Astronomical Society Annual Meeting
Delingha, China

Jul. 2019 — Xinjiang Astronomy Observatory
Altay, China — Annual Conference on Molecular Clouds and Star Formation

CONFERENCE POSTERS

Sep. 2023 — Shandong University
Weihai, China — Chinese Astronomical Society Annual Meeting

Mar. 2023 — Protostars and Planets VII
Kyoto, Japan

May 2022 — School of Physics, Peking University
Beijing, China — Zhong Shengbiao Education Fund Graduate Academic Forum

OTHER TALKS

Jun. 2024 — School of Physics, Peking University
Online — Graduate Student Experience Share

Jun. 2024 — Max Planck Institute for Extraterrestrial Physics
Garching, Germany — Seminar Talk

May 2024 — University of Cologne
Cologne, Germany — Seminar Talk

June 2023 — Kavli Institute for Astronomy and Astrophysics, Peking University
Beijing, China — CSST-galaxy-AGN Seminar

Dec. 2023 — School of Physics, Fudan University
Shanghai, China — Five-University Alliance Doctoral Academic Forum

May 2023 — Peking University
Beijing, China — Challenge Cup

May 2023 — School of Physics, Peking University
Beijing, China — Zhong Shengbiao Education Fund Graduate Academic Forum

Dec. 2022 — School of Physics, Peking University
Shanghai, China — Five-University Alliance Doctoral Academic Forum

RESEARCH TRIPS AND VISITS

I. Physikalisches Institut, University of Cologne Mar. 2024 – Mar. 2025
Joint Ph.D. program – ALMAGAL project

College of Physical Science and Technology, Xiamen University Jan. 2025
Visiting Scholar – VLA calibration

Shanghai Astronomical Observatory Dec. 2022 – Feb. 2023
Visiting Scholar – ALMA data reduction

Department of Astronomy, Yunnan University Sep. 30 2021 – Oct. 7 2021
Visiting Scholar – XCLASS software

Shanghai Astronomical Observatory June 2020 – Sep. 2020
Visiting Scholar – ALMA data reduction

PROFESSIONAL SERVICE

Student Supervision:

Yuchen Liang, Elite Program (Supervised) Jun. 2023 – Nov. 2023
Ran Jing, Elite Program (Supervised) Jun. 2022 – Nov. 2022
Shenglan Sun, undergraduate thesis (Co-supervised) Nov. 2022 – Jun. 2023
Jiahang Zhou, undergraduate thesis (Co-supervised) Nov. 2021 – Jun. 2022
Zhentao Liu, undergraduate thesis (Co-supervised) Nov. 2021 – Jun. 2022

Referee:

Astrophysical Journal Jan. 2024 – Present

Teaching Assistant:

Modern Astronomy Feb. 2022 – Jun. 2022

HONORS/AWARDS RECEIVED

National Scholarship: Annual scholarship, Ministry of Education of PRC Sep. 2023
Merit Student Pacesetter: the utmost accolade, Peking University Sep. 2024/Sep. 2023
Academic Innovation Award, Peking University Sep. 2023
President Scholarship, Peking University Jun. 2023/Jun 2022/Jun 2021
Merit Student: Annual honor, Peking University Jun. 2023/Jun. 2022/Jun. 2021
Qin Jin Scholarship, Peking University Sep. 2022
Lee Wai Wing Scholarship: Annual scholarship, Peking University Sep. 2021
Excellent Student Cadre: Annual honor, Peking University Jun. 2021
Lin Chao Price for Excellent Undergraduate Research Sep. 2020

Award for Outstanding Research, Peking University Dec. 2019
NAOC Scholarship, National Astronomical Observatory of China Dec. 2018

COMMUNITY WORK AND OUTREACH

Jul. 2024 OC member
Shanghai, China QUARKS workshop, SHAO

Jul. 202 LOC member
Beijing, China EPIC workshop, Peking University

Nov. 2023 LOC member
Chongqing, China Molecular Clouds and Star Formation

Jun. 2022 – Jun. 2023 Undergraduate Student Counselor
Beijing, China School of Physics, Peking University

Jun. 2021 – Jun. 2022 President of Graduate Student Union
Beijing, China School of Physics, Peking University

Jun. 2021 – Jun. 2023 Organizer chair of the Badminton Club
Beijing, China KIAA, Peking University

COMPUTER SKILLS

Python: proficient, especially Matplotlib, AstroPy, SpectralCube, APLpy.
Python-based software: CASA, XCLASS (proficient), CARTA (experienced).
Other software: GILDAS, Montage (proficient).
Shell: experienced.
C++: experienced

List Of Publications

49. **Xu**, Wang, Liu, Zhu et al. "The ALMA-QUARKS Survey. II. The ACA 1.3 mm Continuum Source Catalog and the Assembly of Dense Gas in Massive Star-Forming Clumps" RAA, 24, 065011 (2024)
48. **Xu**, Wang, Liu, Eden et al. "On the Scarcity of Dense Cores ($n > 10^5$ cm^{-3}) in High-latitude Planck Galactic Cold Clumps" ApJL, 963, L9 (2024)
47. **Xu**, Wang, Liu, Tang et al. "The ALMA Survey of Star Formation and Evolution in Massive Protoclusters with Blue Profiles (ASSEMBLE): Core Growth, Cluster Contraction, and Primordial Mass Segregation" ApJS, 270, 9 (2024)
46. **Xu**, Wang, He, Wu et al. "Clump-scale Gas Infall in High-mass Star Formation: A Multitransition View with James Clerk Maxwell Telescope HCN (4-3) Mapping" ApJS, 269, 38 (2023)
45. **Xu**, Wang, Liu, Goldsmith et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - XV. Steady accretion from global collapse to core feeding in massive hub-filament system SDC335" MNRAS, 520, 3259 (2023)
44. **Xu**, Wu, Liu, Liu et al. "Planck Galactic Cold Clumps at High Galactic Latitude-a Study with CO Lines" ApJ, 920, 103 (2021)
43. "Massive Star Formation Starts in Sub-virial Dense Clumps Unless Resisted by Strong Magnetic Fields" Wang, Wang, and **Xu** ApJL, 947, L6 (2024)
42. Sun, Wang, Liu, and **Xu** "The Formation of Milky Way "Bones": Ubiquitous HI Narrow Self-Absorption Associated with CO Emission" ApJL, 973, L27 (2024)
41. Jiao, Wang, **Xu**, Wang et al. "Relative alignment between gas structures and magnetic field in Orion A at different scales using different molecular gas tracers" A&A, 686, A202 (2024)
40. Jiao, Wang, and **Xu** "Absence of High-mass Prestellar Cores in the Orion Giant Molecular Cloud" arXiv, arXiv:2408.05007 (2024)
39. Wang, Wang, **Xu**, Sanhueza et al. "The role of turbulence in high-mass star formation: Subsonic and transonic turbulence are ubiquitously found at early stages" A&A, 681, A51 (2024)
38. Li, Wang, **Xu**, Kong et al. "The Interstellar Medium Scaling Relations Using Inner H I and an Application of Estimating Dust Mass" ApJ, 950, 84 (2023)
37. "A survey of sulfur-bearing molecular lines toward the dense cores in eleven massive protoclusters" Tang, Qin, Liu et al. arXiv, arXiv:2409.13231 (2024)
36. Shen, Liu, Ren, Tej et al. "JCMT 850 μm continuum observations of density structures in the G35 molecular complex" arXiv, arXiv:2409.05492 (2024)
35. Saha, Sanhueza, Padovani, Girart et al. "Magnetic Fields in Massive Star-forming Regions (MagMaR): Unveiling an Hourglass Magnetic Field in G333.46–0.16 Using ALMA" ApJL, 972, L6 (2024)
34. Li, Qin, Liu, Liu et al. "Correlations of methyl formate (CH_3OCHO), dimethyl ether (CH_3OCH_3), and ketene (H_2CCO) in high-mass star-forming regions" MNRAS, 533, 1583 (2024)
33. Zapata, Fernández-López, Sanhueza, Girart et al. "Magnetic Fields in Massive Star-forming Regions (MagMaR) IV: Tracing the Magnetic Fields in the O-type protostellar system IRAS 16547−4247" arXiv, arXiv:2408.10199 (2024)
32. Saha, Tej, Liu, Liu et al. "Direct Observational Evidence of Multi-epoch Massive Star Formation in G24.47+0.49" ApJL, 970, L40 (2024)

31. Liu, Liu, Shen, Qin et al. "The First Ka-band (26.1–35 GHz) Blind Line Survey toward Orion KL" ApJS, 271, 3 (2024)
30. Mai, Liu, Liu, Zhu et al. "The ALMA-QUARKS Survey: Detection of Two Extremely Dense Substructures in a Massive Prestellar Core" ApJL, 961, L35 (2024)
29. Liu, Liu, Zhu, Garay et al. "The ALMA-QUARKS Survey. I. Survey Description and Data Reduction" RAA, 24, 025009 (2024)
28. Chen, Qin, Liu, Liu et al. "ALMA High-resolution Spectral Survey of Thioformaldehyde (H_2CS) toward Massive Protoclusters" ApJ, 962, 13 (2024)
27. Zhou, Dib, Wyrowski, Liu et al. "Feedback from protoclusters does not significantly change the kinematic properties of the embedded dense gas structures" A&A, 682, A173 (2024)
26. Zhou, Dib, Wyrowski, Liu et al. "Feedback from protoclusters does not significantly change the kinematic properties of the embedded dense gas structures" arXiv, arXiv:2312.01497 (2023)
25. Liu, Qin, Liu, Tang et al. "A Low-mass line-rich Core Found in Massive Star-forming Region IRAS 16351-4722" ApJ, 958, 174 (2023)
24. Ren, Chen, Liu, Mannfors et al. "A High-mass, Young Star-forming Core Escaping from Its Parental Filament" ApJ, 955, 104 (2023)
23. Feng, Li, Millar, Szczerba et al. "Photochemical origin of SiC2 in the circumstellar envelope of carbon-rich AGB stars revealed by ALMA" FrASS, 10, 1215642 (2023)
22. Yang, Liu, Tej, Liu et al. "Direct Observational Evidence of the Multi-scale, Dynamical Mass Accretion Toward a High-mass Star-forming Hub-filament System" ApJ, 953, 40 (2023)
21. Luo, Liu, Lee, Offner et al. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): A Forming Quadruple System with Continuum "Ribbons" and Intricate Outflows" ApJL, 952, L2 (2023)
20. Liu, Tej, Liu, Sanhueza et al. "Evidence of high-mass star formation through multiscale mass accretion in hub-filament-system clouds" MNRAS, 522, 3719 (2023)
19. Zhang, Zhu, Liu, Ren et al. "ATOMS: ALMA three-millimetre observations of massive star-forming regions - XIV. Properties of resolved ultra-compact H II regions" MNRAS, 520, 3245 (2023)
18. Liu, Liu, Shen, Goldsmith et al. "First detection of radio recombination lines of ions heavier than helium" A&A, 671, L1 (2023)
17. Zhang, Wang, Liu, Zavagno et al. "ATOMS: ALMA three-millimeter observations of massive star-forming regions - XIII. Ongoing triggered star formation within clump-fed scenario found in the massive ($\sim 1500\,M_\odot$) clump" MNRAS, 520, 322 (2023)
16. Jiao, Wang, Pillai, Baug et al. "Fragmentation of the High-mass "Starless" Core G10.21-0.31: A Coherent Evolutionary Picture for Star Formation" ApJ, 945, 81 (2023)
15. Liu, Liu, Shen, Qin et al. "A Q-band Line Survey toward Orion KL Using the Tianma Radio Telescope" ApJS, 263, 13 (2022)
14. Saha, Tej, Liu, Liu et al. "ATOMS: ALMA three-millimeter observations of massive star-forming regions - XII: Fragmentation and multiscale gas kinematics in protoclusters G12.42+0.50 and G19.88-0.53" MNRAS, 516, 1983 (2022)
13. Zhou, Liu, Evans, Garay et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - XI. From inflow to infall in hub-filament systems"

MNRAS, 514, 6038 (2022)

12. Luo, Liu, Tatematsu, Liu et al. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): How Do Dense Core Properties Affect the Multiplicity of Protostars?" ApJ, 931, 158 (2022)
11. Peng, Liu, Qin, Baug et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - X. Chemical differentiation among the massive cores in G9.62+0.19" MNRAS, 512, 4419 (2022)
10. Qin, Liu, Liu, Goldsmith et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - VIII. A search for hot cores by using C_2H_5CN, CH_3OCHO, CH_3OH lines" MNRAS, 511, 3463 (2022)
9. Liu, Liu, Chen, Liu et al. "ATOMS: ALMA three-millimeter observations of massive star-forming regions - VII. A catalogue of SiO clumps from ACA observations" MNRAS, 511, 3618 (2022)
8. Liu, Tej, Liu, Goldsmith et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - IX. A pilot study towards IRDC G034.43+00.24 on multi-scale structures and gas kinematics" MNRAS, 511, 4480 (2022)
7. Liu, Tej, Liu, Issac et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - V. Hierarchical fragmentation and gas dynamics in IRDC G034.43+00.24" MNRAS, 510, 5009 (2022)
6. Liu, Wu, Zhang, Tang et al. "A FAST survey of H I narrow-line self-absorptions in Planck Galactic cold clumps guided by HC_3N" A&A, 658, A140 (2022)
5. Zhou, Liu, Li, Liu et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions-VI. On the formation of the 'L' type filament in G286.21+0.17" MNRAS, 508, 4639 (2021)
4. Liu, Liu, Evans, Wang et al. "ATOMS: ALMA three-millimeter observations of massive star-forming regions - III. Catalogues of candidate hot molecular cores and hyper/ultra compact H II regions" MNRAS, 505, 2801 (2021)
3. Liu, Wu, Zhang, Chen et al. "A Search for Cloud Cores Affected by Shocked Carbon Chain Chemistry in L1251" ApJ, 912, 148 (2021)
2. Liu, Evans, Kim, Goldsmith et al. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - I. Survey description and a first look at G9.62+0.19" MNRAS, 496, 2790 (2020)
1. Liu, Evans, Kim, Goldsmith et al. "ATOMS: ALMA three-millimeter observations of massive star-forming regions - II. Compact objects in ACA observations and star formation scaling relations" MNRAS, 496, 2821 (2020)