

KAI WANG | 王凯

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RESEARCH

- **Galaxy-Halo Connection:** *To what extent the properties of galaxies are shaped by their dark matter halos?*
- **Dark Matter Halo:** *How do halo structure, assembly history, and spatial distribution interplay with each other?*
- **Galaxy Evolution:** *What drives galaxy quenching, metal enrichment, and morphology transformation?*

EXPERIENCE

- Postdoctoral Research Associate, ICC and CEA, **Durham University** Since Jul. 2024
- KIAA Fellow, Kavli Institute for Astronomy and Astrophysics, **Peking University** Jul. 2022 - Jun. 2024

EDUCATION

- Ph.D. in Astronomy, **Tsinghua University** Sep. 2017 - Jul. 2022
Supervisors: Cheng Li & Houjun Mo, Thesis: Finding galaxy groups/clusters at $z \sim 1$ and its application
- Visiting Scholar, **University of Massachusetts, Amherst** Nov. 2019 - Oct. 2021
Supervisor: Houjun Mo
- B.S. in Astronomy, **University of Science and Technology of China (USTC)** Sep. 2013 - Jul. 2017

GRANTS

- KIAA fellow start-up research funding Jul. 2022 - Jul. 2024
(50,000CNY)
- China Scholarship for the Visiting Scholar Nov. 2019 - Oct. 2021
China Scholarship Council (\$45,600)
- National Astronomy Training Base Jun. 2016 - Jun. 2017
Measure the conditional luminosity functions of galaxies at $z \sim 0.6$ using CLAUDS and BOSS (20,000CNY)
- National Astronomy Training Base May 2015 - May 2016
Thermal gravitational-wave background in the general pre-inflationary scenario (20,000CNY)

MENTORSHIP

- **Zeyu Gao**, graduate at Peking University since Nov. 2022
Decoding the SEDs of galaxies with a prior from hydrodynamical simulations [[arXiv: 2408.07749](https://arxiv.org/abs/2408.07749)]
- **Chengyu Ma**, graduate at USTC since Dec. 2023
Revisiting the fundamental metallicity relation with observation and simulation [[arXiv: 2407.21716](https://arxiv.org/abs/2407.21716)]
- **Haochen Jiang**, undergraduate at USTC since Dec. 2023
Dissecting the quenching of massive central galaxies in TNG [[in prep.](#)]
- **Xunda Sun**, graduate at the University of Chinese Academy of Sciences since Jun. 2023
Characterizing the spatial distribution of the metal content for galaxies in FIRE2 [[arXiv: 2409.09290](https://arxiv.org/abs/2409.09290)]

- **Jiaqi Wang**, graduate at Shanghai Jiao Tong University Dec. 2023 - Aug. 2024
Observational evidence of the halo assembly bias effect for protohalo size [\[in prep.\]](#)
- **Zhijun Zhang**, undergraduate at Peking University Sep. 2022 - Jun. 2023
Identify protoclusters from high-redshift photometric surveys [\[Bachelor Thesis\]](#)

TEACHING

- Cosmology and Galaxy Evolution Guest Lecturer, Peking University, Autumn 2023
- Observational Cosmology Teaching Assistant, Tsinghua University, Autumn 2017
- Particle Cosmology Teaching Assistant, USTC, Spring 2017
- General Relativity Teaching Assistant, USTC, Autumn 2016

HONORS

- T. D. Lee Postdoctoral Fellowship (declined) 2024
- MUST Fellowship (declined) 2022
- Comprehensive scholarship (2nd class) of Tsinghua University 2020
- Comprehensive scholarship (1st class) of Tsinghua University 2019
- Future Scholar Scholarship of Tsinghua University 2017
- Outstanding Graduate of USTC 2017
- The annual scholarship of National Astronomical Observatories, CAS 2016
- National Inspirational Award 2016
- Excellent Student Scholarship (Silver Award) 2014
- Excellent Student Scholarship (Bronze Award) 2013

SERVICE

- **Professional Service**
Referee for MNRAS, ApJ, and A&A
- **Departmental Service**
Faculty Candidate Interview Committee at KIAA, Postdoc Representative 2023, 2024
Co-organizer of weekly Galaxy Party at KIAA 2023
Co-organizer of the Postdoc Science Day at KIAA 2022
Co-organizer of the Speaker Lunch at the Tsinghua Center for Astrophysics 2018-2019

TALKS

- Galaxy & Cosmology seminar at Tsinghua University
Dark matter halo and its structure, assembly, and clustering Beijing, May 2024
- Lunch talk at South-Western Institute For Astronomy Research, Yunnan University
Galaxy formation within and without dark matter halos Kunming, Apr. 2024
- Conference of the Co-evolution of galactic eco-systems and their large-scale environments
Dissecting two-halo galactic conformity effect for central galaxies Hangzhou, Apr. 2024
- Astronomical Seminar at the Huazhong University of Science and Technology
Galaxy formation within and without dark matter halos Wuhan, Mar. 2024
- ITC Luncheon
How to connect galaxies across cosmic time? Cambridge, Jan. 2024

- Steward/NOIRLab Galaxy Group Talk
How to connect galaxies across cosmic time? Tucson, Jan. 2024
- Carnegie arXiv Tea
Relating galaxies across different redshift to study galaxy evolution Pasadena, Jan. 2024
- KIPAC tea talk at Stanford University
Characterizing the assembly of dark matter halos with protohalo size histories Stanford, Jan. 2024
- UC Santa Cruz CGI (Cosmology/Galaxies/IGM) Seminar
Central Galaxy Quenching and its Relation to Halo Formation Time & Large-scale Environment Santa Cruz, Jan. 2024
- Galread: Princeton/IAS Galaxy Journal Club
Characterizing the assembly of dark matter halos with protohalo size histories Remote, Oct. 2023
- UC Santa Cruz CGI (Cosmology/Galaxies/IGM) Seminar
Characterizing the assembly of dark matter halos with protohalo size histories Remote, Oct. 2023
- The 2nd Shanghai Assembly on Cosmology and Structure Formation
Characterizing the assembly of dark matter halos with protohalo size histories Shanghai, Oct. 2023
- Collaboration Workshop on Cosmology and Galaxy Formation
Relating Galaxies across Cosmic Time to study galaxy evolution Shanghai, Jun. 2023
- 25th Chinese Astronomical Society Guoshoujing Symposium on Galaxies and Cosmology
Central Galaxy Quenching and its Relation to Halo Formation Time & Large-scale Environment Huangshan, May 2023
- Conference of Star Formation and Nuclei Activity in Galaxies
Central Galaxy Quenching and its Relation to Halo Formation Time & Large-scale Environment Nanjing, Mar. 2023
- KIAA-DoA Seminar, Peking University
Central Galaxy Quenching and its Relation to Halo Formation Time & Large-scale Environment Beijing, Mar. 2023
- Lunch Talk at the Department of Astronomy, Tsinghua University
Relating galaxies across different redshift Beijing, Nov. 2022
- Lunch Talk at Kavli-IPMU, University of Tokyo
Finding proto-clusters to trace galaxy evolution Remote, Jun. 2021
- The 11-th Prime Focus Spectrograph collaboration meeting
Identifying galaxy groups from high-z and incomplete spectroscopic surveys Pasadena, Dec. 2019
- The 10-th Prime Focus Spectrograph collaboration meeting
Finding groups/clusters of galaxies in the PFS galaxy evolution survey Shanghai, Dec. 2018

PUBLICATION

◆29 publications; 12 as the first/corresponding author; >220 citations; H-index: 8; open in [NASA/ADS](#)

First and Corresponding[†] author papers:

1. Kai Wang[†], Yingjie Peng[†], submitted (2024) [arXiv: 2408.07743]
Testing galaxy formation models with the stellar mass-halo mass relations for star-forming and quiescent galaxies
2. Chengyu Ma, Kai Wang[†], Enci Wang[†], et al. *ApJL* 971 L14 (2024) [arXiv: 2407.21716]
Revisiting the fundamental metallicity relation with observation and simulation
3. Kai Wang[†], Houjun Mo, Yangyao Chen, et al. *MNRAS* 528, 2046 (2024) [arXiv: 2309.01039]
Characterizing the assembly of dark matter halos with protohalo size histories: I. Redshift evolution, relation to descendant halos, and halo assembly bias
4. Kai Wang[†], Houjun Mo, Yangyao Chen, Joop Schaye, *MNRAS* 527 10760 (2023) [arXiv: 2310.00200]
An efficient and robust method to estimate halo concentration based on the method of moments

5. **Kai Wang[†]**, Xin Wang[†], Yangyao Chen, **ApJ** 951, 66 (2023) [arXiv: 2305.08161]
Environmental dependence of the mass-metallicity relation in cosmological hydrodynamical simulations
6. **Kai Wang[†]**, Yangyao Chen, Qingyang Li, Xiaohu Yang, **MNRAS** 522, 3188 (2023) [arXiv: 2304.07189]
Late-formed halos prefer to host quiescent central galaxies. I. Observational results
7. **Kai Wang[†]**, Yingjie Peng[†], Yangyao Chen, **MNRAS** 523, 1268 (2023) [arXiv: 2304.06886]
Dissect two-halo galactic conformity effect: The dependence of star formation activities on the large-scale environment for central galaxies
8. **Kai Wang[†]**, Houjun Mo, Cheng Li, Yangyao Chen, **MNRAS** 520, 1774 (2023) [arXiv: 2211.00485]
Relating galaxies across different redshift to study galaxy evolution
9. **Kai Wang[†]**, Houjun Mo, Cheng Li, Yangyao Chen, **MNRAS** 505, 3892 (2021) [arXiv: 2104.12223]
Finding proto-clusters to trace galaxy evolution: I. The finder and its performance
10. **Kai Wang[†]**, Houjun Mo, Cheng Li, Jiacheng Meng, Yangyao Chen, **MNRAS** 499, 89 (2020) [arXiv: 2006.05426]
Identifying galaxy groups at high redshift from incomplete spectroscopic data: I. The group finder and application to zCOSMOS
11. **Kai Wang**, Larissa Santos, Jun-Qing Xia, Wen Zhao[†], **JCAP** 01, 053 (2017) [arXiv: 1608.04189]
Thermal gravitational-wave background in the general pre-inflationary scenario
12. Yi-Fan Wang, **Kai Wang[†]**, Wen Zhao, **RAA** 16, 4 (2016) [arXiv: 1511.01220]
Smoothing methods comparison for CMB E- and B-mode separation

Co-author papers:

13. Xunda Sun et al. **submitted** (2024) [arXiv: 2409.09290]
The physical origin of positive metallicity radial gradients in high-redshift galaxies: insights from the FIRE-2 cosmological hydrodynamic simulations
14. Zeyu Gao, Yingjie Peng[†], **Kai Wang** et al. **submitted** (2024) [arXiv: 2408.07749]
From Halos to Galaxies. X: Decoding Galaxy SEDs with Physical Priors and Accurate Star Formation History Reconstruction
15. Cheqiu Lyu et al. **ApJ** 959 5 (2024) [arXiv: 2407.03409]
From Halos to Galaxies. IX. Accurate estimate of halo assembly history for SDSS galaxy groups
16. Qinxun Li et al. **ApJL** 969 L25 (2024) [arXiv: 2402.10740]
Black-Hole-to-Halo Mass Relation From UNIONS Weak Lensing
17. Tao Wang[†] et al. **Nature** (2023) [arXiv: 2311.07653]
Black holes regulate cold gas accretion in massive galaxies
18. Yangyao Chen[†], H.J. Mo, **Kai Wang**, **MNRAS** 526 2542 (2023) [arXiv: 2304.13890]
Massive Dark Matter Halos at High Redshift: Implications for Observations in the JWST Era
19. Cheqiu Lyu et al. **ApJ** 959 5 (2023) [arXiv: 2310.10733]
From Halos to Galaxies. VII. The Connections Between Stellar Mass Growth History, Quenching History, and Halo Assembly History for Central Galaxies
20. Jiacheng Meng et al. **ApJ** 964 2 (2024) [arXiv: 2008.13733]
Measuring galaxy abundance and clustering at high redshift from incomplete spectroscopic data: Tests on mock catalogs
21. Yangyao Chen et al. **MNRAS** 525 1254 (2023) [arXiv: 2301.08972]
A Conditional Abundance Matching Method of Extending Simulated Halo Merger Trees to Resolve Low-Mass Progenitors and Sub-halos

22. Qingyang Li et al. **ApJ** 933 9 (2022) [[arXiv: 2205.05517](#)]
Groups and Protocluster Candidates in the CLAUDS and HSC-SSP Joint Deep Surveys
23. Yangyao Chen et al. **MNRAS** 507 2510 (2021) [[arXiv: 2106.03984](#)]
MAHGIC: A Model Adapter for the Halo-Galaxy Inter-Connection
24. Zhaoyu Wang et al. **Sci. China Phys. Mech. Astron.** 64 289811 (2021) [[arXiv: 2106.14159](#)]
The clustering of galaxies in the DESI imaging legacy surveys DR8: I. the luminosity and color dependent intrinsic clustering
25. Yangyao Chen et al. **MNRAS** 504 4865 (2021) [[arXiv: 2009.12467](#)]
How to empirically model star formation in dark matter halos: I. Inferences about central galaxies from numerical simulations
26. Yangyao Chen et al. **ApJ** 899 81 (2020) [[arXiv: 2003.05137](#)]
Relating the structure of dark matter halos to their assembly and environment
27. Jia-Ni Ye, **Kai Wang**, Yi-Fu Cai, **Eur. Phys. J. C** 77:720 (2017) [[arXiv: 1705.10956](#)]
Superconducting cosmic strings as sources of cosmological fast radio bursts
28. Larissa Santo et al. **JCAP** 01 043 (2017) [[arXiv: 1612.03564](#)]
Statistical imprints of CMB B-type polarization leakage in an incomplete sky survey analysis
29. Larissa Santo et al. **JCAP** 07 029 (2016) [[arXiv: 1510.07779](#)]
Probing the statistical properties of CMB B -mode polarization through Minkowski Functionals

REFERENCES

- Prof. Houjun Mo
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