

# KAI WANG 王凯

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## Contact Information:

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## RESEARCH INTERESTS

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- Galaxy-Halo Connection: *galaxy group identification; secondary galaxy-halo connections*
- Dark Matter Halo: *halo assembly history; halo assembly bias; halo structure*
- Protoclusters: *protocluster identification; protocluster evolution*
- Galaxy Quenching: *environmental quenching; relation to galaxy-halo connections*

## WORKING EXPERIENCE

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- KIAA Fellow, Kavli Institute for Astronomy and Astrophysics, **Peking University** since Jul. 2022

## EDUCATION

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- Ph.D. in Astronomy, **Tsinghua University** Sep. 2017 - Jul. 2022  
*Supervisors: Prof. Cheng Li & Prof. 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: Prof. Houjun Mo*
- B.S. in Astronomy, **University of Science and Technology of China (USTC)** Sep. 2013 - Jul. 2017

## STUDENT MENTORSHIP

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- Zeyu Gao, graduate at Peking University since Nov. 2022  
*Project: Decoding the SEDs of galaxies with a prior from hydrodynamical simulations*
- Xunda Sun, graduate at the University of Chinese Academy of Sciences since Jun. 2023  
*Project: Characterizing the spatial distribution of the metal content for galaxies in FIRE2*
- Jiaqi Wang, graduate at Shanghai Jiao Tong University since Dec. 2023  
*Project: Observational evidence of the halo assembly bias effect for protohalo size*
- Zhijun Zhang, undergraduate at Peking University Sep. 2022 - Jun. 2023  
*Bachelor Thesis: Identify protoclusters from high-redshift photometric surveys*

## GRANTS

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- 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 (CSC), \$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*

## TEACHING

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|----------------------------------|--|
| • 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 AND AWARDS

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| • 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 |
| • National Inspirational Award                                 | 2016 |
| • Excellent Student Scholarship (Silver Award)                 | 2014 |
| • Excellent Student Scholarship (Bronze Award)                 | 2013 |

## SERVICE

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| • <b>Professional Service</b>   |            |
| Referee for MNRAS, ApJ, and A&A   |            |
| • <b>Departmental Service</b>   |            |
| 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  |

## SELECTED TALKS

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

## PUBLICATION

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♦ **23** publications; **10** as the first/corresponding author; **173** citations; *H*-index: **7**

♦ [Open in NASA/ADS Library](#)

*First/Corresponding\* author papers:*

1. **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*
2. **Kai Wang**, Houjun Mo, Yangyao Chen, et al. submitted to MNRAS (2023) [arXiv: 2309.01039]  
*Characterize the assembly of dark matter halos with protohalo size histories: I. Redshift evolution, relation to descendant halos, and halo assembly bias*
3. **Kai Wang**, Xin Wang, Yangyao Chen, ApJ, 951, 66 (2023) [arXiv: 2305.08161]  
*Environmental dependence of the mass-metallicity relation in cosmological hydrodynamical simulations*
4. **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*
5. **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*
6. **Kai Wang**, Houjun Mo, Cheng Li, Yangyao Chen, MNRAS 520, 1774 (2023) [arXiv: 2211.00485]  
*Relating galaxies across different redshift to study galaxy evolution*
7. **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*
8. **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*
9. **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*
10. 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:*

11. Tao Wang et al. Submitted to Nature (2023) [arXiv: 2311.07653]  
*Black holes regulate cold gas accretion in massive galaxies*
12. 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*
13. 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*
14. Jiacheng Meng et al. Submitted to ApJ (2023) [arXiv: 2008.13733]  
*Measuring galaxy abundance and clustering at high redshift from incomplete spectroscopic data: Tests on mock catalogs*
15. 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*
16. Qingyang Li et al. ApJ 933, 9 (2022) [arXiv: 2205.05517]  
*Groups and Protocluster Candidates in the CLAUDS and HSC-SSP Joint Deep Surveys*
17. Yangyao Chen et al. MNRAS 507, 2510 (2021) [arXiv: 2106.03984]  
*MAHGIC: A Model Adapter for the Halo-Galaxy Inter-Connection*
18. 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*

19. 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*
20. Yangyao Chen et al. ApJ, 899, 81 (2020) [[arXiv: 2003.05137](#)]  
*Relating the structure of dark matter halos to their assembly and environment*
21. 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*
22. 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*
23. Larissa Santo et al. JCAP 07, 029 (2016) [[arXiv: 1510.07779](#)]  
*Probing the statistical properties of CMB  $B$ -mode polarization through Minkowski Functionals*

## REFERENCES

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|---|--------------------------------------|
| <ul style="list-style-type: none"> <li>• Prof. Houjun Mo<br/>✉ <a href="mailto:hjmo@umass.edu">hjmo@umass.edu</a></li> </ul>                            | University of Massachusetts, Amherst |
| <ul style="list-style-type: none"> <li>• Prof. Cheng Li<br/>✉ <a href="mailto:cli2015@tsinghua.edu.cn">cli2015@tsinghua.edu.cn</a></li> </ul>           | Tsinghua University                  |
| <ul style="list-style-type: none"> <li>• Prof. Yingjie Peng<br/>✉ <a href="mailto:yjpeng@pku.edu.cn">yjpeng@pku.edu.cn</a></li> </ul>                   | KIAA, Peking University              |
| <ul style="list-style-type: none"> <li>• Prof. Zheng Cai<br/>✉ <a href="mailto:zcaai@tsinghua.edu.cn">zcaai@tsinghua.edu.cn</a></li> </ul>              | Tsinghua University                  |
| <ul style="list-style-type: none"> <li>• Prof. Fangzhou Jiang<br/>✉ <a href="mailto:fangzhou.jiang@pku.edu.cn">fangzhou.jiang@pku.edu.cn</a></li> </ul> | KIAA, Peking University              |