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Research Interests

- ***Galaxy formation models***: hydrodynamical simulations (cosmological and zoom-in); semi-analytical models; empirical (halo-based and field-based) models
- ***Dark matter halos and fields***: density field reconstruction and its application; halo assembly/merger tree, structure and environment; cosmic web-halo-galaxy connection
- ***Observational analysis and interpretation***: BCGs; dwarfs; globular clusters; SMBHs; galaxy statistics (mass/luminosity function, clustering); cosmic variance quantification and correction; foward mocking observations; high-z galaxies
- ***Statistical and computational methods***: hierarchical/graph Bayesian inference; model ensembles; deep learning models; parallel computation; software development

Experience

- ***08/2022 - present, postdoc fellow***, Department of Astronomy, University of Science and Technology of China
- ***09/2017 - 06/2022, Ph.D. in astronomy***, Tsinghua University
  Thesis: Modeling Galaxy Formation and Evolution Across Cosmic Time with Combined Empirical Approach and Hydrodynamic Simulations. Supervisor: Cheng Li
- ***11/2019 - 10/2021, Visiting scholar***, Department of Astronomy, University of Massachusetts Amherst
- ***09/2013 - 06/2017, B.S. in physics***, Wuhan University

Awards, Honors And Grants

- 2022, Mozi Fellowship, University of Science and Technology of China
- 2022, Special Funding from Chinese Postdoctoral Science Foundation, China Postdoctoral Science Foundation
- 2022, Outstanding Ph.D. Thesis, Tsinghua University
- 2020, National Scholarship for Ph.D. Students, Ministry of Education of China
- 2019, China Scholarship Council Scholarship Program, China Scholarship Council
- 2018, AMD Scholarship, Tsinghua Center for Astrophysics
- 2014, National Scholarship for Undergraduate Students, Ministry of Education of China

Publications

* =corresponding; a complete list can be found in the ADS *library*

Papers that I have major contribution:

1. Z. Zhang, ***Y. Chen***, Y. Rong, H. Wang*, H. Mo, X. Luo, H. Li. Submitted to Nature.
   Strong clustering for isolated diffuse dwarf galaxies: a case for self-interacting dark matter and assembly bias
2. ***Y. Chen****, H. Mo, H. Wang. To be submitted
   A two-phase model of galaxy formation: IV. Breeding seeds to grow supermassive black holes in dark matter halos

3. H. Li*, ***Y. Chen****, H. Wang*, H. Mo. *arXiv eprint*, 2024, 2409.06208. Submitted to MNRAS
   Physical Processes Behind the Co-Evolution of Halos, Galaxies and Supermassive Black Holes in the IllustrisTNG Simulation
4. ***Y. Chen****, H. Mo, H. Wang. *arXiv preprint*, 2024, 2405.18735. Submitted to MNRAS
   A Two-Phase Model of Galaxy Formation: III. The Formation of Globular Clusters
5. ***Y. Chen****, H. Mo, and H. Wang. *MNRAS*, 2024, 532, 4340
   A two-phase model of galaxy formation: II. The size-mass relation of dynamically hot galaxies
6. H. Mo*, ***Y. Chen****, and H. Wang. *MNRAS*, 2024, 532, 3808
   A two-phase model of galaxy formation: I. The growth of galaxies and supermassive black holes
7. ***Y. Chen****, H. J. Mo, and K. Wang. *MNRAS*, 2023, 526, 2542
   Massive dark matter haloes at high redshift: Implications for observations in the JWST era
8. ***Y. Chen****, H. J. Mo, C. Li, K. Wang, H. Wang, and X. Yang. *MNRAS*, 2023, 525, 1254
   A conditional abundance matching method of extending simulated halo merger trees to resolve low-mass progenitors and sub-halos
9. ***Y. Chen****, H. J. Mo, C. Li, K. Wang, H. Wang, X. Yang, Y. Zhang, and N. Katz. *MNRAS*, 2021, 507, 2510
   MAHGIC: A Model Adapter for the Halo-Galaxy Inter-Connection
10. ***Y. Chen****, H. J. Mo, C. Li, and K. Wang. *MNRAS*, 2021, 504, 4865
    How to empirically model star formation in dark matter halos: I. Inferences about central galaxies from numerical simulations
11. ***Y. Chen****, H. J. Mo, C. Li, H. Wang, X. Yang, Y. Zhang, and K. Wang. *ApJ*, 2020, 899, 81
    Relating the Structure of Dark Matter Halos to Their Assembly and Environment
12. ***Y. Chen****, H. J. Mo, C. Li, H. Wang, X. Yang, S. Zhou, and Y. Zhang. *ApJ*, 2019, 872, 180
    ELUCID. VI. Cosmic Variance of the Galaxy Distribution in the Local Universe

Papers that I have co-authored:

13. X. Luo*, H. Wang*, W. Cui, H. Mo, R. Li, Y. Jing, N. Katz, R. Dave, X. Yang, ***Y. Chen*** and H. Li, S. Huang. *ApJ*, 2024, 966, 236
    ELUCID. VIII. Simulating the Coma Galaxy Cluster to Calibrate Model and Understand Feedback
14. K. Wang*, H. J. Mo, ***Y. Chen***, H. Wang, X. Yang, J. Wang, Y. Peng, and Z. Cai. *MNRAS*, 2024, 528, 2046
    Characterize the assembly of dark matter halos with protohalo size histories: I. Redshift evolution, relation to descendant halos, and halo assembly bias
15. J. Meng*, C. Li*, H. Mo, ***Y. Chen***, K. Wang. *ApJ*, 2024, 964, 161
    Measuring Galaxy Abundance and Clustering at High Redshift from Incomplete Spectroscopic Data: Tests on Mock Catalogs
16. T. Wang*, H. Sun, L. Zhou, K. Xu, C. Cheng, Z. Li, ***Y. Chen***, H. Mo, A. Dekel, X. Zheng, Z. Cai, T. Yang, Y. Dai, D. Elbaz, J. Huang. *arXiv preprint*, 2024, 2403.02399. Submitted to Nature Communications.
    The True Number Density of Massive Galaxies in the Early Universe Revealed by JWST/MIRI
17. K. Wang*, H. J. Mo, ***Y. Chen***, J. Schaye. *MNRAS*, 2024, 527, 10760
    An efficient and robust method to estimate halo concentration
18. J. Meng*, C. Li*, H. J. Mo, ***Y. Chen***, Z. Jiang, L. Xie. *ApJ*, 2023, 944, 75
    Galaxy Populations in Groups and Clusters: Evidence for a Characteristic Stellar Mass Scale at Msat $10^{9.5}\ M_{\odot}$
19. K. Wang*, ***Y. Chen***, Q. Li, X. Yang. *MNRAS*, 2023, 522, 3188
    Late-formed halos prefer to host quiescent central galaxies. I. Observational results
20. K. Wang*, H. Mo, C. Li, ***Y. Chen***. *MNRAS*, 2023, 520, 1774-1788
    Relating galaxies across different redshift to study galaxy evolution
21. K. Wang*, Y. Peng*, ***Y. Chen.*** *MNRAS*, 2023, 523, 1268
    Dissect two-halo galactic conformity effect for central galaxies: The dependence of star formation activities on the large-scale environment
22. K. Wang*, X. Wang*, ***Y. Chen.*** *ApJ*, 2023, 951, 66
    Environmental Dependence of the Mass-Metallicity Relation in Cosmological Hydrodynamical Simulations.
23. Z. Wang, ***Y. Chen***, Y. Mao*, H. Mo, H. Wang, H. Guo, C. Li, J. Fu, Y. Jing, J. Wang, X. Yang, Z. Zheng. *ApJ*, 2021, 907, 4.
    The Breakdown Scale of H I Bias Linearity

24. K. Wang*, H. J. Mo, C. Li, ***Y. Chen***. *MNRAS*, 2021, 505, 3892
Finding proto-clusters to trace galaxy evolution: I. The finder and its performance
25. X. Yang*, H. Xu, M. He, Y. Gu, A. Katsianis, J. Meng, F. Shi, H. Zou, Y. Zhang, C. Liu, Z. Wang, F. Dong, Y. Lu, Q. Li, ***Y. Chen***, H. Wang, H. Mo, J. Fu, H. Guo, A. Leauthaud, Y. Luo, J. Zhang, Y. Zu. *ApJ*, 2021, 909, 143
An Extended Halo-based Group/Cluster finder: Application to the DESI legacy imaging surveys DR8
26. K. Wang*, H. J. Mo, C. Li, J. Meng, ***Y. Chen***. *MNRAS*, 2020, 499, 89
Identifying galaxy groups at high redshift from incomplete spectroscopic data - I. The group finder and application to zCOSMOS

Academic Activities

Mentoring:

- 2024-, Ziwen Zhang, PhD candicate at USTC
Project: Assembly of brightest cluster galaxies
- 2023-, Hao Li, PhD candicate at USTC
Project: Physical processes behind the co-evolution of halos, galaxies and supermassive black holes in hydrodynamic simulations

Teaching:

- 2017, teaching assistant of "Observational Cosmology", Tsinghua University

Service:

- 2024-, scientific consultant, Hefei No. 50 Middle School
- 2018-2019, co-organizer of the speaker lunch, Department of Astronomy, Tsinghua University

Selected talks:

- Contributed talk at the 2nd Conference of Active Galactic Nuclei Feedback — *10/2024, Shanghai*
Breeding seeds to grow supermassive black holes in dark matter halos: theory and semi-analytical forecasts
- Invited talk at Department of Astronomy, Tsinghua University — *09/2024, Beijing*
Reconstructing the cosmic history with galaxy surveys
- Invited talk at the Martes Talk Colloquium, School of Astronomy and Space Science, Nanjing University — *05/2024, Nanjing*
A Multi-Phase and Multi-Scale Scenario of Galaxy Formation and its Semi-Analytic Forecasts
- Contributed talk at the Symposium on the coevolution of galactic ecosystems and their large-scale environment — *04/2024, Hangzhou*
Cooling and Compression: the Origin of Multi-Scale Stellar Size-Mass Relations in Turbulent CGM and ISM
- Contributed talk at the Anhui Astronomical Society Annual Meeting — *01/2024, Maanshan*
Semi-analytic modeling of galaxies and supermassive black holes in the JWST era
- Contributed talk at the Conference on Observations and Theories of Galaxies in the Era of Space Telescopes — *11/2023, Beijing*
The physical origin of the size-mass relation for dynamically hot galaxies throughout cosmic history
- Contributed talk at the Collaboration Workshop on Cosmology and Galaxy Formation — *06/2023, Shanghai*
MAHGIC: A Model Adapter for the Halo-Galaxy Inter-Connection
- Contributed talk at the 25th Guoshoujing Conference of Galaxy Formation — *05/2023, Huangshan*
Massive Dark Matter Halos at $z > 7$ and Implications for Observations in the JWST Era
- Invited talk at the 3rd JMLC MachineLearning Session — *02/2023, Remote*
MAHGIC: a Model Adapter for the Halo-Galaxy Inter-Connection
- Invited Lunch Talk at Kavli-IPMU, University of Tokyo — *07/2021, Remote*
How to Empirically Model Star Formation in Dark Matter Halos
- Contributed talk at the 11th PFS Collaboration Meeting — *12/2019, Pasadena*
Identifying galaxy protocluster at high redshift
- Contributed talk at the 21st Guoshoujing Conference of Galaxy Formation — *05/2019, Xiamen*
Cosmic variance of galaxy distribution in the local universe

- Contributed talk at the PFUNT Doctoral Academic Forum of the Five University Alliance *12/2018*
  Cosmic variance of galaxy distribution in the local universe *Shanghai*
- Contributed talks at the 10th PFS Collaboration Meeting *12/2018*
  (i) Cosmic variance of galaxy distribution in the local universe *Shanghai*
  (ii) An empirical model of galaxy formation in dark matter halos

References

- *Houjun Mo*, Professor, University of Massachusetts, Amherst. *hjmo@umass.edu*
- *Cheng Li*, Professor, Tsinghua University, *cli2015@tsinghua.edu.cn*
- *Huiyuan Wang*, Professor, University of Science and Technology of China, *whywang@ustc.edu.cn*