Ke Ma

ke.ma@nottingham.ac.uk | mark-ke-ma.github.io | Google Scholar | 0000-0002-0564-891X

EDUCATION & RESEARCH

University of Nottingham — Nottingham, UK
Ph.D. in Astronomy — Sep. 2023 – Present
Supervisor: James S. Bolton.
Research: Cosmology with the Lyman-α forest.

Tsinghua University — Beijing, China
Research Assistant, Department of Astronomy — Oct. 2021 – Jun. 2023
Supervisor: Zheng Cai.
Research: High-redshift Lyα emitters, luminosity functions and cosmic variance.

University College London — London, UK
MSci in Theoretical Physics (Integrated Master) — Sep. 2017 – Jul. 2021
First Class Honours; overall average: 85/100. Supervisor: Andrew Pontzen.
Thesis: *Improved Estimator of Dark Matter Entropy in Cosmological Simulations*.

RESEARCH INTERESTS

- The Lyα forest as a cosmological probe.
- The thermal history of the intergalactic medium and hydrogen reionisation.
- Intergalactic metal enrichment and the ionising background.

AWARDS & FUNDING

CSC Research Excellence Scholarship — 2023

Dean's List, UCL Faculty of Mathematical and Physical Sciences — 2021
Top 5% of graduating students.

Wood Prize, UCL Department of Physics & Astronomy — 2019
Ranked first in second-year Physics.

PROFESSIONAL EXPERIENCE

Publications

Five refereed journal articles published and one manuscript submitted, including three first-author papers (two published and one submitted). A separate publication list provides full details.

Selected Talks

COSMO-26, Leiden, Netherlands — contributed talk, Aug. 2026.

Sherwood collaboration meeting, Nottingham, UK, May 2026.

Sherwood collaboration meeting, Cambridge, UK, Apr. 2025.

Teaching

Undergraduate Physics Demonstrator / Marker, University of Nottingham — 2023–2025

Part-time Physics Tutor, Shanghai Zhengling Education — Jun.–Aug. 2021

TECHNICAL SKILLS

Research methods: Simulation-based mock spectra, power-spectrum analysis and MCMC inference.
Scientific computing: Python (NumPy, SciPy, Astropy); HPC and Slurm workflows.
Observational analysis: Imaging survey data, SExtractor and GalSim.

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Publications

Refereed Publications and Preprints

1. **Ma, K.**, Bolton, J. S., Iršič, V., Gaikwad, P., Pieri, M. M., Berg, T. A. M., Dutta, R., Fossati, M., Fumagalli, M., Gafton, E., Pérez Ràfols, I., & Pistis, F., 2026, submitted to MNRAS, arXiv:2608.13153.
   Forecast for the detectability of patchy hydrogen reionization in WEAVE-QSO measurements of the Lyman-α forest power spectrum at redshift $z \geq 4$.

2. **Ma, K.**, Bolton, J. S., Iršič, V., Gaikwad, P., & Puchwein, E., 2026, MNRAS, 546, staf2262.
   An improved model for the effect of correlated Si III absorption on the one-dimensional Lyman-α forest power spectrum.

3. Zhang, H., Cai, Z., Li, M., Liang, Y., Kashikawa, N., **Ma, K.**, Wu, Y., Li, Q., Johnson, S. D., Kikuta, S., Ouchi, M., Fan, X., & Ning, Y., 2025, ApJ, 981, 70.
   MAMMOTH-Subaru. IV. Large Scale Structure and Clustering Analysis of Lyα Emitters and Lyα Blobs at $z = 2.2$–2.3.

4. Li, M., Zhang, H., Cai, Z., Liang, Y., Kashikawa, N., **Ma, K.**, Fan, X., Prochaska, J. X., Emonts, B. H. C., Wang, X., Wu, Y., Zhang, S., Li, Q., Johnson, S. D., Yue, M., Arrigoni Battaia, F., Cantalupo, S., Hennawi, J. F., Kikuta, S., Ning, Y., Ouchi, M., Shimakawa, R., Wang, B., Wang, W., Zheng, Z., & Zheng, Z.-Y., 2024, ApJS, 275, 27.
   MAMMOTH-Subaru. II. Diverse Populations of Circumgalactic Lyα Nebulae at Cosmic Noon.

5. **Ma, K.**, Zhang, H., Cai, Z., Liang, Y., Kashikawa, N., Li, M., Wu, Y., Li, Q., Fan, X., Johnson, S. D., & Ouchi, M., 2024, ApJ, 961, 102.
   MAMMOTH-Subaru. V. Effects of Cosmic Variance on Lyα Luminosity Functions at $z = 2.2$–2.3.

6. Zhang, H., Cai, Z., Liang, Y., **Ma, K.**, Kashikawa, N., Li, M., Wu, Y., Li, Q., Johnson, S. D., Ouchi, M., & Fan, X., 2024, ApJ, 961, 63.
   MAMMOTH-Subaru. III. Lyα Halo Identified by Stacking ∼3300 Lyα Emitters at $z = 2.2$–2.3.