Sangjun Cha — CV

Department of Astronomy, College of Science, Yonsei University
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ADS Library Google Scholar

Education

Yonsei University
Ph.D. in Astronomy *2021/03 – 2026/08 (expected)*
Thesis: High-Precision Mapping of Dark Matter in Galaxy Clusters Through Strong and Weak Lensing with Deep-Learning Techniques
Supervisor: Prof. Myungkook James Jee

Yonsei University
B.S. in Astronomy & Physics (Double majors) *2015/03 – 2021/02*

Research Interests

Strong gravitational lensing in the galaxy cluster scale - Weak gravitational lensing analysis - Deep learning for galaxy clusters

Publication Statistics

17 total refereed/under-review papers. **6 first-author papers** (5 refereed, 1 under review),
4 second or third author and **7 co-author papers** (7 refereed, 4 under review)

Fellowship, Grants, Scholarship, and Awards

2018 – 2020: Truth Scholarship (Yonsei University), ∼ USD 4500

2021 – 2023: Integrated Undergraduate-and-Graduate Program Scholarship (Yonsei University; Three-year full-tuition), ∼ USD 23000

2021 – 2023: Brain Korea 21 Plus Fellowship (Yonsei University), ∼ USD 30000

2023: Yonsei Merit Academic Paper Award (Yonsei University)

2024: Excellent Academic Paper Award (Yonsei University), ∼ USD 400

2024 – 2026: Doctoral Student Research Fellowship (National Research Foundation of Korea), ∼ USD 40000

2024: International Joint Research Grant by Yonsei Graduate School, ∼ USD 1800

2025: Academic Research Fellowship (Yonsei University), ∼ USD 1400

Teaching Assistant

2021: UNDERSTANDING OF SPACE (Yonsei University)

2021: ASTROPHYSICS (Yonsei University)

2022: INTRODUCTION TO ASTROPHYSICS (Yonsei University)

2022: SCIENTIFIC IMAGE DATA PROCESSING (Yonsei University)

Successful Proposals

Hubble Space Telescope Cycle 33 (25.8 hours, co-I)

Requiem's Return: Precision cosmology from a decade-delayed, strongly-lensed supernova and its new sibling

Presentations (selected)

Talk

2025: Detection and Reconstruction of Filamentary Structures around Abell 2744 from Weak Lensing Alone / 2025 KAS Fall Meeting / South Korea / Contributed

2025: JWST Lensing Analysis of Merging Galaxy Clusters: The Bullet Cluster and Abell 2744 / CL2025: Entering a Golden Age of Galaxy Cluster Studies / Taiwan / Contributed

2025: Probing Galaxy Cluster Mergers by Combining Strong and Weak Gravitational Lensing in the JWST Era / MPA / Germany

2024: Probing Galaxy Clusters by Combining Strong and Weak Gravitational Lensing in the JWST Era / NOIRLab, University of Arizona / USA

2024: Probing Galaxy Clusters by Combining Strong and Weak Lensing in the JWST Era: Mass Reconstruction of Abell 2744 / The 11th KIAS Workshop on Cosmology and Structure Formation / South Korea / Contributed

2024: Constraining Cosmological Parameters through Strong Lensing / 2024 KAS Spring Meeting / South Korea / Contributed

2022: Wide-field Weak-lensing Mass Reconstruction with Improved Convolutional Neural Network / 2022 KAS Fall Meeting / South Korea / Contributed

2022: MARS Probe of Hubble Frontier Fields Clusters / IAUGA 2022 / South Korea / Contributed

Poster

2025: Probing Galaxy Clusters from Cores to the Outskirts in the JWST Era: Mass Reconstruction of the Galaxy Cluster Abell 2744 by Combining Strong and Weak Lensing / Tracing Cosmic Evolution with Galaxy Clusters V / Italy

2025: Lensing through JWST: Greater Detail Nearby, New Perspectives High Redshift / EAS 2025 / Ireland

2024: Multi-resolution MAximum-entropy Reconstruction Technique Integrating Analytic Node (Mr.MARTIAN): A New Hybrid Lensing Reconstruction Method for the JWST Era / The 11th KIAS Workshop on Cosmology and Structure Formation / South Korea

2024: Precision MARS Mass Reconstruction of A2744: Synergizing the Largest Strong-lensing and Densest Weak-lensing Data Sets from JWST / EAS 2024 / Italy

2024: Constraining Cosmological Parameters through Strong Lensing / EAS 2024 / Italy

2023: MAximum-entropy ReconStruction (MARS): A New Strong-lensing Reconstruction Algorithm for the JWST Era / IAUS 381: Strong gravitational lensing in the era of Big Data / Italy

2022: A New Maximum-entropy-regularized Strong Lensing Mass Reconstruction Method / 240th AAS Meeting / USA

Service and Outreach

Military Service (Served as a part of the mandatory military service in South Korea)

2016 – 2017: Korea National Police Agency Auxiliary Police

2023: Merging Cluster Workshop 2023 at Yonsei – Served as a LOC

2025: First-author paper on the Bullet Cluster (ApJL, 987, L15) was featured in a NASA press release

2025: Merging Cluster Workshop 2025 at Yonsei – Served as a LOC

Publication List

Refereed Publications

First Author

[5]: A High-Caliber View of the Bullet Cluster Through JWST Strong and Weak Lensing Analyses, **Cha, S.**, Cho, B. Y., Joo, H., Lee, W., HyeongHan, K., Scofield, Z. P., Finner, K., Jee, M. J., 2025, ApJL, 987, L15

[4]: Weak-lensing Mass Reconstruction of Galaxy Clusters with a Convolutional Neural Network. II. Application to Next-Generation Wide-Field Surveys, **Cha, S.**, Jee, M. J., Hong, S. E., Park, S., Bak, D., Kim, T., 2025, ApJ, 981, 52

[3]: Precision MARS Mass Reconstruction of A2744: Synergizing the Largest Strong-lensing and Densest Weak-lensing Data Sets from JWST, **Cha, S.**, HyeongHan, K., Scofield, Z. P., Joo, H., Jee, M. J., 2024, ApJ, 961, 186

[2]: Model-independent Mass Reconstruction of the Hubble Frontier Field Clusters with MARS Based on Self-consistent Strong-lensing data, **Cha, S.**, Jee, M. J., 2023, ApJ, 951, 140

[1]: MARS: A New Maximum-entropy-regularized Strong Lensing Mass Reconstruction Method, **Cha, S.**, Jee, M. J., 2022, ApJ, 931, 127

Co-Author

[7]: Is Earendel a Star?: Investigating the Sunrise Arc Using JWST Strong and Weak Gravitational Lensing Analyses, Scofield, Z. P., Jee, M. J., **Cha, S.**, Park, H., 2025, ApJ, in press

[6]: Cosmology with Supernova Encore in the strong lensing cluster MACS J0138-2155: photometry, cluster members, and lens mass model, Ertl, S., Suyu, S. H., Schuldt, S., Granata, G., Grillo, C., Caminha, G. B., Acebron, A., Bergamini, P., Cañameras, R., **Cha, S.**, Diego, J. M., Foo, N., Frye, B. L., Fudamoto, Y., Halkola, A., Jee, M. J., Kamieneski, P. S., Koekemoer, A. M., Meena, A. K., Nishida, S., Oguri, M., Pierel, J. D. R., Rosati, P., Tortorelli, L., Wang, H., Zitrin, A., 2025, A&A, in press

[5]: SN H0pe: The First Measurement of H_0 from a Multiply Imaged Type Ia Supernova, Discovered by JWST, Pascale, M., Frye, B. L., Pierel, J. D. R., Chen, W., Kelly, P. L., Cohen, S. H., Windhorst, R. A., Riess, A. G., Kamieneski, P. S., Diego, J. M., Meena, A. K., **Cha, S.**, Oguri, M., Zitrin, A., Jee, M. J., Foo, N., Leimbach, R., Koekemoer, A. M., Conselice, C. J., Dai, L., Goobar, A., Siebert, M. R., Strolger, L., Willner, S. P., 2025, ApJ, 979, 13

[4]: Weak-lensing detection of intracluster filaments in the Coma cluster, HyeongHan, K., Jee, M. J., **Cha, S.**, Cho, H., 2024, NatAs, 8, 377

[3]: Weak-lensing Analysis of the Complex Cluster Merger A746 with Subaru/Hyper Suprime-Cam, HyeongHan, K., Cho, H., Jee, M. J., Wittman, D., **Cha, S.**, Lee, W., Finner, K., Rajpurohit, K., Brüggen, M., Forman, W., Jones, C., van Weeren, R., Botteon, A., Lovisari, L., Stroe, A., Domínguez-Fernández, P., O'Sullivan, E., Vrtilek, J., 2024, ApJ, 962, 100

[2]: Weak-lensing Mass Bias in Merging Galaxy Clusters, Lee, W., **Cha, S.**, Jee, M. J., Nagai, D., King, L., ZuHone, J., Chadayammuri, U., Felix, S., Finner, K., 2023, ApJ, 945, 71

[1]: Weak-lensing Mass Reconstruction of Galaxy Clusters with a Convolutional Neural Network, Hong, S. E., Park, S., Jee, M. J., Bak, D., **Cha, S.**, 2021, ApJ, 923, 266

Submitted Publications

[5]: Cosmology with supernova Encore in the strong lensing cluster MACS J0138-2155: Lens model comparison and H0 measurement, Suyu, S. H., Acebron, A., Grillo, C., Bergamini, P., Caminha, G. B., **Cha, S.**, Diego, J. M., Ertl, S., Foo, N., Frye, B. L., Fudamoto, Y., Granata, G., Halkola, A., Jee, M. J., Kamieneski, P. S., Koekemoer, A. M., Meena, A. K., Newman, A. B., Nishida, S., Oguri, M., Rosati, P., Schuldt, S., Zitrin, A., Cañameras, R., Hayes, E. E., Larison, C., Mamuzic, E., Millon, M., Pierel, J. D. R., Tortorelli, L., and Wang, H., 2025, arXiv, arXiv:2509.12319, submitted to A&A

[4]: Cosmology with supernova Encore in the strong lensing cluster MACS J0138-2155: Time delays &

Hubble constant measurement, Pierel, J. D. R., Hayes, E. E., Millon, M., Larison, C., Mamuzic, E., Acebron, A., Agrawal, A., Bergamini, P., **Cha, S.**, Dhawan, S., Diego, J. M., Frye, B. L., Gilman, D., Granata, G., Grillo, C., Jee, M. J., Kamieneski, P. S., Koekemoer, A. M., Meena, A. K., Newman, A. B., Oguri, M., Padilla-Gonzalez, E., Poidevin, F., Rosati, P., Schuldt, S., Strolger, L. G., Suyu, S. H., Thorp, S., and Zitrin, A., 2025, arXiv, arXiv:2509.12301, submitted to ApJ

[3]: MrMARTIAN: A Multi-resolution Mass Reconstruction Algorithm Combining Free-form and Analytic Components, **Cha, S.**, Jee, M. J., 2025, arXiv:2508.13262, submitted to ApJ

[2]: JWST Discovery of Strong Lensing from a Galaxy Cluster at Cosmic Noon: Giant Arcs and a Highly Concentrated Core of XLSSC 122, Finner, K., **Cha, S.**, Scofield, Z. P., Jee, M. J., Lin, Y.-. heng ., Joo, H., Park, H., Morishita, T., Faisst, A., Lee, B., Wang, W., Chary, R.-R., 2025, arXiv:2508.08356, submitted to ApJL

[1]: A dynamical mass measure of an inactive black hole in the distant universe, Newman, A. B., Gu, M., Belli, S., Ellis, R. S., Gangula, S., Greene, J. E., Walsh, J. L., Suyu, S. H., Ertl, S., Caminha, G., Granata, G., Grillo, C., Schuldt, S., Barone, T. M., Bird, S., Glazebrook, K., Jafariyazani, M., Kriek, M., Matthews, A., Morishita, T., Nanayakkara, T., Pierel, J. D. R., Acebron, A., Bergamini, P., **Cha, S.**, Diego, J. M., Foo, N., Frye, B., Fudamoto, Y., Jee, M. J., Kamieneski, P. S., Koekemoer, A. M., Meena, A. K., Nishida, S., Oguri, M., Rosati, P., Zitrin, A., 2025, arXiv:2503.17478, submitted

Conference Proceedings

[1]: MAximum-entropy ReconStruction (MARS): A New Strong-lensing Reconstruction Algorithm for the JWST Era, **Cha, S.**, Jee, M. J., Proceedings of the International Astronomical Union , Volume 18 , Symposium S381: Strong Gravitational Lensing in the Era of Big Data , December 2022 , pp. 102 - 105