

Joohyun Lee

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RESEARCH INTEREST

Theoretical & Computational Astrophysics

numerical cosmological simulation of epoch of reionization;
role of dark matter models in the growth of structures;
general galaxy formation & evolution; usage of machine learning in simulation analysis

EDUCATION

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| Ph.D. in Astronomy , University of Texas at Austin <i>Supervisor: Paul Shapiro</i> | 09/2021 - present |
| B.Sc. in Physics & B.Eng. in Electrical and Computer , Seoul National University | 03/2014 - 08/2021 |

RESEARCH EXPERIENCE

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| Research Associate, Computational Cosmology Group , Seoul National University <i>(Supervisor: Prof. Ji-hoon Kim)</i> <ul style="list-style-type: none">• <u>Estimating Galactic Baryonic Properties from Their Dark Matter Using Machine Learning</u><ul style="list-style-type: none">- Applied trained machine to the cosmological simulation halo catalog (IllustrisTNG simulation)- Computed and compared two-point correlation function in IllustrisTNG halo catalog and machine-predicted halo catalog• <u>Dark Matter Deficient Galaxies Produced Via High-velocity Galaxy Collision in Cosmological Simulation</u><ul style="list-style-type: none">- Studied IllustrisTNG catalog to find high-speed collision event of dwarf galaxies to compare with idealized simulation• <u>pc-scale Simulation of Simultaneous Formation of Dark Matter Deficient Galaxies and Star Clusters</u><ul style="list-style-type: none">- Runned a suite of 1.25 pc-resolution galaxy collision simulations with different merger configuration and feedback schemes- Resolved and tracked the formation process of dark matter deficient galaxies and massive star clusters | 09/2019 - 08/2021 |
| Research Associate, AGN Research Group , Seoul National University <i>(Supervisor: Prof. Jong-Hak Woo)</i> <ul style="list-style-type: none">• <u>Calibrated and Applied Novel Method of Measuring SFR in AGNs</u><ul style="list-style-type: none">- Tested Oxygen emission line flux as SFR indicator by statistically analyzing SDSS spectroscopy data and IR surveys- Investigated correlation between gas outflow strength from AGNs and star formation of host galaxies | 09/2020 - 02/2021 |

AWARDED FELLOWSHIPS & SCHOLARSHIPS

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| FINNEST Fellowship (\$150k) , NASA | 09/2022 - 08/2025 |
| Dean's Excellence Fellowship , University of Texas at Austin | 09/2021 - 08/2022 |
| Presidential Science Scholarship (~ \$40k) , Korea Student Aid Foundation | 03/2014 - 08/2020 |

PUBLICATIONS

- Lee, J., Shin, E. -j., & Kim, J. -h., “Dark Matter Deficient Galaxies And Their Member Star Clusters Form Simultaneously During High-velocity Galaxy Collisions In 1.25 pc Resolution Simulations”, *ApJL* 917 (2021) L15, *astro-ph:2108.01102*
- Shin, E. -j., Jung, M., Kwon, G., Kim, J. -h, Lee, J., Jo, Y., & Oh, B. K., “Dark Matter Deficient Galaxies Produced Via High-velocity Galaxy Collisions In High-resolution Numerical Simulations”, *ApJ* 899 (2020) 25, *astro-ph:2007.09889*

CONTRIBUTED TALKS & PRESENTATIONS

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| • IAUGA 2022 (poster) | 08/2022 |
| • APS April Meeting 2022 | 04/2022 |
| • Galaxy Evolution Workshop 2021, ASIAA | 02/2022 |
| • Numerical Galaxy Formation Mini-Workshop, SNU | 01/2022 |
| • SAZERAC-SIPS Early Galaxy Formation Near and Far — Preparing for a Long Journey with JWST | 12/2021 |
| • The 1st KIAA Forum on Gas in Galaxies for Early Career Scientists (KooGiG-Junior workshop) | 10/2021 |
| • UT Austin Extragalactic/Cosmology Seminar | 09/2021 |
| • AGORA WORKSHOP 2021 | 08/2021 |

COMPUTING SKILLS & EXPERIENCES

Languages: Python, LaTeX, C, C++ (skilled); Fortran, MATLAB, Mathematica, html, Markdown (familiar);
IDL, RISC-V assembly language (basic)

Astrophysical Simulation Codes: Enzo, Gadget, DICE, yt

Machine Learning: PyTorch, TensorFlow (familiar)

High performance computing experience:

- Local cluster of Computational Cosmology Group, Seoul National University (CentOS)
- Nurion, Korea Institute of Science and Technology Information (CentOS)
- Frontera, Texas Advanced Computing Center (CentOS)
- Stampede2, Texas Advanced Computing Center (Red Hat)
- Andes, Oak Ridge National Laboratory (Linux)

OUTREACH & TEACHING EXPERIENCES

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| Korea Student Aid Foundation Science Teaching Service Organization | 01/2015 - 02/2015 |
| Habitat for Humanity in Cebu, Phillippines | 02/2016 |
| Military Service at Korean Air Force 5th Air Mobility Wing | 05/2017 - 04/2019 |

OTHER SKILLS

Languages: Korean (native), English, Japanese (fluent)