

# Joohyun Lee

The University of Texas at Austin,  
PMA 16.212, Astronomy Department,  
2515 Speedway, Austin, Texas 78712-1205

<https://joohyun-lee.github.io/>  
Email : [jhl1862@gmail.com](mailto:jhl1862@gmail.com), [joohyun.lee@austin.utexas.edu](mailto:joohyun.lee@austin.utexas.edu)  
<https://orcid.org/0000-0001-8593-8222>

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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

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## EDUCATION

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

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## RESEARCH EXPERIENCE

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

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## AWARDED FELLOWSHIPS & SCHOLARSHIPS

<b>Dean's Excellence Fellowship</b> , University of Texas at Austin	09/2021 - 08/2022
<b>Presidential Science Scholarship</b> , Korea Student Aid Foundation	03/2014 - 08/2020

## PUBLICATIONS

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- 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*

## NTH-AUTHOR PUBLICATIONS

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- 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*

## TALKS & PRESENTATIONS

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- 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

## COMPUTING SKILLS & EXPERIENCES

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**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),

## OUTREACH & TEACHING EXPERIENCES

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

## OTHER SKILLS

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