

Research Interest

Cosmological simulations; dwarf galaxies; ultra-faint dwarfs; machine learning; disk formation; direct N-body methods; star cluster formation

Education

Seoul National University – SNU

Bachelor of Science - Double Major in Physics Education and Astronomy

Mar. 2017 – Feb. 2021

Seoul National University – SNU

MS/PhD Student in Physics

Mar. 2021 – Present

Primary Refereed Publications

Dark Matter Deficient Galaxies Produced Via High-velocity Galaxy Collisions In High-resolution Numerical Simulations. *Astrophys. J.* 899, 25 (2020).

E. -J. Shin[†], **M. Jung**[†], G. Kwon[†], J. -H Kim^{*}, J. Lee, Y. Jo, B. K. Oh

Merger-tree-based Galaxy Matching: A Comparative Study across Different Resolutions. *Astrophys. J.* 965, 156 (2024)

M. Jung^{*}, Kim, J. -H^{*}, B. K. Oh, S. E. Hong, J. Lee, and J. Kim

The AGORA High-resolution Galaxy Simulations Comparison Project. IV: Halo and Galaxy Mass Assembly in a Cosmological Zoom-in Simulation at $z \leq 2$. *Astrophys. J.* 968, 125 (2024)

S. Roca-Fàbrega^{*}, J. -H Kim^{*}, J. R. Primack^{*}, **M. Jung**^{*}, and other 23 co-authors for the AGORA Collaboration

The AGORA High-resolution Galaxy Simulations Comparison Project. V: Satellite Galaxy Populations In A Cosmological Zoom-in Simulation of A Milky Way-mass Halo. *Astrophys. J.* 964, 123 (2024)

M. Jung^{*}, S. Roca-Fàbrega^{*}, J. -H Kim^{*}, and other 18 co-authors for the AGORA Collaboration

Evolution of Nuclear Star Cluster in Dwarf Galaxy through Mergers and In-Situ Star Formation. *Submitted to ApJ*

Y. Jo^{*}, **M. Jung**, S. Kim, G. L. Bryan, J. -H Kim, and Lee, A.

The AGORA High-resolution Galaxy Simulations Comparison Project. VII: Satellite quenching in zoom-in simulation of a Milky Way-mass halo. *Submitted to A&A*

R. Rodríguez-Cardoso^{*}, S. Roca-Fàbrega^{*}, **M. Jung**^{*}, T. H. Nguyen^{*}, and other 18 co-authors for the AGORA Collaboration

The AGORA High-resolution Galaxy Simulations Comparison Project. VIII: Formation and Evolution of Disk in Milky Way Mass Progenitor Galaxies at $1 < z < 5$. *In prep.*

M. Jung^{*}, J. -H Kim^{*}, T. H. Nguyen^{*}, R. Rodríguez-Cardoso^{*} et al.

Other Refereed Publications

The AGORA High-resolution Galaxy Simulations Comparison Project. VI: Similarities and Differences in the Circumgalactic Medium. *Astrophys. J.* 962, 29 (2024)

S. Strawn^{*}, S. Roca-Fàbrega^{*}, J. R. Primack^{*}, J. -H Kim^{*}, and other 28 co-authors including **M. Jung**

Inferring Cosmological Parameters on SDSS via Domain-generalized Neural Networks and Light-cone Simulations. *Astrophys. J.* 975, 38 (2024)

J. -Y Lee, J. -H Kim^{*}, **M. Jung**, and other 6 co-authors

Awards

Outstanding Presentation Award

Oral Session (#)

Apr. 23, 2023

The Korean Physical Society

Outstanding Project Award (1st Place)

The 14th KIAS CAC Summer School on Artificial Intelligence & Parallel Computing (#)

June. 30, 2023

Korea Institute for Advanced Study

Outstanding Project Award (3rd Place)

2024 Winter School on Programming for Accelerators - Advanced Course (#)

Feb. 24, 2024

SNU THUNDER Research Group

[†]these authors contributed equally to this work

^{*}corresponding author

Undergraduate Thesis

시계열 분석을 통한 코로나-19 확진자 증감 예측 – Free Energy Minimization 알고리즘을 기반으로 –
(Forecasting COVID-19 Case Fluctuations Through Time Series Analysis — Based on the Free Energy Minimization Algorithm —)
Advisor: Junghyo Jo

IllustrisTNG 시뮬레이션에서 암흑물질 없는 은하의 통계적 성질
(Statistical Properties of Dark Matter-Deficient Galaxies in the IllustrisTNG Simulation)
Advisor: Myungshin Im

Oral Presentaions

Numerical Galaxy Formation Mini-Workshop (#) <i>Dark matter deficient galaxies produced via high-velocity galaxy collisions in high-resolution numerical simulations</i>	Jan. 16. 2020 Shin, E. -J & M. Jung
2023 Darwin+NGF Workshop (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. V: Satellite Galaxy Populations In A Cosmological Zoom-in Simulation of A Milky Way-mass Halo</i>	Jan. 11. 2023 M. Jung
2023 KPS spring meeting (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. V: Satellite Galaxy Populations In A Cosmological Zoom-in Simulation of A Milky Way-mass Halo</i>	Apr. 21. 2023 M. Jung
XV International Conference on Gravitation, Astrophysics and Cosmology (ICGAC15, #) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. V: Satellite Galaxy Populations In A Cosmological Zoom-in Simulation of A Milky Way-mass Halo</i>	Jul. 3. 2023 M. Jung
2023 Santa Cruz Galaxy Workshop (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. V: Satellite Galaxy Populations In A Cosmological Zoom-in Simulation of A Milky Way-mass Halo</i>	Aug. 10. 2023 M. Jung
SNU ARC 2nd H.S. Yun Astronomy Workshop (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. V: Satellite Galaxy Populations In A Cosmological Zoom-in Simulation of A Milky Way-mass Halo</i>	Aug. 30. 2023 M. Jung
2023 108th KAS Fall Meeting (#) <i>Merger-tree-based Galaxy Matching: A Comparative Study across Different Resolutions</i>	Oct. 18. 2023 M. Jung
The 2nd Workshop on Galaxies and Dark Matter (Hosted by SNU LAMP Foundation) <i>The AGORA High-resolution Galaxy Simulations Comparison Project: A MW-mass Galaxy and Substructures in a Cosmological Zoom-in Simulation</i>	Feb. 27. 2024 M. Jung
The 2nd CTP Bosan Workshop: AGORA in Asia + 5th Numerical Galaxy Formation Meeting in Korea (#) <i>The Satellite Galaxy Population in the AGORA CosmoRun, and Resolution Convergence Test in the TNG Simulation</i>	May. 7. 2024 M. Jung
2024 110th KAS Fall Meeting (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. IX: Formation and Evolution of Disk in Milky Way Mass Progenitor Galaxies at $1 < z < 5$</i>	Oct. 16. 2024 M. Jung
The 3rd Workshop on Galaxies and Dark Matter (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. IX: Formation and Evolution of Disk in Milky Way Mass Progenitor Galaxies at $1 < z < 5$</i>	Feb. 27. 2025 M. Jung

Poster Presentations

2023 DARWIN-Dwarf galaxy researcher workshop (#) <i>Merger-tree-based Galaxy Matching: A Comparative Study across Different Resolutions</i>	Aug. 16, 2023 M. Jung
The 11th KIAS Workshop on Cosmology & Structure Formation (#) <i>The AGORA High-resolution Galaxy Simulations Comparison Project. IX: Formation and Evolution of Disk in Milky Way Mass Progenitor Galaxies at $1 < z < 5$</i>	Oct. 27, 2024 M. Jung

Experiences

Undergraduate Internship <i>Department of Physics & Astronomy (Advisor: Prof. Kim Ji-hoon)</i> <ul style="list-style-type: none">Studied cosmological hydrodynamical simulationsInvestigated the kinematics of dark matter and baryons in galaxies via simulationsConducted a statistical analysis of the spin of galaxies	Mar. 2019 – Aug. 2020 SNU
System Administrator <i>Computational Cosmology Group (Advisor: Prof. Kim Ji-hoon)</i> <ul style="list-style-type: none">Administered the lab's computing cluster with root access; managed user environments, installed scientific software, and ensured system stability	Sep. 2021 – Present SNU

Teaching Experiences

Assistant Mentor, 1 year, SNU Science Education Institute for The Gifted, Student Research Mentoring Program (Physics)	2022
Teaching Assistant, 1 semester, Seoul National University, Rudimentary Mathematical Methods of Physics	2022
Teaching Assistant, 1 semester, Seoul National University, Physics 1	2022
Teaching Assistant, 1 semester, Seoul National University, Rudimentary Mathematical Methods of Physics	2021
Teaching Assistant, 1 semester, Seoul National University, Physics Lab.1	2021
Teaching Practicum, 1 semester, Seoul National University Middle School	2020

Technical Skills, Language Skills, and Interests

Programming Languages: Python, C, C++, CUDA

Programs: ENZO, GADGET-4, MUSIC

Libraries: yt, scipy, pandas, pytorch

Open-Source Contributions: ABYSS, ENZO-ABYSS