Jeongbhin Seo, Ph.D.

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Employment History

2024.10 - - · · · · **Chick Keller Fellow,** Los Alamos National Laboratory, Theoretical Division
Advisor: Dr. Fan Guo, Dr. Hui Li

2023.12 - - 2024.9 **Postdoctoral Researcher,** Los Alamos National Laboratory, Theoretical Division
Advisor: Dr. Fan Guo, Dr. Hui Li

2022.9 - - 2023.11 **Postdoctoral Researcher,** Department of Physics, Ulsan National Institute of Science & Technology.
Advisor: Prof. Dongsu Ryu

Education

2018.09 - - 2022.08 **Ph.D., Pusan National University** Earth Science.
Advisor: Prof. Hyesung Kang
Degree date: 08/26/2022
Thesis title: *A Simulation Study of Ultra-relativistic Jets.*

2015.03 - - 2018.02 **M.Sc., Pusan National University** Earth Science.
Advisor: Prof. Hyesung Kang
Degree date: 02/23/2018
Thesis title: *The Contribution of Stellar Winds to Cosmic Ray Production.*

2008.03 - - 2012.02 **B.Ed., Pusan National University** Earth Science Education.
Degree date: 02/17/2012

Awards and Fellowships

2024 **LANL SPOT Award**, Los Alamos National Laboraotry

2024-2027 **Chick Keller Fellow**, Los Alamos National Laboraotry

2021 **Busan Future Scientist Award** , Federation of Busan Science and Technology

2020-2022 **NRF Ph.D. Fellow**, The National Research Foundation of Korea

Research Publications

PEER REVIEWED PAPERS

1. A. Bhattacharjee, **J. Seo**, D. Ryu, and H. Kang, "A simulation study of low-power relativistic jets: Flow dynamics and radio morphology of fr-i jets," *The Astrophysical Journal*, vol. 976, no. 1, p. 91, Nov. 2024. DOI: 10.3847/1538-4357/ad83cc.

2. **J. Seo**, F. Guo, X. Li, and H. Li, "Proton acceleration in low- magnetic reconnection with energetic particle feedback," *The Astrophysical Journal*, vol. 977, no. 2, p. 146, Dec. 2024. DOI: 10.3847/1538-4357/ad8e64.

3. **J. Seo**, H. Kang, and D. Ryu, "Model Spectrum of Ultrahigh-energy Cosmic Rays Accelerated in FR-I Radio Galaxy Jets," *The Astrophysical Journal*, vol. 962, no. 1, p. 46, Feb. 2024. DOI: 10.3847/1538-4357/ad182c.

4. **J. Seo**, H. Kang, and D. Ryu, "Ultra-High Energy Cosmic Rays from Radio Galaxies," *Submitted*, Oct. 2024.

5. **J. Seo**, H. Kang, and D. Ryu, "A New Code for Relativistic Hydrodynamics and its Application to FR II Radio Jets," *IAU Symposium*, vol. 362, pp. 87–93, Jan. 2023. DOI: 10.1017/S1743921322001314.

6. **J. Seo** and D. Ryu, "HOW-MHD: A High-order WENO-based Magnetohydrodynamic Code with a High-order Constrained Transport Algorithm for Astrophysical Applications," *Astrophysical Journal*, vol. 953, no. 1, 39, p. 39, Aug. 2023. DOI: 10.3847/1538-4357/acdf4b.

7. **J. Seo**, D. Ryu, and H. Kang, "A Simulation Study of Ultra-relativistic Jets. III. Particle Acceleration in FR-II Jets," *Astrophysical Journal*, vol. 944, no. 2, 199, p. 199, Feb. 2023. DOI: 10.3847/1538-4357/acb3ba.

8. **J. Seo**, H. Kang, and D. Ryu, "A Simulation Study of Ultra-relativistic Jets. II. Structures and Dynamics of FR-II Jets," *Astrophysical Journal*, vol. 920, no. 2, 144, p. 144, Oct. 2021. DOI: 10.3847/1538-4357/ac19b4.

9. **J. Seo**, H. Kang, D. Ryu, S. Ha, and I. Chattopadhyay, "A Simulation Study of Ultra-relativistic Jets-I. A New Code for Relativistic Hydrodynamics," *Astrophysical Journal*, vol. 920, no. 2, 143, p. 143, Oct. 2021. DOI: 10.3847/1538-4357/ac19b3.

10. **J. Seo**, H. Kang, and D. Ryu, "The Contribution of Stellar Winds to Cosmic Ray Production," *Journal of Korean Astronomical Society*, vol. 51, no. 2, pp. 37–48, Apr. 2018. DOI: 10.5303/JKAS.2018.51.2.37.

Conferences

Invited talks, Seminars, and Colloquia

2024.10 "A New Code for Relativistic Hydrodynamics and its Application".
Geophysical and Astrophysical Fluid Dynamics (GAFD) Seminar Series. UC Santa Cruz, Santa Cruz, CA.

2024.04 "Acceleration of Non-Thermal Electrons in Solar Flares".
CfA Solar Science Meeting. Harvard–Smithsonian Center for Astrophysics, Cambridge, MA.

"Radio Galaxy Jets as an Origin of Ultra-High Energy Cosmic Rays".
CfA High Energy Seminar. Harvard–Smithsonian Center for Astrophysics, Cambridge, MA.

"Radio Galaxy Jets as an Origin of Ultra-High Energy Cosmic Rays".
CfA Galaxy Cluster Group Meeting. Harvard–Smithsonian Center for Astrophysics, Cambridge, MA.

2024.03 "Particle Acceleration in Astrophysical Phenomena".
LANL Plasma Group Seminar. Los Alamos National Laboratory, Los Alamos, NM.

2023.11 "Radio Galaxies as the Origin of Ultra-High-Energy Cosmic Rays".
71st GWNR Workshop. Daejeon, South Korea

2023.03 "Acceleration of Ultra-High Energy Cosmic Rays at Radio Galaxy Jets".
The VLBI Group Seminar. Max-Planck institute, Online, Germany

2023.01 "A Simulation Study of Radio Galaxy Jets".
2023 SKA-Korea Workshop. Cheonan, South Korea

2022.09 "An introduction to relativistic hydrodynamics simulation and its application".
66th GWNR Workshop. Pohang, South Korea

2021.12 "FR-II radio jets and the acceleration of UHECRs".
Korea young Astronomers Meeting Colloquium. Online, South Korea

Conferences (continued)

International Conferences

2024.12 "Acceleration and Transport of Nonthermal Electrons in the Solar Flare Region".
AGU24, Washington, DC, Poster

"Particle Acceleration in Magnetic Reconnection with Feedback from Energetic Particles".
AGU24, Washington, DC, Talk

2024.08 "Efficient Electron Acceleration in the Solar Flare Region".
SHINE Workshop, Juneau, AK, Poster

2024.07 "Acceleration of Non-Thermal Electrons in Solar Flares".
HINODE-17/IRIS-15/SPHERE-3 Joint Meeting, Bozeman, MT, Talk

2023.07 "Generation of Ultra-High Energy Cosmic Rays at Radio Galaxy Jets".
ICGAC15, Gyeongju, South Korea, Talk

2023.06 "A New WENO Magnetohydrodynamic Code with a High-Order Constrained Transport Scheme".
2023 ASTRONUM. Pasadena, CA, Poster

2022.09 "Particle acceleration at relativistic jets of FR-II radio galaxies".
2022 IAUGA. Busan, South Korea, Poster

2022.06 "Relativistic Hydrodynamic Simulations of Ultra-relativistic Jets in the Intracluster Medium".
2022 EAS. Valencia, Spain, Poster

2021.11 "A New Code for Relativistic Hydrodynamics and its Application to FRII Radio Jets".
IAU Symposium 362: Computational astrophysics, Online, Talk

Domestic Conferences

2023.10 "Radio Galaxies as the Origin of Ultra-High-Energy Cosmic Rays".
2023 108th KAS Fall Meeting. Jeju, South Korea, Talk

2023.04 "A New Magnetohydrodynamic Code with a High-Order Constrained Transport Scheme".
2023 107th KAS Spring Meeting. Jeonju, South Korea, Talk

2022.12 "Particle Acceleration in Radio Galaxy Jets".
6th CHEA Workshop. Cheonan, South Korea

2022.04 "Acceleration of Ultra-high Energy Cosmic Rays at Relativistic Jets".
2022 105th KAS Spring Meeting. Busan, South Korea, Talk

2021.11 "FR-II radio jets and the acceleration of UHECRs".
5th CHEA Workshop. Busan, South Korea

2021.10 "FR-II radio jets and the acceleration of UHECRs".
2021 104th KAS Fall Meeting. Jeju, South Korea, Talk

2021.04 "Structures and Energetics of Flows in Ultra-relativistic Jets".
2021 103th KAS Spring Meeting. Online, South Korea, Talk

2020.10 "A New Code for Relativistic Hydrodynamics".
2020 102th KAS Fall Meeting. Online, South Korea, Poster

"Morphology and Dynamical Properties of Ultra-Relativistic Jets".
2020 102th KAS Fall Meeting. Online, South Korea, Talk

2020.01 "A simulation study of ultra-relativistic jets".
4th CHEA Workshop. Busan, South Korea

2019.01 "The contribution of Stellar Winds to Cosmic Ray Production".
3rd CHEA Workshop. Gyeongju, South Korea

Collaboration

2019 - - · · · · · **Center for High Energy Astrophysics (CHEA)**
Ulsan National Institute of Science & Technology, South Korea

2022 - - · · · · · **Wombat User Group**
University of Minnesota, USA

Skills

Languages English, Korean

Coding Fortran, Python, C++, IDL, LaTeX, OpenMP, MPI

Research Particle acceleration, Relativistic Jets, Magnetic Reconnection, Collisionless Shock, Astrophysical Turbulence, Galaxy Cluster, Solar Flare, Heliosphere, Hydrodynamics (HD), Relativistic Hydrodynamics (RHD), Magneto-Hydrodynamics (MHD), Monte-Carlo simulation, Simulation code development

High Performance Computing

4M CPU Times LANL HPC, MHD, Particle acceleration Simulations

3M CPU Times NERSC, MHD, Particle acceleration Simulations

4M CPU Times CHEA Cluster, MHD, RHD, Monte-Carlo Simulations

2M CPU Times UNIST Supercomputing Center, RHD Simulations

1M CPU Times PNU Cluster, HD, RHD, Monte-Carlo Simulations

Public Outreach

2023.08 "The Theory and Practice of Astronomical Observation".
Physics Festival for High School students, Ulsan, South Korea

2023.07 "Relativistic hydrodynamics and a simulation study of ultra-relativistic jets".
Numerical relativity and gravitational wave summer school, Daejeon, South Korea

2023.05 "Path to Becoming an Astrophysicist".
Gaeun Middle School, Yangsan, South Korea

"Path to Becoming an Astrophysicist".
Muryong High School, Ulsan, South Korea

2023.01 "Solving partial differential equations using numerical methods".
Numerical relativity and gravitational wave winter school, Ulsan, South Korea

2022.11 "From a science teacher to an astrophysical researcher".
PNU Future Education Center, Busan, South Korea

2022.10 "What does an astrophysicist do?".
Gaeun Middle School, Yangsan, South Korea

2022.07 "Career Mentoring Program - Astrophysicist".
PNU Future Education Center, Busan, South Korea

2021.12 "The usage of coding in astrophysics".
Mulgeum High School, Yangsan, South Korea

2021.11 "What does an astrophysicist do?".
Muryong High School, Ulsan, South Korea

Academic services

2024.10 - - · · · · **Journal Reviewer**
Astrophysical Journal

2024.02 - - · · · · **Workshop Organizer**
LANL Plasma Group Meeting

2023.03 - - 2024.04 **Workshop Organizer**
68th-72st Workshop on Gravitational Waves and Numerical Relativity

2023.05 - - 2023.11 **Workshop Organizer**
2023 Korea Numerical Astrophysics Group Workshop

Teaching Experience

2024.02 - - · · · · **Postbac Mentor**
LANL, NM, United States

2020.03 - - 2022.08 **Teaching Assistant**
Pusan National University, South Korea

2012.03 - - 2019.08 **High/Middle School Science Teacher**
Gyeongsangnam-do Office of Education, South Korea