Curriculum Vitae

Jeonghoon (Jay) Lim

Department of Physics and Astronomy, Iowa State University
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Research Interests

- **Computational Astrophysics**: Magnetohydrodynamics (MHD), Particle-Mesh Methods
- **Protoplanetary Disks**: Streaming Instability, Planetesimal Formation
- **Turbulence**: MHD Turbulence, Dynamo, Decaying Turbulence

Education

Doctor of Philosophy (Ph.D.) in Astrophysics, Iowa State University
Department of Physics and Astronomy
Expected Graduation: Spring 2026
Major Professor: Dr. Jacob B. Simon

Master of Science (M.S.) in Astronomy, Chungnam National University
Department of Astronomy and Space Science, South Korea
Graduation: Spring 2020
Thesis: "Statistics of Turbulence Driven by Solenoidal and Compressive Drivings"
Major Professor: Dr. Jungyeon Cho

Bachelor of Science (B.S.) in Astronomy, Chungnam National University
Department of Astronomy and Space Science, South Korea
Graduation: Spring 2018

Research Experience

Graduate Research Assistant, Iowa State University
Department of Physics and Astronomy
March 2021 - Present
Supported by NASA FINESST Award

- Developed turbulence forcing modules for the Athena code, making them available for community use.
- Investigated the interaction between turbulence and streaming instability, focusing on its effects on planetesimal formation.

Graduate Research Assistant, Chungnam National University, South Korea
Department of Astronomy and Space Science
March 2018 - May 2020

- Evaluated turbulence dynamo in MHD turbulence with compressive driving schemes.
- Investigated the decay of hydrodynamic turbulence under a non-isothermal equation of state.
- Published work in the *Journal of the Korean Astronomical Society.*

Teaching Experience

Graduate Teaching Assistant, Iowa State University
Department of Physics and Astronomy
Fall 2020

- Assisted in conducting lab experiments and discussions for PHYS 111 (General Physics I Labs).
- Provided feedback on lab notebooks and held weekly help sessions for students.

Graduate Teaching Assistant, Chungnam National University, South Korea
Department of Astronomy and Space Science
Spring 2019

- Led study sessions and provided feedback for assignments in Galactic Astronomy.
- Graded and assessed student performance on weekly assignments.

Publications

- **Lim, J.**; Baronett, S.A; Simon J. B.; Yang, C. C.; Sengupta, D.; Umurhan, O. M.; Lyra; W., "Bridging Unstratified and Stratified Simulations of the Streaming Instability for $\tau_s = 0.1$ Grains", submitted to ApJ, preprint: arXiv:2505.23902
- Carrera, D.; Eriksson, L. E. J.; **Lim, J.**; Lyra, W.; Simon, J. B. "Positive Feedback II: How Dust Coagulation inside Vortices Can Form Planetesimals at Low Metallicity, submitted to A&A, preprint: arXiv:2504.06332.
- Carrera, D.; **Lim, J.**; Eriksson, L. E. J.; Lyra, W.; Simon, J. B. (2025), "Positive feedback: How a synergy between the streaming instability and dust coagulation forms planetesimals", *Astronomy & Astrophysics*, DOI: 10.1051/0004-6361/202554100
- **Lim, J.**; Simon, J.B.; Li, R., Carrera, D.; Baronett, S.A; Youdin, A.N.; Lyra, W.; Yang, C.C. (2025). "Probing Conditions for Strong Clumping by the Streaming Instability: Small Dust Grains and Low Dust-to-gas Density Ratio", *The Astrophysical Journal*, DOI: 10.3847/1538-4357/adb311
- **Lim, J.**; Simon, J.B.; Li, R.; Armitage, P.J.; Carrera, D.; Lyra, W.; Rea, D.G.; Yang, C.C.; Youdin, A.N. (2024). "Streaming Instability and Turbulence: Conditions for Planetesimal Formation." *The Astrophysical Journal.* DOI: 10.3847/1538-4357/ad47a2

- **Lim, J.**; Cho, J.; & Yoon, H. (2020). "Generation of Solenoidal Modes and Magnetic Fields in Turbulence Driven by Compressive Driving." *The Astrophysical Journal*, 893, 75. DOI: 10.3847/1538-4357/ab8066
- **Lim, J.**; & Cho, J. (2020). "Decay of Turbulence in Fluids with Polytropic Equations of State." *Journal of the Korean Astronomical Society*, 53, 49. DOI: JAKO202012941166990

Oral Presentations

- "Clumping of mm-cm Sized Solid Particles in the Presence of Turbulent Gas" – Astro Seminar, Iowa State University, November 2022.
- "Generation of Solenoidal Modes and Magnetic Fields in Turbulence Driven by Compressive Driving" – Astro Seminar, Iowa State University, October 2020.
- "Generation of Magnetic Fields in Turbulence Driven by Compressive Driving" – Magnetic Fields in the Universe 7, Quy Nhon, Vietnam, February 2020.
- "Generation of Solenoidal Modes in Turbulence Driven by Compressive Driving" – Korean Astronomical Society Fall Meeting, Seoul, South Korea, October 2019.

Professional Services

Local Organizing Committee Member, 8th East-Asia School and Workshop on Laboratory Space and Astrophysical Plasmas, **July 2018**

Honors & Awards

- **NASA FINESST Award** ($50,000/year) – Future Investigators in NASA Earth and Space Science and Technology, 2022-2025.
- **Korean Government Scholarship Program for Study Overseas**, 2020-2022.
- **Graduate Research Award** – *Journal of the Korean Astronomical Society*, 2020.
- **Graduate Academic Merit Scholarships** – Chungnam National University, 2018-2019.
- **Undergraduate Academic Merit Scholarship** – Chungnam National University, 2016.

Technical Skills

- **Programming Languages**: C, Julia, Python, Fortran, IDL
- **Software & Tools**: Athena, VISIT
- **Numerical Tools**: Particle-Mesh Methods, Magnetohydrodynamics (MHD) Codes

References

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