

Yeongwoo Song

PHD STUDENT

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Summary

I am a Ph.D. student of physics with a keen interest in the latest advancements in the field of artificial intelligence (AI). My work focuses on the interdisciplinary field of physics and AI. Specifically, my research aims to understand the behavior and functions of AI through the lens of physics, and vice versa, to solve the problems in physics with the help of AI.

RESEARCH INTERESTS

- Physics for AI: understanding and advancing deep neural networks through the lens of statistical physics and complex systems.
- AI for physics: automated discovery of physical laws or symmetries with the aid of artificial intelligence.
- not limited to above: phase transitions and critical phenomena of complex systems, learning dynamics and mechanistic interpretability of NNs, hyperbolic representations, GNNs, PINNs, etc.

Education

Korea Advanced Institute of Science and Technology (KAIST)

INTEGRATED PHD PROGRAM IN DEPT. OF PHYSICS

- Advisor: Prof. [Hawoong Jeong](#)

Daejeon, Korea

Mar. 2022 - Present

Korea Advanced Institute of Science and Technology (KAIST)

B.S. IN PHYSICS

- Double major in Computer Science

Daejeon, Korea

Mar. 2016 - Feb. 2022

Publications¹

PUBLISHED

Towards Cross Domain Generalization of Hamiltonian Representation via Meta Learning

YEONGWOO SONG & HAWOONG JEONG, IN: *The 12th International Conference on Learning Representations (ICLR)*

2024

Stochastic Resetting Mitigates Latent Gradient Bias of SGD from Label Noise

YOUNGKYOUNG BAE[†], YEONGWOO SONG[†], & HAWOONG JEONG, IN: *Machine Learning: Science and Technology* **6** 015062

2025

PREPRINT / IN PROGRESS

Uncovering Emeergent Physics Representations Learned In-Context by Large Language Models

YEONGWOO SONG[†], JAEYONG BAE[†], DONG-KYUM KIM, & HAWOONG JEONG, IN: *arXiv:2508.12448*

2025

Presentations²

TOWARDS CROSS DOMAIN GENERALIZATION OF HAMILTONIAN REPRESENTATION VIA META LEARNING

- The 12th International Conference on Learning Representations (ICLR 2024), Vienna, Austria, May. 2024 (poster)
- The 28th International Conference on Statistical Physics (STATPHYS28), Tokyo, Japan, Aug. 2023 (oral)
- The 2023 Korea Physical Society Spring Meeting, Daejeon, Korea, Apr. 2023 (oral)
- NeurlPS 2022 Workshop on Machine Learning and the Physical Sciences Workshop, New Orleans, USA, Dec. 2022 (poster)
- The 15th Asia Pacific Physics Conference, Online, Aug. 2022 (poster)

STOCHASTIC RESETTING MITIGATES LATENT GRADIENT BIAS OF SGD FROM LABEL NOISE

- The 29th International Conference on Statistical Physics (STATPHYS29), Florence, Italy, Jul. 2025 (poster)
- KIAS Center for AI and Natural Sciences 2025 Summer Workshop, Jeongseon, Korea, May. 2024 (oral)
- The 2024 Korea Physical Society Fall Meeting, Yeosu, Korea, Oct. 2024 (oral)
- ICLR 2024 Workshop on Bridging the Gap Between Practice and Theory in Deep Learning, Vienna, Austria, May. 2024 (poster)
- The 2023 Korea Physical Society Fall Meeting, Changwon, Korea, Nov. 2023 (poster, *outstanding presentation award*)
- The 22nd Workshop for Statistical Physics 2023, Hwasun, Korea, Aug. 2023 (oral)

UNCOVERING EMERGENT PHYSICS REPRESENTATIONS LEARNED IN-CONTEXT BY LARGE LANGUAGE MODELS

- KIAS Center for AI and Natural Sciences 2026 Winter Workshop, Goseong, Korea, Jan. 2026 (poster)
- The 23rd Workshop for Statistical Physics, Busan, Korea, Oct. 2025 (oral)

¹†: equal contribution

²categorized by publications

Teaching Experience

GPU/CPU Cluster Maintenance

TEACHING/MAINTENANCE ASSISTANT

Dept. of Physics, KAIST

Feb. 2024 - Present

KAIST Cultural Events

GRADUATE STUDENT MANAGER, TEACHING ASSISTANT

KAIST Concert Hall

Mar. 2022 - Feb. 2024

Special Topics in Physics (Complex Systems: Science of 21st Century) (PH489D)

TEACHING ASSISTANT

Dept. of Physics, KAIST

2023 FA

Computational Physics (PH413)

TEACHING ASSISTANT

Dept. of Physics, KAIST

2022 SP, 2023 SP

General Physics II (PH142)

TEACHING ASSISTANT

Dept. of Physics, KAIST

2022 FA

Honors

Donghwa Industries Scholarship

DONGHWA INDUSTRIES SCHOLARSHIP FOUNDATION

Mar. 2024 - Present

- 10 Million KRW per year granted during KAIST Ph.D. Program.

Excellent Leadership and Volunteer Graduate Award

KAIST

Feb. 2022

- Awarded for showing exceptional leadership and participation in multiple volunteer acts, as one of 11 among all graduates (~3000) in 2022.

KAIST Alumni Academic Scholarship

KAIST ALUMNI ASSOCIATION

Mar. 2017 - Feb. 2020

- A scholarship granted to students showing distinguished academic/extracurricular activities.
- 5 Million KRW per year granted for 3 years.

Undergraduate Humanities Scholarship

KAIST

Jul. 2019

- Awarded for devoting to academic studies and volunteer acts of the department, as one among all students (~100) from Dept. of Physics.
- 1 Million KRW granted.

National Excellence Scholarship in Natural Science and Engineering

KOREA STUDENT AID FOUNDATION (KOSAF)

Mar. 2016 - Feb. 2019

- A scholarship to honor distinguished freshmens in natural science of the nation.
- 10 Million KRW per year granted.

References

Hwoong Jeong

PROFESSOR

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