

Hae Seong Lee | Curriculum Vitae

Statistical Physics of Eco-Evolutionary Dynamics (SPEED) Lab, Department of Physics
Inha University
✉ haesung0125@gmail.com

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Research Interests

- Emergent phenomena in complex systems
- Dynamics in complex networks
- Ecological system
- Synchronization

Research Experiences

Inha University

Postdoctoral Researcher,

Mar.2025-Present

Education

Sungkyunkwan University

Ph.D. candidate in Physics

2019–2025

Supervisor: Prof. Beom Jun Kim

Sungkyunkwan University

B.S. in Physics,

2013–2017

Publications

- [5] (*in preparation*) **Hae Seong Lee** and Beom Jun Kim, "The effect of prior knowledge on vocabulary learning"
- [4] (*in revision*) Younghwa Cha, Yeji Lee, Eunhee Ji, SoHyun Han, Sunhyun Min, Hyoungkyu Kim, Minseo Cho, **Hae Seong Lee**, Youngjai Park, and Joon-Young Moon, "Sustained Attention Task (gradCPT) Dataset using simultaneous EEG-fMRI and DTI"
- [3] Jae Hyung Woo, **Hae Seong Lee**, Tae-Wook Ko and Joon-Young Moon, "Hysteresis in a generalized Kuramoto model with a simplified realistic coupling function and inhomogeneous coupling strengths", Chaos, Solitons and Fractals 190, 115770 (2025).
- [2] **Hae Seong Lee**, Beom Jun Kim, and Hye Jin Park "Stability of twisted states in power-law-coupled Kuramoto oscillators on a circle with and without time-delay", Phys. Rev. E 109, 064203 (2024).
- [1] **Hae Seong Lee**, Jong Il Park, and Beom Jun Kim, "Modified Kuramoto model with inverse-square law coupling and spatial time delay", Physica A 582, 126263 (2021).

Skills

Programming languages: C, C++, Python, SQL, Matlab, Javascript

Computer skills: Monte-carlo simulation, CUDA programming, Agent-based simulation, MPI programming, Networkx, Latex

Honors & Awards

SKKU scholarship innovation	Sungkyunkwan University	2022
SKKU innovative research fellowship	Sungkyunkwan University	2022
Excellence project award	19th KIAS-APCTP Winter School on Statistical Physics	2022
Outstanding oral presentation award	2021 Korean Physical Society Spring Meeting	2021
Graduate merit scholarship	Sungkyunkwan University	2019–2021

Services

Organizer of the joint journal club of statistical physicists
Sungkyunkwan U., Hanyang U., Catholic U. of Korea, and Inha U. Aug. 2024 - Jan. 2025

Experiences

Teaching Assistant
Thermal and Statistical Mechanics II: Spring 2020, Spring 2021
Thermal and Statistical Mechanics I: Fall 2020, Fall 2021
Analytical Mechanics II Exercise: Fall 2019
Analytical Mechanics II: Fall 2019
Analytical Mechanics I: Spring 2019
Military service
Technical Research Personnel: 2022-2025

Attended schools

International schools
XII GEFENOL Summer School on Statistical Physics of Complex Systems
Madrid, Spain, 2024
Topic: Selected topics in statistical physics
Complexity72h
Madrid, Spain, 2024
Topic: Unraveling cancer dynamics: From multiscale stochastic models to tissue morphology
Complex Networks: Theory, Methods, and Applications
Como, Italy, 2024
Topic: Selected topics in complex networks

CSH Winter School 2023 <i>Obergurgl, Austria,</i> Topic: Integrative and Disintegrative Processes in Complex Human Societies	2023
VII Mediterranean school on complex networks <i>Catania, Italy,</i> Topic: Selected topics in complex networks	2022
Domestic schools	
22nd KIAS-APCTP Winter School on Statistical Physics <i>Pohang, South Korea,</i> Topic: selected topics in statistical physics on biological or related synthetic systems	2025
21st KIAS-APCTP Winter School on Statistical Physics <i>Pohang, South Korea,</i> Topic: Selected topics in statistical physics on complex systems	2024
Complex systems summer school <i>Seoul, South Korea,</i> Topic: Lectures on "Network Science" written by Barabasi	2023
20th KIAS-APCTP Winter School on Statistical Physics <i>Pohang, South Korea,</i> Topic: Statistical Physics of Quantum Systems	2023
19th KIAS-APCTP Winter School on Statistical Physics <i>Online,</i> Topic: Phase transitions and critical phenomena	2022
18th KIAS-APCTP Winter School on Statistical Physics <i>Online,</i> Topic: Kinetic models in statistical physics	2021
17th KIAS-APCTP Winter School on Statistical Physics <i>Pohang, South Korea,</i> Topic: Machine learning for statistical physics in practice	2020
16th KIAS-APCTP Winter School on Statistical Physics <i>Yeosu, South Korea,</i> Topic: critical phenomena and renormalization group	2019

Presentations

International oral presentations.....

- [7] "Bird Migration Patterns Arising from Seasonal Resource Availability and Competition", Conference on Complex Systems 2025 (Siena, Italy, Sep. 1, 2025)
- [6] "Hysteresis in coupled identical oscillators with generalized coupling function and coupling strength inhomogeneity", Complex Networks 2023 (Menton, France, Nov. 28, 2023)
- [5] "Stability of twisted states in Kuramoto oscillators on a circle with power-law interaction strength", Roles of heterogeneity in non-equilibrium collective dynamics (RHINO 2022) (Tokyo, Japan, Sep. 18, 2022)
- [4] "Twisted states in Kuramoto oscillators on a circle with distance-decaying coupling strength", 15th Asia Pacific Physics Conference (Online, Aug. 22, 2022)

- [3] "Synchronization of oscillators with power-law coupling and spatial time delay", 2022 Korea-Canada Symposium and International Workshop on Multiplex Brain Networks (Calgary & Banff, Canada, Apr. 21, 2022)
- [2] "The central word set in a language", Networks 2021 (Online, Jul. 5, 2021)
- [1] "Modified Kuramoto model with power law coupling and spatial time delay", Conference on Complex Systems 2019 (Singapore, Sep. 30, 2019)

Domestic oral presentations

- [8] "Evolution of risk-taking strategy in von Neumann poker game", Workshop on the game theory and its applications (Gwangmyeong, South Korea, Nov. 24, 2023)
- [7] "Stability of Twisted States in Kuramoto Oscillators on a Circle with Distance-Decaying and Time-Delayed Coupling", 2023 Korean Physical Society Spring Meeting (Daejeon, Apr. 20, 2023)
- [6] "The compartment learning model and the core vocabulary in Korean language", 2021 Korean Physical Society Spring Meeting (Online, Apr. 22, 2021)
- [5] "A set of central words in Korean language", 2020 Korea Academy of Complexity Studies Fall Conference (Online, Nov. 28, 2020)
- [4] "A set of central words in Korean language", Joint mini-workshop on collective dynamics (Busan, South Korea, Nov. 12, 2020)
- [3] "A set of central words in Korean language", 2020 Korean Physical Society Fall Meeting (Online, Nov. 5, 2020)
- [2] "Modified Kuramoto model with power law coupling and site-dependent time delay", 2019 Korean Physical Society Fall Meeting (Gwangju, South Korea, Oct. 24, 2019)
- [1] "Modified Kuramoto model with power law coupling and spatial time delay", The 20th Workshop for Statistical Physics (Byeonsan, South Korea, Aug. 21, 2019)

International poster presentations

- [5] "Generalized Random Lotka-Volterra model with degree- correlated interaction strengths", Statphys29 (Florence, Italy, Jul. 14, 2025)
- [4] "How Do Degree-Correlated Interaction Strengths Shape Biodiversity?", ACMB-JSMB 2025 (Kyoto, Japan, Jul. 8, 2025)
- [3] "Why we sing in a round at a stadium: stability analysis of twisted states in Kuramoto oscillators on a circle", Netsci 2024 (Quebec, Canada, Jun. 17, 2024)
- [2] "Finding core vocabulary in a language", Statphys28 (Tokyo, Japan, Aug. 8, 2023)
- [1] "Effect of prior knowledge on vocabulary learning", Conference on Complex Systems 2022 (Palma, Spain, Oct. 18, 2022)

Domestic poster presentations

- [5] "Impact of Degree-Correlated Interactions on Biodiversity", 2025 Korean Physical Society Spring Meeting (Daejeon, South Korea, Apr. 23, 2025)
- [4] "Biodiversity in Random Lotka-Volterra model with degree-correlated interaction strength", Stochastic Processes as Tools for Understanding Biological Systems (Busan, South Korea, Feb. 17, 2025)
- [3] "Locally twisted states of Kuramoto oscillators in a brain network with site-dependent time delay", 2024 Korean Physical Society Fall Meeting (Yeosu, South Korea, Oct. 25, 2024)
- [2] "Finding important words: Network analysis of a Korean dictionary", 2024 Korean Physical Society Spring Meeting (Daejeon, South Korea, Apr. 25, 2024).

[1] “Emergence of twisted states in Kuramoto oscillators on a circle with power-law coupling strength”, 2022 SKKU Physics Workshop (Suwon, South Korea, Nov. 30, 2022)