

# Hae Seong Lee | Curriculum Vitae

Statistical Physics of Eco-Evolutionary Dynamics (SPEED) Lab, Department of Physics  
Inha University  
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## Research Interests

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- Emergent phenomena in complex systems
- Dynamics in complex networks
- Synchronization
- Neuroscience
- Spreading Phenomena
- Language

## Research Experiences

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### Inha University

Postdoctoral Researcher,

Mar.2025-Present

## Education

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### Sungkyunkwan University

Ph.D. candidate in Physics

2019–2025

Supervisor: Prof. Beom Jun Kim

### Sungkyunkwan University

B.S. in Physics,

2013–2017

## Publications

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[5] (*in preparation*) **Hae Seong Lee** and Beom Jun Kim, "The effect of prior knowledge on vocabulary learning"

[4] (*submitted*) Younghwa Cha, Yeji Lee, Eunhee Ji, SoHyun Han, Sunhyun Min, Hyoungkyu Kim, Ms 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

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

## Attended schools

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

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

## **Presentations**

### **International oral presentations**.....

- [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**

[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)