

Hae Seong Lee | Curriculum Vitae

Statistical Physics Lab, Department of Physics – Sungkyunkwan University

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Research Interests

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

Education

Sungkyunkwan University

Ph.D. candidate in Physics

2019–present

Supervisor: Prof. Beom Jun Kim

Sungkyunkwan University

B.S. in Physics,

2013–2017

Publications

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

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.....

- [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)

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

Attended schools

International schools.....

XII GEFENOL Summer School on Statistical Physics of Complex Systems	2024
<i>Madrid, Spain,</i>	
Topic: Selected topics in statistical physics	
Complexity72h	2024
<i>Madrid, Spain,</i>	
Topic: Unraveling cancer dynamics: From multiscale stochastic models to tissue morphology	
Complex Networks: Theory, Methods, and Applications	2024
<i>Como, Italy,</i>	
Topic: Selected topics in complex networks	
CSH Winter School 2023	2023
<i>Obergurgl, Austria,</i>	
Topic: Integrative and Disintegrative Processes in Complex Human Societies	
VII Mediterranean school on complex networks	2022
<i>Catania, Italy,</i>	
Topic: Selected topics in complex networks	

Domestic schools.....

21st KIAS-APCTP Winter School on Statistical Physics	2024
<i>Pohang, South Korea,</i>	
Topic: Selected topics in statistical physics on complex systems	
Complex systems summer school	2023
<i>Seoul, South Korea,</i>	
Topic: Lectures on "Network Science" written by Barabasi	
20th KIAS-APCTP Winter School on Statistical Physics	2023
<i>Pohang, South Korea,</i>	
Topic: Statistical Physics of Quantum Systems	
19th KIAS-APCTP Winter School on Statistical Physics	2022
<i>Online,</i>	
Topic: Phase transitions and critical phenomena	
18th KIAS-APCTP Winter School on Statistical Physics	2021
<i>Online,</i>	
Topic: Kinetic models in statistical physics	
17th KIAS-APCTP Winter School on Statistical Physics	2020
<i>Pohang, South Korea,</i>	
Topic: Machine learning for statistical physics in practice	
16th KIAS-APCTP Winter School on Statistical Physics	2019
<i>Yeosu, South Korea,</i>	

Topic: critical phenomena and renormalization group

Services

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

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-present

Skills

Programming languages: C, C++, Python, SQL, Matlab, Javascript
Computer skills: Monte-carlo simulation, Agent-based simulation, MPI programming, Networkx, Latex