

# Hye Jin Park | Curriculum Vitæ

Statistical physics of ecology and evolution group,  
Asia Pacific Center for Theoretical Physics, Pohang, South Korea (37673)

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## Research Experience

**Department of Physics, POSTECH**

*Adjunct Professor*

**Pohang, South Korea**

*2020.09.01–present*

**Asia Pacific Center for Theoretical Physics**

*Junior Research Group Leader*

**Pohang, South Korea**

*2020.04.01–present*

**Max-Planck Institute for Evolutionary Biology**

*PostDoc*

**Plön, Germany**

*2016.09.01–2020.03.31*

## Education

**Sungkyunkwan University**

*Ph. D. in physics*

Title: Statistical physics approach to social phenomena

Advisor: Beom Jun Kim

**Suwon, South Korea**

*2011–2016*

*B. Sc. in Physics*

*2007–2011*

## Research Subject

- Ecological and evolutionary dynamics
- Evolutionary game dynamics
- Computational social science
- Spin system

## Publications

- [20] **Park, H. J.**, B. J. Kim, H.-C. Jeong, C. Hilbe, and M. Nowak, Vacancies in a growing habitat and the evolution of cooperation, in preparation.
- [19] Y. Gao, **Park, H. J.**, A. Traulsen, and Y. Pichugin, Evolution of irreversible somatic differentiation, *eLife* (2021), 2021;10:e66711.
- [18] J. I. Park, B. J. Kim, **Park, H. J.**, Stochastic resonance of abundance fluctuations and mean time to extinction in an ecological community, *Phys. Rev. E* 104 (2021) 024133.
- [17] **Park, H. J.**, C. S. Gokhale, and Frederic Bertels, How sequence populations persist inside bacterial genomes, *Genetics*, (2021), iyab027.

- [16] C. S. Gokhale and **Park, H. J.**, Eco-evolutionary spatial dynamics of non-linear social dilemmas, *Advances in Dynamic Games*, (2020), 185-198.
- [15] G. B. Ayan, **Park, H. J.**, and J. Gallie, The birth of a bacterial tRNA gene by large-scale, tandem duplication events, *eLife*, (2020), 2020;9:e57947.
- [14] **Park, H. J.**, Y. Pichugin, and A. Traulsen, Why is cyclic dominance so rare?, *eLife*, (2020), 2020;9:e57857.
- [13] B. Wu, **Park, H. J.**, L. Wu, D. Zhou, Evolution of cooperation driven by self-recommendation, *Phys. Rev. E* 100 (2019) 042303.
- [12] Y. Pichugin, **Park, H. J.**, and A. Traulsen, Evolution of simple multicellular life cycles in dynamic environments, *J. Royal Soc. Interface* 16 (2019) 20190054.
- [11] **Park, H. J.**, Y. Pichugin, W. Huang, and A. Traulsen, Population size changes and extinction risk of populations driven by mutant interactors, *Phys. Rev. E* 99 (2019) 022305.
- [10] **Park, H. J.** and C. S. Gokhale, Ecological feedback on diffusion dynamics, *Royal Society Open Science* 6 (2019) 181273.
- [9] **Park, H. J.**, W. S. Jo, S. H. Lee, and B. J. Kim, Generalized Gravity Model for Human Migration, *New J. Phys.* 20 (2018) 093018.
- [8] S.-G. Yang, **Park, H. J.**, and B. J. Kim, Dynamic critical behavior of the one-dimensional XY model with long-range interaction, *Phys. Rev. E* 98 (2018) 032120.
- [7] **Park, H. J.** and A. Traulsen, Extinction dynamics from meta-stable coexistences in an evolutionary game, *Phys. Rev. E* 96 (2017) 042412.
- [6] **Park, H. J.**, B. J. Kim, H.-C. Jeong, Role of generosity and forgiveness: Return to cooperative society, *Phys. Rev. E* 95 (2017) 042314.
- [5] **Park, H. J.**, S. D. Yi, D. J. Kim, B. J. Kim, Network of likes and dislikes: Conflict and membership, *Physica A* 461 (2016) 647–654.
- [4] S. K. Baek, **Park, H. J.**, B. J. Kim, Anomalous response in the vicinity of spontaneous symmetry breaking, *Eur. Phys. J. B* 88 (2015) 127.
- [3] **Park, H. J.**, S. K. Baek, B. J. Kim, Stochastic resonance in the two-dimensional q-state clock models, *Phys. Rev. E* 89 (2014) 032137.
- [2] S. K. Baek, I. G. Yi, **Park, H. J.**, B. J. Kim, Statistics of the knockout tournament, *Scientific Reports* 3 (2013) 3198.
- [1] **Park, H. J.**, H. Sim, H.-H. Jo, B. J. Kim, Analysis of one-dimensional yut-nori game: winning strategy and avalanche-size distribution, *J. Korean Phys. Soc.* 63 (2013) 1497.

## Honors

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**Awards:** Young Statistical Physicist Award from Korea Physics Society, Daejeon, Korea, 25 April 2018

**Awards:** Best Poster Award from Statphys26, Lyon, France, 18-22 July 2016

**Awards:** Best Presentation Award from Complexity Research and Education Network, Korea, 2013

**Scholarships:** Lotte Scholarship (2011-2, 2012-1)

## Grants

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**2020 September-2023 February:** National Research Foundation of Korea(NRF) grant funded by the Korea government (MSIT).

## Organizing

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**2020 August:** Workshop "Modeling on Ecology and Evolution", APCTP, Pohang, Korea, August 24-26, 2020.

**2020 June-Present:** Seminar series "Modeling on Ecology and Evolution", APCTP, Pohang, Korea, June 2020-present.

**2019 September:** Workshop "Evolution of interacting populations", MPI for Evolutionary Biology, Plön, Germany, September 15-17, 2019.

**2018-2020:** Internal meeting "Monthly Academia", MPI for Evolutionary Biology, Plön, Germany, October 2018-March 2020.

**2017-2018:** Internal meeting "Statistical Physics study group", MPI for Evolutionary Biology, Plön, Germany, March 2017-February 2018.

**2014 May-June:** Assistant organizer of public talks "Let's play with physics", Sungkyunkwan University, Suwon, South Korea, May-June 2014.

## Mentoring

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**2019 May-August:** Co-supervising internship student in MPI for Evolutionary Biology, Plön, Germany

**2017 July-September:** Co-supervising internship student in MPI for Evolutionary Biology, Plön, Germany

## Teaching

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**2021 September-December:** Computational science, POSTECH, South Korea

**2013 September-December:** Statistical physics practice, Sungkyunkwan University, South Korea

**2013 March-June:** Classical mechanics practice, Sungkyunkwan University, South Korea

**2012 September-December:** Thermodynamics practice, Sungkyunkwan University, South Korea

## Invited Talks

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**2021 August 17-19:** "Artificial group selection on a simple model", Roles of heterogeneity in non-equilibrium collective dynamics (RHINO), Pohang, Korea.

**2021 July 5-7:** "Emergence of cooperation", Biophysics School, virtual meeting, Korea.

**2021 June 23-25:** "Ecological communities from generalized Lotka-Volterra dynamics with random

heterogeneous interactions", KIAS Workshop on Complex Systems and Data Science, KIAS, Seoul, Korea.

**2021 June 13-17:** "Extinction dynamics from meta-stable coexistences in an evolutionary game", a mini-symposium "Evolutionary Game Theory under Uncertainty" at the 2021 Annual Meeting of the Society for Mathematical Biology, virtual meeting.

**2021 April 7:** "How interactions shape ecological communities", colloquium at Physics Department, POSTECH, Pohang, Korea.

**2021 March 1-3:** "Why cyclic dominance is so rare?", Eurasian summit for models of society, virtual meeting.

**2021 February 23:** "Simple model on artificial group selection", colloquium at Division of Environmental Science & Engineering, POSTECH, Pohang, Korea.

**2020 November 25-27:** "Extinction dynamics from meta-stable coexistences in ecological systems", The 2nd workshop on stochasticity and fluctuations in small systems, Gyeongju, Korea.

**2020 September 25:** "Evolving ecological communities", StatPhys Monthly Meeting, Korea.

**2020 September 16:** "Eco-evolutionary dynamics with novel mutations", iTHEMS Biology Seminar.

**2020 August:** "Why cyclic dominance is so rare?", RHINO 2020 workshop, Pohang, Korea.

**2019 December 3:** "Eco-evolutionary dynamics with novel mutation", Complex Systems seminar, Queen Mary University, UK.

**2019 November 27-28:** "Eco-evolutionary dynamics with stochasticity and novel mutation", Frontiers of Physics Symposium, Asia Pacific Center for Theoretical Physics (APCTP), Pohang, Korea.

**2019 October 30:** "Generalized Gravity model for human migration: Marriage pattern in the past", Seminar talk, Xiamen University, Xiamen, China.

**2019 October:** "Marriage pattern in the past studied by generalized gravity model", Seminar talk, Gyeongnam National University of Science and Technology, Korea.

**2019 July 16-19:** "Extinction risk of populations driven by mutant interactors", Mini symposium in Mathematical Models in Ecology and Evolution (MMEE), Lyon, France.

**2019 June 24-26:** "Role of generosity and forgiveness: Return to cooperative society", Workshop—Dynamics of Interdependent Decisions, Hanse-Wissenschaftskolleg, Germany.

**2019 April 10-13:** "Population size and interaction structure driven by mutant interactors", Interdisciplinary Challenges in Non-Equilibrium Physics workshop, The Higgs Centre for Theoretical Physics, University of Edinburgh, Scotland.

**2018 May 7:** "Fate of populations in a stochastic system with mutations", Perspectives in Statistical Physics on Evolutionary Game Theory, Pukyong National University (PKNU), Busan, Korea

**2017 July 10-12:** "Ecological feedback on evolutionary spatial dynamics with social dilemmas", Mini symposium in Mathematical Models in Ecology and Evolution (MMEE), London, United Kingdom.

**2017 April 28:** "Extinction dynamics from meta-stable coexistences", Seminar talk, Korea Institute for Advanced Study (KIAS), Seoul, Korea.

**2016 May 10:** "Vacancies in a growing habitat and the evolution of cooperation", Department of Evolutionary Theory, Max Planck Institute for Evolutionary Biology, Plön, Germany.

**2015 August 26:** "Vacancies in a growing habitat and the evolution of cooperation", Program for

Evolutionary Dynamics, Harvard University, US.