

## Hawoong Jeong

Professor, Director of Center for Complex Systems

Complex Systems and Statistical Physics Lab

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Prof. Hawoong Jeong is currently Director of BK2FOUR program at physics department at KAIST, Korea. He got his Ph.D. in physics at Seoul National University, and his research area includes complex systems, statistical/computational physics and interdisciplinary science. He published about 120 research papers with more than 22,000 citations (Google Scholar, 50,000 citations) in diverse areas including physics, biology, computer science, social science and arts.



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## Education

1998 : Seoul National University (Ph. D. in Physics)

1993 : Seoul National University (M.S. in Physics)

1991 : Seoul National University (B.S. in Physics)

## Employment History

2001 ~ Present : KAIST, Assistant/Associate/Professor/KAIST-Chair-Professor

1998 ~ 2001 : Univ. of Notre Dame, Post. Doc./Research Assistant Prof.

## Research Interests

- Complex Systems
- Artificial Intelligence (AI) and Machine Learning
- Data-Science
- Network Science: Structure and dynamics of complex networks
- Computational methods in statistical physics

## Selected Honors & Awards

- 2023 Korea Academy of Science and Technology(KAST) Leading Scientist
- 2021 Minister of Public Administration and Security's Official Commendation
- 2016 Presidential Award from Korean Government at Science Day
- 2013 Academic Research Award from Korean Physical Society (KPS)
- 2012 Young Scientist by Summer Davos World Economic Forum
- 2010 The Scientist of the Month (May 2010) by MOST & KRF
- 2009 Grand Prize for Excellence in Teaching, by KAIST
- 2007 Yong-Bong Prize by Korean Physical Society (KPS)
- 2004 Prime Minister's Prize from Korean Government at Science Day

## International Activities

2012/7~ Editorial Board of "EPJ Data Science"

2018/1~ Associate Editor of "J. of Computational Social Science"

2020/8~ Editorial Board of "Regional Statistics"

2012~ International Advisory Committee of STATPHYS25

2016~ Board member of Network Science Society

2017~ General Council member of APCTP

**Plenary/Keynote/invited talks:** (for full list, <http://stat.kaist.ac.kr/~hjeong/presentation.html>)

1. 2023/8 28th International Conference on Statistical Physics (STATPHYS28) "Understanding complex systems via D.N.A.(Data,Networks,AI)", Tokyo, Japan (invited)
2. 2023/8 34th IUPAP Conference on Computational Physics (CCP2023) "Understanding complex systems via D.N.A.(Data,Networks,AI)", Kobe, Japan (invited)
3. 2021/10 "Bigdata and Privacy", International Symposium on Cybercrime Response 2021 (ISCR2021), Korea (plenary)
4. 2020/9 "Quantitative analysis of painting arts", 45th Conference of the middle European cooperation in statistical physics (MECO45), Romania (invited)
5. 2018/11 Dynamic Days Asia Pacific (DDAP10) "Big-data and Complex Networks", Xiamen, China (plenary)
6. 2018/6 StatPhys Taiwan 2018, "Big-data and Complex Networks" (invited)
7. 2018/1 NetSciX2018, "Big-data and Complex Networks", Hangzhou, China (invited)
8. 2016/12 Dynamic Days Asia Pacific (DDAP9), "Complex Networks and Data Science", HongKong (invited)
9. 2016/11 NOLTA2016 (International Symposium on Non-Linear Theory and its Application), "Complex Networks and Data Science", Yugawara, Japan (plenary)
10. 2016/8 Asia-Pacific Econophysics conference 2016, "Interdisciplinary applications of network dynamics", Tokyo, Japan (invited)
11. 2016/03 American Physical Society (APS) March Meeting "Interdisciplinary applications of network dynamics: From microscopic to Macroscopic", Baltimore, USA (invited)
12. 2014/07 JSMB/SMB mathematical biology meeting "Complex Directed Bio-Networks" Osaka, Japan (plenary)
13. 2012/09 Summer Davos World Economic Forum Ideaslabs "Big-data for Network Biology" Tianjin, China (invited)
14. 2011/03 55th Annual BPS Meeting, "Structure and Dynamics of Biological Networks", Baltimore, USA (invited)
15. 2010/07 STATPHYS24, "Directed Complex Networks", Cairns, Australia (invited)
16. 2010/05 NETSCI 2010, "Googling Hidden Interactions: Network Construction from WWW",

Boston, USA (invited)

17. 2009/12 Conference on Computational Physics 2009 (CCP2009), Taiwan "Googling Social Interactions" (invited)

18. 2009/03 2009 APS March Meeting "Flux Balance Analysis of Metabolic Networks", Pittsburgh, USA (invited)

19. 2008/9 DDAP5 (Dynamic Days Asia Pacific Conference) "Finding Optimal Position of the Facilities" Nara, Japan (invited)

20. 2005/7 STAT-PHYS-Taiwan, Academia Sinica, Taiwan, "From topology to dynamics of metabolic networks: Flux Balance Analysis" (plenary)

21. 2005/3 APS March Meeting, "Robustness of metabolic networks: Flux Balance Analysis" (invited)

22. 2004/10 4th Conference of the International Society of Ecological Information (ISEI), "Complex networks: from topology to dynamics" (keynote speech)

23. 2004/10 Japanese Biochemical Society Bio-Symposium, "Complex Bionetworks: from topology to dynamics", Yokohama, Japan (invited)

24. 2004/3 2004 APS March Meeting, "Secondary network emerging from simple perturbation", Montreal, Canada (invited)

25. 2002/5 STAT-PHYS-Taiwan, Academia Sinica, Taiwan, "Complex Networks" (invited)

### **Selected Publications**

(for full list, see <https://scholar.google.com/citations?user=-Jhj6swAAAAJ&hl=en>)

1. "Spontaneous emergence of music detectors in a deep neural network trained for natural sound recognition", *Nature Comm.* (2024)
2. "Towards cross domain generalization of Hamiltonian representation via Meta Learning", *ICLR* (2024)
3. "Social learning spontaneously emerges by searching optimal heuristics with deep reinforcement learning", *ICML* (2023)
4. "Learning Heterogeneous Interaction Strengths by Trajectory Prediction with Graph Neural Network", *ICLR* (2023)
5. "Learning entropy production via neural networks", *Phys. Rev. Lett.* (2020)
6. "Dissecting landscape art history with information theory", *PNAS* (2020)
7. "Early onset of structural inequality in the formation of collaborative knowledge in all Wikimedia projects" *Nature Human Behaviour* (2019) [2019/02 Issue cover]
8. "Large-scale Quantitative Analysis of Painting Arts", *Sci. Rep.* (2014)
9. "Fundamental Structural Constraint of Random Scale-Free Networks" *Phys. Rev. Lett.* (2012)
10. "Dynamics and Directionality in Complex Networks" *Phys. Rev. Lett.* (2009)

11. "Scaling Laws between Population and Facility Densities" *PNAS* (2009)
12. "Price of Anarchy in Transportation Networks: Efficiency and Optimality Control" *Phys. Rev. Lett.* (2008)
13. "Metabolite Essentiality Elucidates Robustness of *E. coli* Metabolism" *PNAS* (2007)
14. "Universality Class of Fiber Bundle Model on Complex Networks", *Phys. Rev. Lett.* (2005)
15. "Role of the Cytoskeleton in Signaling Networks", *J. of Cell Science* (2004)[Issue cover]
16. "Subnetwork Hierarchies of Biochemical Pathways", *Bioinformatics* (2003)
17. "Classification of Scale-free Networks", *PNAS* (2002)
18. "Modeling the Internet's Large-scale Topology", *PNAS* (2002)
19. "Comparable System-level Organization of Archaea and Eukaryotes", *Nature Genetics* (2001)
20. "Lethality and Centrality in Protein Networks", *Nature* (2001)
21. "The Large-scale Organization of Metabolic Networks", *Nature* (2000)
22. "Error and Attack Tolerance of Complex Networks", *Nature* (2000)
23. "The Diameter of the World Wide Web", *Nature* (1999)