

# Sang Hoon Lee

Assistant Professor  
Department of Liberal Arts,  
Gyeongnam National University of Science and Technology,  
33 Dongjin-ro, Jinju 52725, South Korea.  
Office: 1111 in the Centennial Memorial Hall  
Email: lshlj82@gntech.ac.kr

Phone (office): +82 (0)55-751-3466  
FAX (department office): +82 (0)55-751-3538  
Web: <http://newton.kias.re.kr/~lshlj82/>  
Google Scholar Profile:  
<http://scholar.google.com/citations?user=GuruM50AAAAJ>

## Personal Data

Date and Place of Birth: December 21, 1982, Ulsan, Republic of Korea

Nationality: Republic of Korea

Language: English (fluent in writing and speaking), Korean (native language)

## Professional Experience

Assistant Professor, Department of Liberal Arts, Gyeongnam National University of Science and Technology (GNTECH), March 2018–present.

Associate Member, School of Physics, Korea Institute for Advanced Study (KIAS), April 2018–present.

Research Fellow, School of Physics, KIAS, August 2015–February 2018.

BK21+ Research Professor, Department of Energy Science, Sungkyunkwan University, August 2014–July 2015.

Postdoctoral Research Associate, Mathematical Institute, University of Oxford, June 2012–July 2014.

Postdoctoral Researcher, Integrated Science Lab (IceLab), Department of Physics, Umeå University, July 2010–June 2012.

Postdoctoral Researcher, Department of Physics, Korea Advanced Institute of Science and Technology (KAIST), February 2010–June 2010.

## Education

Ph.D. Physics, KAIST, January 2010.

*Dissertation:* A few applications and critical phenomena on networks.

*Ph.D. Supervisor:* Hawoong Jeong (<http://stat.kaist.ac.kr/~hjeong/>)

*Committee:* Hawoong Jeong (chair), Hie-Tae Moon, Tae-Young Yoon, Jae Dong Noh, and Hyunsuk Hong.

B.S. Physics (Minor: Mathematics), *Summa Cum Laude*, Class Valedictorian, KAIST, February 2004.

## Selected Honors and Awards

- Bronze prize, the 3rd BK21 Young Physicists Workshop, January 2010.
- Full scholarship at International Summer School: Fundamental Problems in Statistical Physics XII (FPSPXII), Leuven, Belgium, August–September 2009.
- Bronze prize, the 2nd BK21 Young Physicists Workshop, January 2009.
- Grand prize, the 1st Korean BioInformation Center (KOBIC) Bioinformatics Contents Contest, February 2007.

- Best oral presentation award, Korean Physical Society Fall Meeting, October 2006.
- Outstanding Teaching Assistant award, KAIST, September 2006.
- Scholarship from Kim Bojeong Basic Science Foundation, September 2004–December 2005.
- Outstanding Intellectuals of the 21st Century Awards, Ministry of Education (South Korea), February 2004.
- Seokrim Scholarship from KAIST Alumni, December 2003.

## Grants

- “Information theoretical approaches on complex networks”, First Research in Lifetime, National Research Foundation of Korea (NRF), September 2018–August 2021.
- “Statistical physics approaches to complex and nonequilibrium systems”, Start-up Research Grant, GNTECH, March 2018–February 2019.

## Research Area

statistical physics; critical phenomena; nonequilibrium statistical mechanics; information theory; structures, dynamics, phase transitions, and navigability of/on complex networks; community and core-periphery structures in networks; systems biology; protein-protein interaction; gene expression analysis; chromosome interaction; combinatorial optimization problems.

## Research Papers in Refereed Journals

33. J. Yun, **S. H. Lee**, and H. Jeong, “Early onset of structural inequality in the formation of collaborative knowledge in all Wikimedia projects”, *Nat. Hum. Behav.* **3**, 155 (2019).
32. **S. H. Lee** and P. Holme, “Navigating temporal networks”, *Physica A* **513**, 288 (2019).
31. **S. H. Lee**, J. Um, and H. Park, “Nonuniversality of heat-engine efficiency at maximum power”, *Phys. Rev. E* **98**, 052137 (2018).
30. H. Kim, **S. H. Lee**, J. Davidsen, and S.-W. Son, “Multistability and variations in basin of attraction of power-grid systems”, *New J. Phys.* **20**, 113006 (2018).
29. H. J. Park, W. S. Jo, **S. H. Lee**, and B. J. Kim, “Generalized gravity model for human migration”, *New J. Phys.* **20**, 093018 (2018).
28. X.-M. Cui, C. N. Yoon, H. Youn, **S. H. Lee**, J. S. Jung, and S. K. Han, “Dynamic burstiness of word-occurrence and network modularity in textbook systems”, *Physica A* **487**, 103 (2017).
27. E. Lee, P. Holme, and **S. H. Lee**, “Modeling the dynamics of dissent”, *Physica A* **486**, 262 (2017).
26. **S. H. Lee**, M. D. Fricker, and M. A. Porter, “Mesoscale analyses of fungal networks as an approach for quantifying phenotypic traits”, *J. Complex Netw.* **5**, 145 (2017).
25. **S. H. Lee**, J. M. Magallanes, and M. A. Porter, “Time-dependent community structure in legislation cosponsorship networks in the Congress of the Republic of Peru”, *J. Complex Netw.* **5**, 127 (2017).
24. M. Cucuringu, P. Rombach, **S. H. Lee**, and M. A. Porter, “Detection of core-periphery structure in networks using spectral methods and geodesic paths”, *Eur. J. Appl. Math.* **27**, 846 (2016).
23. H. Kim, **S. H. Lee**, and P. Holme, “Building blocks of basin stability of power grids”, *Phys. Rev. E* **93**, 062318 (2016).

22. **S. H. Lee**, “Network nestedness as generalized core-periphery structures”, *Phys. Rev. E* **93**, 022306 (2016).
21. J. Yun, **S. H. Lee**, and H. Jeong, “Intellectual interchanges in the history of the massive online open-editing encyclopedia, Wikipedia”, *Phys. Rev. E* **93**, 012307 (2016).
20. H. Kim, **S. H. Lee**, and P. Holme, “Community consistency determines the stability transition window of power-grid nodes”, *New J. Phys.* **17**, 113005 (2015).
19. **S. H. Lee**, R. Ffrancon, D. M. Abrams, B. J. Kim, and M. A. Porter, “Matchmaker, matchmaker, make me a match: Migration of populations via marriages in the past”, *Phys. Rev. X* **4**, 041009 (2014).
18. **S. H. Lee**, M. Cucuringu, and M. A. Porter, “Density-based and transport-based core-periphery structures in networks”, *Phys. Rev. E* **89**, 032810 (2014).
17. J. Zhao, **S. H. Lee**, M. Huss, and P. Holme, “The network organization of cancer-associated protein complexes in human tissues”, *Sci. Rep.* **3**, 1583 (2013).
16. **S. H. Lee** and P. Holme, “A greedy-navigator approach to navigable city plans”, *Eur. Phys. J.-Spec. Top.* **215**, 135 (2013).
15. **S. H. Lee** and P. Holme, “Geometric properties of graph layouts optimized for greedy navigation”, *Phys. Rev. E* **86**, 067103 (2012).
14. **S. H. Lee** and P. Holme, “Exploring maps with greedy navigators”, *Phys. Rev. Lett.* **108**, 128701 (2012) [selected as Editors’ Suggestions].
13. **S. H. Lee**, S. Bernhardtsson, P. Holme, B. J. Kim, and P. Minnhagen, “Neutral theory of chemical reaction networks”, *New J. Phys.* **14**, 033032 (2012) [selected as IOPselect & featured in the Highlights of 2012 collection of *New J. Phys.*].
12. **S. H. Lee**, S. Lee, S.-W. Son, and P. Holme, “Phase-shift inversion in oscillator systems with periodically switching couplings”, *Phys. Rev. E* **85**, 027202 (2012).
11. **S. H. Lee** and P. Holme, “Pathlength scaling in graphs with incomplete navigational information”, *Physica A* **390**, 3996 (2011).
10. **S. H. Lee**, P.-J. Kim, and H. Jeong, “Global organization of protein complexome in the yeast *Saccharomyces cerevisiae*”, *BMC Syst. Biol.* **5**, 126 (2011) [designated as highly accessed articles].
9. P. Holme, M. Huss, and **S. H. Lee**, “Atmospheric reaction systems as null-models to identify structural traces of evolution in metabolism”, *PLOS ONE* **6**(5), e19759 (2011).
8. **S. H. Lee**, M. Ha, C. Jeon, and H. Jeong, “Finite-size scaling in random  $K$ -satisfiability problems”, *Phys. Rev. E* **82**, 061109 (2010).
7. Y. Baek, **S. H. Lee**, and H. Jeong, “Market behavior and performance of different strategy evaluation schemes”, *Phys. Rev. E* **82**, 026109 (2010).
6. **S. H. Lee**, P.-J. Kim, Y.-Y. Ahn, and H. Jeong, “Googling social interactions: Web search engine based social network construction”, *PLOS ONE* **5**(7), e11233 (2010).
5. **S. H. Lee**, M. Ha, H. Jeong, J. D. Noh, and H. Park, “Critical behavior of the Ising model in annealed scale-free networks”, *Phys. Rev. E* **80**, 051127 (2009).
4. **S. H. Lee**, H. Jeong, and J. D. Noh, “Random field Ising model on networks with inhomogeneous connections”, *Phys. Rev. E* **74**, 031118 (2006).
3. **S. H. Lee** and H. Jeong, “Effects of substrate network topologies on competition dynamics”, *Phys. Rev. E* **74**, 026118 (2006).
2. **S. H. Lee** and H. Jeong, “Minority game with interaction via various networks”, *J. Korean Phys. Soc.* **48**, S186 (2006).

1. S. H. Lee, P.-J. Kim, and H. Jeong, “Statistical properties of sampled networks”, *Phys. Rev. E* **73**, 016102 (2006).

## Unpublished Preprint(s) / Paper(s) under Review

- J. Lee, S. H. Lee, J. Um, and H. Park, “Carnot efficiency and zero-entropy-production rate do not guarantee reversibility of a process”, e-print arXiv:1812.10651, submitted to *Phys. Rev. Lett.* (under review)
- S. H. Lee, Y. Kim, S. Lee, X. Durang, J.-H. Jeon, P. Stenberg, and L. Lizana, “Mapping the spectrum of 3D communities in human chromosome conformation capture data”, e-print arXiv:1810.01307, submitted to *Sci. Rep.* (under review)
- R. Flanagan, L. Lacasa, E. K. Towilson, S. H. Lee, and M. A. Porter, “Effect of antipsychotics on community structure in functional brain networks”, e-print arXiv:1806.00080, submitted to *J. Complex Netw.* (under review)
- S. H. Lee, J. Um, and H. Park, “Efficiency at the maximum power output for simple two-level heat engine”, e-print arXiv:1612.00518.

## Papers in Preparation

- H. Kim and S. H. Lee, “Relational flexibility of network elements based on inconsistent community detection”.
- S. H. Lee and S. K. Han, “Multiscale network complexity from information theory”.
- M. J. Lee, E. Lee, D.-S. Lee, and S. H. Lee, “Uncovering hidden mutual importance in networks via information entropy”.

## Media Coverage

- “Inequalities in crowdsourced knowledge”, Editorial in *Nat. Hum. Behav.*, February 12, 2019. <https://www.nature.com/articles/s41562-019-0550-5>.
- “Study Shows a Monopolizing Few Can Control Collective Intelligence”, *The Korea Bizwire*, December 20, 2018. <http://koreabizwire.com/study-shows-a-monopolizing-few-can-control-collective-intelligence/129098>
- “How I met my collaborators”, *Behavioural & Social Sciences at Nature Research*, December 17, 2018. <https://socialsciences.nature.com/users/199227-jinhyuk-yun/posts/42267-how-i-met-my-collaborators>
- “Wikipedia’s social structures resemble a bureaucratic corporation, studies say”, *The Washington Post*, April 28, 2016. <http://wapo.st/1Sx0UQG>
- “Wikipedia has become 20th century bureaucracy”, *Fudzilla*, April 28, 2016. <http://www.fudzilla.com/news/40552-wikipedia-has-become-20th-century-bureaucracy>
- “Wikipedia is basically just another giant bureaucracy, study finds”, *ScienceAlert*, April 28, 2016. <http://www.sciencealert.com/wikipedia-is-basically-just-another-old-fashioned-bureaucracy-study-finds>
- “Wikipedia is basically a corporate bureaucracy, according to a New study”, *Gizmodo*, April 25, 2016. <http://gizmodo.com/wikipedia-is-basically-a-corporate-bureaucracy-accordi-174695234>
- “What the editing history of Wikipedia reveals”, *Asian Scientist*, February 15, 2016. <http://www.asianscientist.com/2016/02/in-the-lab/editing-history-wikipedia-reveals/>

- “Wikipedia vulnerabilities explored in new research”, The Speaker, February 4, 2016. <http://thespeaker.co/science/wikipedia-vulnerabilities-explored-new-research/>
- “Wikipedia articles separate into four categories”, APS Physics: Focus, January 22, 2016. <http://physics.aps.org/articles/v9/8>
- “Marriage records reveal patterns of Korean migration through the centuries”, Pacific Standard, November 4, 2014. <http://www.psmag.com/health-and-behavior/marriage-records-probe-korean-migration-centuries-93632>
- “How wedding registries reveal migration paths”, Mathematical Institute website, October 17, 2014. <http://www.maths.ox.ac.uk/node/13171>
- “Wedding registries reveal migration paths”, APS Physics: Synopsis, October 16, 2014. <http://physics.aps.org/synopsis-for/10.1103/PhysRevX.4.041009> (introduced in Physics Today facebook page: <https://www.facebook.com/PhysicsToday/posts/10154776052125164>).
- “Bugs Bunny as mathematician”, Mathematical Institute website, September 2, 2014. <https://www.maths.ox.ac.uk/node/894>
- “Greed is good”, APS Physics: Synopsis, March 22, 2012. <http://physics.aps.org/synopsis-for/10.1103/PhysRevLett.108.128701>
- “Google tracks political allegiances”, New Scientist: issue 2771, p19, July 31, 2010. <http://www.newscientist.com/article/mg20727715.200>
- “Pocket Science Ep1 – Google something new”, [http://www.youtube.com/watch?v=Mpp\\_kZrA-vA](http://www.youtube.com/watch?v=Mpp_kZrA-vA) (YouTube), July 26, 2010.

## Research Supervision / Examination and Assessment Duties

Co-supervising Ph.D. students in Department of Energy Science, Sungkyunkwan University.

Heetae Kim, joint with P. Holme, Summer 2014–Spring 2015,

Minjin Lee, joint with P. Holme, Summer 2014–Spring 2015.

Eun Lee, joint with P. Holme, Summer 2014–Spring 2015.

Co-supervising undergraduate/master’s students in Mathematical Institute, University of Oxford.

Ryan Flanagan (master’s student in Mathematical Institute), “Network analysis of separated cognitive states in the human brain”, joint with M. A. Porter, Summer 2013–Spring 2014.

Fabian Ying (undergraduate student in Mathematical Institute), “Dynamical processes on random geometric graphs”, joint with M. A. Porter, Summer 2013–Fall 2013.

Melissa Lever (master’s student in Systems Biology Doctoral Training Centre), “Characterising patients and controls with brain graphs constructed from fMRI data”, joint with M. A. Porter, Summer 2012.

Assessor of the mini-projects, MSc in Mathematics and the Foundations of Computer Science (MFoCS), University of Oxford.

Trinity Term (April 21–June 15), 2013.

Examiner (supervising master’s thesis), Umeå University.

Johan Dahlin, “Community detection in imperfect network”, Master’s Thesis in Engineering Physics, January–June 2011.

## Teaching

Assistant Professor, Department of Liberal Arts, Gyeongnam National University of Science and Technology.

- Fall 2018
  - K61021: Physics (물리)
  - EG11005: Physics 2 (물리 및 실험2)
  - H61024: Physics and Laboratory(2) [물리 및 실험(2)]
  - D61027: Social Physics (물리학으로 보는 사회)
- Spring 2018
  - H61022: Physics and Laboratory(1) [물리 및 실험(1)]
  - D61027: Social Physics (물리학으로 보는 사회)
  - Z61001: Reading and Discussion 1: Philosophy of Science and Technology [독서와토론1(과학기술철학 읽기)]

Lecturer, Department of Physics, Syungkyunkwan University.

- Spring 2015
  - GEDB008: General Physics I

Teaching Assistant, Department of Physics, KAIST.

- Fall 2006
  - Statistical Physics
- Spring 2006
  - Thermal Physics (Outstanding TA Award)
- Fall 2005
  - Advanced General Physics II
- Spring 2005
  - General Physics I

## Talks and Seminars

### *Invited Talks*

- “Mapping the spectrum of 3D communities in human chromosome conformation capture data”, The Arctic Biophysics Meeting on Epigenetics and Chromosome Dynamics, Kiruna, Sweden, January 22, 2019.
- “Uncovering hidden mutual importance in networks via information entropy”, International Workshop on Theoretical Perspectives in Network Science, Seoul National University, South Korea, December 8, 2018.
- “Uncovering hidden mutual importance in networks via information entropy”, The 6th International Workshop on Physics of Social Complexity (PoSCo), Pohang University of Science and Technology (POSTECH), Pohang, South Korea, June 1, 2018.
- “Modeling the dynamics of dissent”, Perspectives in Statistical Physics on Evolutionary Game Theory, Pukyong National University, Busan, South Korea, May 6, 2018.
- “Finding higher-order interactions in human chromosomes”, 2018 The Korean Physical Society Spring Meeting, Daejeon, South Korea, April 26, 2018.
- “Finding higher-order interactions in human chromosomes”, A Mini-Symposium on the Biophysics of Human Chromosome, POSTECH, Pohang, South Korea, February 5, 2018.

- “Higher-order network structures in topologically associated domains of chromosome interactions”, When Complex Networks Meet Complex Data: Higher-Order Models in Network Science (NetSci2017 Satellite Workshop), Indianapolis, the United States, June 20, 2017.
- “Higher-order organization of interactions in chromosome: 1D sequence  $\rightarrow$  3D structure  $\rightarrow$  topologically associated domain via network community detection”, A mini-symposium on structures and dynamics in human chromosomes, POSTECH, Pohang, South Korea, March 27, 2017.
- “Network education in this country: my personal perspective”, NetSciEd5: The Fifth NetSci Satellite Symposium on Network Science and Education, Seoul, South Korea, May 31, 2016.
- “Networks: From the small world into the real world”, Computational Neuroscience Winter School 2015, POSTECH, Pohang, South Korea, February 5, 2015.
- “Mesoscale analyses of political networks”, Physics of Social Complexity (PoSCo), POSTECH, Pohang, South Korea, January 28, 2015.
- “Migration of populations via marriages in the past”, The 4th Thermoelectric Workshop (TEW) in Korea Electrotechnology Research Institute (KERI), Gyeongju, South Korea, December 18, 2014.
- “Investigation on the marriages and migration in the past based on Korean family books and modern census (족보, 인구조사 자료를 기반으로 한 본관별 혼인과 인구 이동에 대한 연구 in Korean)”, The Fall Conference of Korea Academy of Complexity Studies, Ewha Womans University, Seoul, South Korea, November 29, 2014.
- “Matchmaker, matchmaker, make me a match: Migration of populations via marriages in the past”, The First Wednesday Multidisciplinary Forum, KAIST, Daejeon, South Korea, November 5, 2014.
- “Matchmaker, matchmaker, make me a match: Migration of populations via marriages in the past”, Invited Session on Social Simulation, the Korean Operations Research and Management Science Society (KORMS) Fall Conference, Korea University, Seoul, South Korea, November 1, 2014.
- “Physics of connection: Beyond the nearest neighbor towards the era of friend recommendation (연결의 물리학: 일촌의 파도를 넘어 친구 추천의 시대로 in Korean)”, Colloquium at the Subject Matter Education Institute of Chosun University, Gwangju, South Korea, October 28, 2014.
- “Exploring road networks with greedy navigators and their core-periphery structures”, an invited seminar at the research group on Large Graphs and Networks in Université catholique de Louvain, Louvain-la-Neuve, Belgium, December 14, 2012.
- “Neutral theory of chemical reaction networks”, Maximum entropy and ecology: advanced intensive one-week interdisciplinary course at Umeå University, Umeå, Sweden, October 4, 2012. <http://www.org.umu.se/icelab/english/education/maximum-entropy-and-ecology/>.
- “Googling social interactions: Web search engine based social network construction”, High Throughput Humanities [satellite meeting at the European Conference on Complex Systems 2010 (ECCS'10)], Lisbon University Institute ISCTE, Lisbon, Portugal, September 15, 2010.
- “Glass transition”, The 5th APCTP-KIAS Winter School on Statistical Physics, Phoenix Park, Pyeongchang, South Korea, January 30, 2008.

#### *Talks and Poster Presentations (international conferences)*

- “Higher-order interactions in human chromosomes: finding topologically associated domains via network community detection”, the 30th Marian Smoluchowski Symposium on Statistical Physics: On the Uniformity of Laws of Nature, Kraków, Poland, September 7, 2017.
- “Nonuniversality of heat engine efficiency at maximum power”, the 30th Marian Smoluchowski Symposium on Statistical Physics: On the Uniformity of Laws of Nature, Kraków, Poland, September 5, 2017.

- “Finding topologically associated domains in chromosome interactions via network community identification”, NetSci2017: International School and Conference on Network Science, Indianapolis, the United States, June 21, 2017.
- “Efficiency at the maximum power output for simple two-level heat engine”, 9th Dynamics Days Asia Pacific (DDAP9), Hong Kong, December 15, 2016.
- “Efficiency at the maximum power output for simple two-level heat engine”, Workshop on Stochasticity and Fluctuations in Small Systems, POSTECH, Pohang, South Korea, November 30, 2016.
- “Efficiency at the maximum power output for simple two-level heat engine”, 26th International Conference on Statistical Physics of the International Union of Pure and Applied Physics (STATPHYS 26), Lyon, France, July 18–22, 2016.
- “Efficiency at the maximum power output for simple two-level heat engine”, The 7th KIAS Conference on Statistical Physics, KIAS, Seoul, South Korea, July 5, 2016.
- “Core-periphery structures in networks and its relation to network nestedness”, NetSci2016: International School and Conference on Network Science, Seoul, South Korea, June 2, 2016.
- “Finding Lagrangian coherent structures using community detection”, The 3rd East Asia Joint Seminar on Statistical Physics, KIAS, Seoul, South Korea, October 15, 2015. video for the talk: [http://media.kias.re.kr/detailPage.do?pro\\_seq=996&type=p](http://media.kias.re.kr/detailPage.do?pro_seq=996&type=p)
- “Matchmaker, matchmaker, make me a match: Migration of populations via marriages in the past”, International Conference on Computational Social Science (ICCSS), Helsinki, Finland, June 11, 2015.
- “Finding Lagrangian coherent structures using community detection”, NetSciX: International School and Conferences on Network Science, Rio de Janeiro, Brazil, January 15, 2015.
- “Community structures of multilayer political cosponsorship networks”, The 2nd Daegu Gyeongbuk (Gyeongju) International Social Network Conference (DISC 2014), Eldis Regent Hotel, Daegu, South Korea, December 12, 2014.
- “Matchmaker, matchmaker, make me a match: Migration of populations via marriages in the past”, Application of Econophysics and Social Physics: Summer Workshop, Inha University, Incheon, South Korea, August 22, 2014.
- “Core-periphery structures in networks based on edge density, transport, and eigenvalue spectra”, NetSci2014: International School and Conference on Network Science, Clark Kerr Campus, Berkeley, California, the United States, June 5, 2014.
- “Matchmaker, matchmaker, make me a match: Migration of populations via marriages in the past”, Tnet-Sphys’14: Temporal Networks, Human Dynamics and Social Physics (satellite meeting at the NetSci2014: International School and Conference on Network Science), Clark Kerr Campus, Berkeley, California, the United States, June 3, 2014.
- “Density-based and transport-based core-periphery structures in networks”, Cambridge Networks Day (CN-Day) 2014, the Sainsbury Laboratory, University of Cambridge, Cambridge, United Kingdom, May 23, 2014.
- “Density-based and transport-based core-periphery structures in networks”, Dynamics Days US 2014, Georgia Institute of Technology, Atlanta, Georgia, the United States, January 3, 2014.
- “Density and transport-based core-periphery structures in networks”, Network Frontier Workshop, Northwestern University, Evanston, Illinois, the United States, December 5, 2013.
- “Overlapping community detection of multilayer networks”, Multiplex Networks 2013: Towards the understanding of a complex world [satellite meeting at the European Conference on Complex Systems 2013 (ECCS’13)], World Trade Center, Barcelona, Spain, September 19, 2013.



- “Matchmaker, matchmaker, make me a match: migration of population via marriages in the past”, COVENANT 2013: Collective Behaviors and Networks [satellite meeting at the European Conference on Complex Systems 2013 (ECCS'13)], World Trade Center, Barcelona, Spain, September 19, 2013.
- “Overlapping community detection on multilayer networks”, Econophysics Colloquium 2013 & Asia Pacific Econophysics Conference 2013 (satellite meeting of STATPHYS 25), Pohang, South Korea, July 30, 2013.
- “Matchmaker, matchmaker, make me a match: migration of population via marriages in the past”, 25th International Conference on Statistical Physics of the International Union of Pure and Applied Physics (STATPHYS 25), Seoul, South Korea, July 26, 2013.
- “Mesoscopic spatiotemporal properties of growing fungal networks”, Uncertainty in Interaction Networks, University of Bath, Bath, United Kingdom, June 13, 2013.
- “The organization of human cancer-related protein complexes”, Genomic Complexity [satellite meeting at the European Conference on Complex Systems 2012 (ECCS'12)], Université Libre de Bruxelles, Brussels, Belgium, September 6, 2012.
- “Geographic network in the eyes of greedy path-finding navigators”, Nordic Network for Network Science (NNNS) Kickoff, Stockholm, Sweden, November 2011.
- “Exploring spatial networks with greedy navigators”, NetSci2011: International School and Conference on Network Science, Central European University, Budapest, Hungary, June 2011.
- “Exploring spatial networks with greedy navigators”, Conference on Applications of Network Theory, Nordic Institute for Theoretical Physics (NORDITA), Stockholm, Sweden, April 2011.
- “Exploring spatial networks with greedy navigators”, Applications of network theory: from mechanisms to large-scale structure, NORDITA, Stockholm, Sweden, April 2011.
- “Finite-size effects of threshold behavior in the  $K$ -satisfiability problem”, Dynamics Days 2010: International Conference on Chaos and Nonlinear Dynamics, Northwestern University, Evanston, Illinois, the United States, January 2010.
- “Critical behavior of the Ising model in annealed scale-free networks”, Dynamics Days 2010: International Conference on Chaos and Nonlinear Dynamics, Northwestern University, Evanston, Illinois, the United States, January 2010.
- “Finite-size effects of threshold behavior in random  $K$ -satisfiability ( $K$ -SAT) problem”, International Summer School: Fundamental Problems in Statistical Physics XII, La Foresta, Leuven, Belgium, September 2009.
- “Googling social interactions: Web search engine based social network construction”, International Conference on Complex Networks: The Past 10 Years and Future, Seoul National University, Seoul, South Korea, December 2008.
- “Finite-size effects of phase transitions in  $K$ -satisfiability ( $K$ -SAT) problem”, The 3rd KIAS Conference on Statistical Physics, KIAS, Seoul, South Korea, July 2008.
- “Googling social interactions: Web search engine based social network construction”, Physics of distributed information systems (PhysDIS), NORDITA, Stockholm, Sweden, May 2008.
- “Bipartite network analysis on protein complexes in *Saccharomyces cerevisiae*”, APPC 10: The 10th Asia Pacific Physics Conference, POSTECH, Pohang, South Korea, August 2007.
- “Social network analysis based on WWW search engine”, 23rd International Conference on Statistical Physics of the International Union of Pure and Applied Physics (STATPHYS 23), Genoa, Italy, July 2007.
- “Social network analysis based on WWW search engine”, American Physical Society March Meeting, Denver, Colorado, the United States, March 2007.

- “Statistical properties of sampled networks”, Dynamics Days Asia Pacific 4: the 4th International Conference on Nonlinear Science, POSTECH, Pohang, South Korea, July 2006.
- “Effects of substrate network topologies on competition dynamics”, Dynamics Days Asia Pacific 4: the 4th International Conference on Nonlinear Science, POSTECH, Pohang, South Korea, July 2006.
- “Random field Ising model on networks with heterogeneous connections”, The 2nd KIAS Conference on Statistical Physics, KIAS, Seoul, South Korea, July 2006.
- “Statistical Properties of Sampled Networks”, American Physical Society March Meeting, Baltimore, Maryland, the United States, March 2006.

## Additional Service

### Workshop/Conference Organizing

- Social Media Chair, NetSci2016: International School and Conference on Network Science, Seoul, South Korea, May 30–June 3, 2016.
- Organizer, When Complex Networks Meet Complex Data: Higher-Order Models in Network Science (NetSci2016 Satellite Workshop), Seoul, South Korea, May 30, 2016.
- Organizer, Workshop on Time-Dependent and Multiplex Networks, University of Oxford, Oxford, United Kingdom, July 8–9, 2013.

### Journal Reviewer

Nature Communications, Physical Review Letters, Physical Review E, Chaos, Physica A, The European Physical Journal–Special Topics, The European Physical Journal B, Journal of the Korean Physical Society, New Physics: Sae Mulli (새물리), Scientific Reports, PLOS ONE, European Journal of Applied Mathematics, Network Science, Social Network Analysis and Mining, Palgrave Communications, IEEE Transactions on Network Science and Engineering, Complexity, Entropy.

### Conference/Workshop Program Committee

- NetSci2019: International School and Conference on Network Science, Burlington, Vermont, the United States, May 27–31, 2019.
- IC<sup>2</sup>S<sup>2</sup>: 2018 4th Annual International Conference on Computational Social Science, Evanston, Illinois, the United States, July 12–15, 2018.
- Social Informatics 2018 (Socinfo 2018), Saint Petersburg, Russia, September 25–28, 2018.
- Social Informatics 2017 (Socinfo 2017), Oxford, United Kingdom, September 13–15, 2017.
- Complex Networks 2017: The 6th International Conference on Complex Networks and their Applications, Lyon, France, November 29–December 1, 2017.
- NetSci2017: International School and Conference on Network Science, Indianapolis, Indiana, the United States, June 19–23, 2017.
- Complex Networks 2016: The 5th International Workshop on Complex Networks and their Applications, Milan, Italy, November 30–December 2, 2016.
- The 8th International Conference on Social Informatics (SocInfo 2016), Seattle, Washington, the United States, November 11–14, 2016.
- 2016 International Conference on Computational Social Science (ICCS), Evanston, Illinois, the United States, June 23–26, 2016.
- International Conference on Computational Social Science (ICCS), Helsinki, Finland, June 8–11, 2015.
- The 9th International AAAI Conference on Web and Social Media (ICWSM-15), Oxford, United Kingdom, May 26–29, 2015.

- Computational Social Science (CSS) 2014 [European Conference on Complex Systems 2014 (ECCS'14) Satellite Workshop], Lucca, Italy, September 24–25, 2014.

#### Outreach on Network Science for School Students in United Kingdom

- Places and Dates: Arden School, Solihull (November 19, 2012), Somerville College, University of Oxford (November 24, 2012), The Discovery Academy, Stoke-On-Trent (December 3, 2012), Somerville College, University of Oxford (May 11, 2013: YouTube video below), Brentford School for Girls, Brentford (November 20, 2013), Ormiston Sir Stanley Matthews Academy, Stoke-On-Trent (February 3, 2014).
- Video Clip: [Oxford Impacts] Sharing the beauty of networks. <http://www.youtube.com/watch?v=9dcdjcyA-8E>, September 4, 2013.
- Related article: H. A. Harrington, M. Beguerisse Díaz, M. P. Rombach, L. M. Keating, and M. A. Porter, “Commentary: Teach network science to teenagers”, *Network Sciences* 1, 226 (2013).

#### Translation

- “페이스북의 친구추천이 정교해진 이유” (“The reason why the friend recommendation on facebook has got accurate” in English) [the interview with László Barabási during NetSci 2016], Tech M, June 9, 2016. [http://techm.kr/bbs/board.php?bo\\_table=article&wr\\_id=2139](http://techm.kr/bbs/board.php?bo_table=article&wr_id=2139).
- The Korean version of Network Literacy Project (in collaboration with Mi Jin Lee): “네트워크 이해하기 (in Korean)”. <http://newton.kias.re.kr/~lshlj82/networkliteracy.html>, April 27, 2015.

## Background and Skills

programming and data analyses with C, Python, MATLAB, R, etc.; UNIX/LINUX/Mac OS systems; large-scale network analysis tools (Pajek, NetworkX package of Python, etc.); agent-based modeling; Web data mining; statistical physics; Monte Carlo simulation; finite-size scaling analysis.

Last updated: February 12, 2019