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Current Position

- **KAIST** Daejeon, South Korea
  Integrated master's/doctoral program, Department of Mathematical Sciences *2021.03-Current*
  - Advised by Jaehoon Kim and Hong Liu.
- **IBS ECOPRO** Daejeon, South Korea
  Student Researcher *2022.04-Current*

Education

- **KAIST** Daejeon, South Korea
  B.S., Department of Mathematical Sciences *2016.03-2020.08*
- **Hansung Science High School(한성과학고등학교)** Seoul, South Korea
  High school education *2014.03-2016.02*

Research Interests

- Extremal graph theory, especially
  - Embedding spanning structures in dense graphs
  - Homomorphism counting
- Computational complexity of graph problems

Preprints submitted

- On high discrepancy 1-factorizations of complete graphs (with Jiangdong Ai, Fankang He, Hyunwoo Lee), arXiv:2503.17176
- Ramsey–Dirac theory for bounded degree hypertrees (with Jie Han, Jaehoon Kim, and Donglei Yang), arXiv:2411.17996
- Sidorenko's conjecture for subdivisions and theta substitutions (with Ruonan Li and Hong Liu), arXiv:2408.03491
- Graph with any rational density and no rich subsets of linear size (with Suyun Jiang, Hong Liu, and Tuan Tran), arXiv:2402.13825
- A bandwidth theorem for graph transversals (with Debsoumya Chakraborti, Jaehoon Kim, and Hong Liu), arXiv:2302.09637

Published

To appear

- The proper conflict-free k-coloring problem and the odd k-coloring problem are NP-complete on bipartite graphs (with Jungho Ahn and Sang-il Oum), arXiv:2208.08330
  To appear in *Discrete Applied Mathematics*

2025

- On rainbow Turán Densities of Trees (with Jaehoon Kim, Hyunwoo Lee, and Haesong Seo), *Random Structures & Algorithms* 66(3), e70005.
  arXiv:2312.15956 doi.org/10.1002/rsa.70005
- Dirac's theorem for linear hypergraphs (with Hyunwoo Lee),
  SIAM Journal on Discrete Mathematics, 39(2), 834-847.
  arXiv:2403.14269, doi.org/10.1137/24M1659467
- Crux, space constraints and subdivisions (with Jaehoon Kim, Younjin Kim, and Hong Liu)
  Journal of Combinatorial Theory, Series B 170 (2025): 82-127.
  arXiv:2207.06653, doi.org/10.1016/j.jctb.2024.08.005. An extended abstract appears in EUROCOMB'23

2024

- A proof of the Elliott-Rödl conjecture on hypertrees in Steiner triple systems (with Jaehoom Kim, Joonkyong Lee, and Abhishek Methuku)
  Forum of Mathematics, Sigma 2024;12:e75
  arXiv:2208.10370, doi.org/10.1017/fms.2024.34
- On the spectral radius of graphs with given maximum degree and girth (with Jiangdong Ai, Jaehoon Kim, Hyunwoo Lee, Suil O, and Liwen Zhang)
  Linear Algebra and its Applications vol 691, 182-195
  doi.org/10.1016/j.laa.2024.03.026

2016

- On the mean square displacement of a random walk on a graph (with Hwidong Kim, Jiho Maeng, Jihwan Yu, Yongwook Cha, and Seong-HunPaeng)
  European Journal of Combinatorics 51 (2016): 227-235
  doi.org/10.1016/j.ejc.2015.05.009

Talks

- (invited) Discrete Analysis at Yonsei
  June 19, 2025 at Yonsei University (Seoul, South Korea)
  Ramsey–Dirac theory for bounded degree hypertrees (site)
- 2025 KMS Spring Meeting
  April 25, 2025 at KAIST (Daejeon, South Korea)
  Spanning hypertrees in dense pseudorandom hypergraphs (site)

- (invited) 4th East Asia Workshop on Extremal and Structural Graph Theory
  March 29, 2025 at Sun-Yet Sen University (Guangzhou, China)
  Ramsey–Dirac theory for bounded degree hypertrees (site)

- (invited) BUPT(Beijing University for Posts and Telecommunications) workshop
  December 15, 2024 at Hainan, China
  Ramsey–Dirac theory for bounded degree hypertrees

- (invited) Beijing Institute of Technology(BIT) seminar
  December 10, 2024 at Beijing Institute of Technology (Beijing, China)
  Almost spanning hypertrees in a Steiner triple system

- (invited) 2024 KMS Annual Meeting - Special Section: Recent developments in combinatorics
  October 25, 2024 at Sungkyunkwan University (Suwon, South Korea)
  Sidorenko's conjecture for theta substitutions (site)

- (invited) Discrete Analysis Seminar
  October 15, 2024 at Yonsei University (Seoul, South Korea)
  Rainbow Turán Densities of Trees via Graph Limits (site)

- (invited) Shandong University Seminar
  August 5, 2024, Zoom
  Rainbow Turán Densities of Trees via Graph Limits

- 9th European Congress of Mathematics(ECM) - CS-15: 04. Combinatorics and Discrete Mathematics (II)
  July 16, 2024 at Sevilla, Spain
  Graph with any rational density and no rich subsets of linear size (site)

- Summit280
  July 11, 2024 at Budapest, Hungary
  Dirac's theorem for linear hypergraphs (site)

- 30th British Combinatorial Conference(BCC)
  July 3, 2024 at London, UK
  Dirac's theorem for linear hypergraphs (site)

- (invited) 31st KIAS combinatorics workshop
  June 1, 2024 at Jeju, South Korea
  Dirac's theorem for linear hypergraphs (site)

- 2024 KMS Spring Meeting
  April 19, 2024 at Daejeon, South Korea
  On rainbow Turán densities of trees (site)

- (invited) Yeungnam University Combinatorics Seminar
  March 18, 2024 at Yeungnam University (Gyeongsan, South Korea)
  Graph with any rational density and no rich subsets of linear size (site)

- 2023 European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB'23)
  August 31, 2023 at Prague, Czech Republic
  Crux, space constraints and subdivisions (Extended abstract)

- (invited) 2023 KMS Spring Meeting - Special Section: Extremal Combinatorics: Methods and Applications
  April 29, 2023 at Daejeon, South Korea
  A bandwidth theorem for graph transversals (site)
- (invited) Shandong University Seminar
  March 30, 2023, Zoom
  A bandwidth theorem for graph transversals (Bilibili)
- (invited) IBS Discrite Math Seminar
  November 29, 2022 at IBS (Daejeon, South Korea)
  A proof of the Elliott-Rödl conjecture on hypertrees in Steiner triple systems (Youtube)
- KAIST Math Graduate student Seminar (KMGS)
  November 3, 2022 at KAIST (Daejeon, South Korea)
  Large clique subdivisions in graphs without small dense subgraphs (site)
- 2021 Combinatorics Workshop
  December 21, 2021 at Yangpyeong, South Korea
  Large clique subdivisions in graphs without small dense subgraphs (Youtube)
- (invited) IBS Discrete Math Seminar
  November 30, 2021 at IBS (Daejeon, South Korea)
  Large clique subdivisions in graphs without small dense subgraphs (Youtube)

Teaching

- Mini course: Finding Large Structures (with Hyunwoo Lee)
  Nankai University
  2025 Feb 18-21

TA works

2025

- (spring) CS492 Algorithmic Graph Theory at KAIST

2024

- (fall) MAS 477 Introduction to graph theory at KAIST
- (spring) MAS 275 Discrete mathematics at KAIST

2023

- (fall) MAS 102 Calculus 2 and MAS 480 Topological methods in combinatorics at KAIST
- (spring) MAS 101 Calculus 1 and MAS 275 Discrete mathematics at KAIST

2022

- (fall) MAS 102 Calculus 2 and MAS 477 Introduction to Graph Theory at KAIST
- (spring) MAS 102 Calculus 2 and MAS 275 Discrete mathematics at KAIST

2021

- (fall) MAS 102 Calculus 2 and CC511 Probability and Statistics at KAIST
- (spring) MAS 101 Calculus 1 at KAIST (Won the Outstanding Teaching Assistant Award).

Organizing events

- Co-organizing Deep seminar in combinatorics, 2023-Current (link)
- Co-organizing 2024 KSCW (Korean Student Combinatorics Workshop), 2024 July 29-August 2 (link)
- Co-organizing IBS ECOPRO student reading group, 2022-2023 (link)

Awards & Honors

Outstanding TA Award 2021
Awarded by KAIST
37th Mathematical Contest for University Students - Silver Prize 2018
Awarded by Korean Mathematical Society
2018 Kakao Code Festival 5th prize (30th place) 2018
Awarded by Kakao Corporation
36th Mathematical Contest for University Students - Silver Prize 2017
Awarded by Korean Mathematical Society

Research Visits

- Visited Nankai University, Tianjin, China
  at the invitation of Prof. Jiangdong Ai (February 13-25, 2025).
- Visited Beijing University for Posts and Telecommunications Hainan Campus, Hainan, China
  at the invitation of Prof. Luyining Gan (December 11-23, 2024).
- Visited Beijing Institute of Technology, Beijing, China
  at the invitation of Prof. Jie Han (December 09-11, 2024).
- Visited Nankai University, Tianjin, China
  at the invitation of Prof. Jiangdong Ai (February 16-25, 2024).

References

- **Prof. Jaehoon Kim**
  Department of Mathematical Sciences, KAIST
  jaehoon.kim@kaist.ac.kr
- **Prof. Hong Liu**
  Extremal Combinatorics and Probability Group, Institute for Basic Science (IBS ECOPRO)
  hongliu@ibs.re.kr

Other manuscripts

- Complexity of Partitioning Hypergraphs, arXiv:1812.09206