Zichao Dong 董子超

Institute for Basic Science

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Curriculum Vitae

Last update: Aug. 2025

Research interests

Extremal combinatorics and graph theory, algebraic and probabilistic methods, discrete geometry, combinatorial number theory.

Employment

- **Research fellow**, Institute for Basic Science 01/2024–now
  - Mentor: Hong Liu
- **Research fellow**, Alfréd Rényi Institute of Mathematics 09/2023–12/2023
  - Mentor: János Pach

Education

- **PhD in Mathematics**, Carnegie Mellon University 09/2018–05/2023
  - Advisor: Boris Bukh
  - Thesis: "Several problems in extremal combinatorics"
- **BS in Mathematics**, Peking University 09/2014–07/2018
  - Advisor: Chunwei Song
  - Thesis: "Three proofs of Roth's theorem"
- **Middle and High School**, Beijing National Day School 09/2008–07/2014

Academic positions

- **Teaching assistant at CMU** 09/2018–present
  - 21-325 Probability, grading Spring 2023
  - 21-228 Discrete Mathematics, grading and recitations Spring 2022
  - 21-301 Combinatorics, grading Fall 2021
  - 21-623 Complex Analysis (graduate), grading Spring 2021
  - 21-295 Putnam Seminar, grading Fall 2020

- 21-325 Probability, grading — Spring 2020
- 21-701 Discrete Mathematics (graduate), grading — Fall 2019
- 21-325 Probability, grading — Spring 2019
- 21-371 Algebraic Structures, grading — Fall 2018
- 21-341 Linear Algebra, grading — Fall 2018

- **Teaching assistant at PKU** — 09/2017–01/2018
  - Calculus (college of engineering), grading and recitations — Fall 2017

Publications

- **Large grid subsets without many cospherical points**
  - With Zijian Xu, arXiv:2506.18113.
- **Induced rational exponents and bipartite subgraphs in $K_{s,s}$-free graphs**
  - With Jun Gao, Ruonan Li, and Hong Liu, arXiv:2506.09020.
- **Set families: restricted distances via restricted intersections**
  - With Jun Gao, Hong Liu, Minghui Ouyang, and Qiang Zhou, arXiv:2504.12296.
- **Bipartite Turán problem on graph gluing**
  - With Jun Gao and Hong Liu, arXiv:2501.12953.
- **Many cliques with small degree powers**
  - With Ting-Wei Chao, Zijun Shen, and Ningyuan Yang, arXiv:2410.04744.
- **Empty red-red-blue triangles**
  - With Ting-Wei Chao and Zhuo Wu, arXiv:2409.17078.
  - The main result of the paper appeared in "A note on empty balanced tetrahedra in two-colored point sets in $\mathbb{R}^3$" by Díaz-Bañez, Fabila-Monroy, and Urrutia.
- **Saturation results around the Erdős–Szekeres problem**
  - With Gabór Damásdi, Manfred Scheucher, and Ji Zeng, arXiv:2312.01223.
  - Preliminary version appeared in SoCG 2024.
  - Accepted to Eur. J. Comb..
- **Rainbow even cycles**
  - With Zijian Xu, arXiv:2211.09530.
  - Appeared in SIAM J. Discrete Math., vol. 38(2), 2024.

- **Convex polytopes in restricted point sets in $\mathbb{R}^d$**
  - With Boris Bukh, arXiv:2204.02487.
  - Appeared in Adv. Comb., 2025:1.
- **A simple proof of the Gan–Loh–Sudakov conjecture**
  - With Ting-Wei Chao, arXiv:2201.05181.
  - Appeared in Electronic J. of Combinatorics, vol. 29(3), P3.59, 2022.
- **On the stability of graph independence number**
  - With Zhuo Wu, arXiv:2102.13306.
  - Appeared in SIAM J. Discrete Math., vol. 36(1), 2022.
- **Longest common subsequences between words of very unequal length**
  - With Boris Bukh, arXiv:2009.05869.

Presentations

- **Bipartite Turán problem on graph gluing**
  - School of Mathematics and Physics seminar at XJTLU, Suzhou, China, August 2025.
- **Bipartite Turán problem on graph gluing**
  - School of Mathematical Sciences Seminar at PKU, Beijing, China, June 2025.
- **Set families: restricted distances via restricted intersections**
  - The 34th KIAS Combinatorics Workshop in Jeju, Korea, May 2025.
- **Maximizing the number of cliques in a graph of given degree sequence ℓ^p-norm**
  - Yongjiang Mathematics forum at NBU, Ningbo, China, Nov. 2024.
- **Lectures on Erdős–Szekeres combinatorial geometry results and related problems**
  - Combinatorics seminar at NKU, Tianjin, China, Nov. 2024.
- **Maximizing the number of cliques in a graph of given degree sequence ℓ^p-norm**
  - Mathematical sciences seminar at TYUT (online), Taiyuan, China, Nov. 2024.
- **Maximizing the number of cliques in a graph of given degree sequence ℓ^p-norm**
  - Lectures of the New Stars at SDU, Jinan, China, Nov. 2024.
- **Saturation around the Happy Ending**
  - Combinatorics Seminar at NPU, Xi'an, China, Nov. 2024.

- **Maximizing the number of cliques in a graph of given degree sequence ℓ^p-norm**
  - Combinatorics Seminar at NPU, Xi'an, China, Nov. 2024.
- **Saturation around the Happy Ending**
  - The Ninth Qilu Youth Forum at SDU (online), Jinan, China, Oct. 2024.
- **Saturation around the Happy Ending**
  - SoCG 2024 in Athens, Greece, June 2024.
- **Saturation around the Happy Ending**
  - The 31st KIAS Combinatorics Workshop in Jeju, Korea, May 2024.
- **Convex polytopes in non-elongated point sets in $\mathbb{R}^d$**
  - IBS Discrete Mathematics Seminar at IBS, Korea, Jan. 2024.
- **Convex polytopes in non-elongated point sets in $\mathbb{R}^d$**
  - Erdős Center Seminar at the Rényi Institute, Hungary, Oct. 2023.
- **Rainbow even cycles**
  - AMS Spring Southeastern Sectional Meeting at GIT, Atlanta, USA, Mar. 2023.
- **A simple proof of the Gan–Loh–Sudakov conjecture**
  - Graduate students seminar at CMU, Pittsburgh, USA, Feb. 2023.
- **On the Stability of Graph Independence Number**
  - SIAM Conference on Discrete Mathematics (DM22) at CMU, Pittsburgh, USA, Jun. 2022.
- **Convex polytopes in non-elongated point sets in $\mathbb{R}^d$**
  - ACO seminar at CMU, Pittsburgh, USA, Apr. 2022.
- **Convex independence and convex holes**
  - Graduate students seminar at CMU, Pittsburgh, USA, Oct. 2019.
- **Random permutations and extremal set problems**
  - Graduate students seminar at CMU, Pittsburgh, USA, Feb. 2019.
- **Domino Tilings of Aztec Diamonds**
  - Graduate students seminar at CMU, Pittsburgh, USA, Oct. 2018.

Services

- Anonymous journal referee services
  - *Discrete Comput. Geom.* (2023, 2024)
  - *J. Graph Theory* (2024)
  - *SIAM J. Discrete Math.* (2024)
  - *Amer. Math. Monthly* (2025)
- Math Olympiad Summer Program (MOP) Summer 2022
  - Training for the USA team at the International Math Olympiad (IMO).
  - Served as an instructor, gave lectures under directions of Po-Shen Loh.
- Western PA ARML 2019–2022
  - Training for the Western Pennsylvania Team at American Rigions Math League (ARML).
  - Served as an instructor, gave lectures on combinatorics and number theory.