Ting-Wei Chao

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Research Interest

Extremal combinatorics.
Entropy method, polynomial method, discrete geometry

Position

2024 - **C.L.E. Moore Instructor of Mathematics**, *Massachusetts Institute of Technology*.

Education/Previous Positions

2019 - 2024 **Ph.D. ACO Program**, *Carnegie Mellon University*.
Thesis: Problems in Discrete Geometry, Incidence Geometry, and Extremal Graph Theory.
Advisor: Boris Bukh

2018 - 2019 **Research Assistant**, *Academia Sinica*.

2014 - 2018 **B.S. Mathematics**, *National Taiwan University*.

Awards

2024 **Guy C. Berry Graduate Research Award**, *Carnegie Mellon University*.

2023 **Outstanding Graduate Research Prize**, *Carnegie Mellon University*.

2021 **Paul and James Wang – Sercomm Graduate Fellowship**, *Carnegie Mellon University*.

2018 **Tah-Kai Hu Scholarship**, *National Taiwan University*.

2016 **Hwa Chung Torng, Scholarship**, *National Taiwan University*.

Papers and Preprints

Papers

2026+ **Tight Bound and Structural Theorem for Joints**, *Accepted to American Journal of Mathematics*, Ting-Wei Chao and Hung-Hsun Hans Yu.

2026 **When Joints Meet Extremal Graph Theory: Hypergraph Joints**, *Discrete & Computational Geometry*, Ting-Wei Chao and Hung-Hsun Hans Yu.

2026 **When Entropy Meets Turán: New Proofs and Hypergraph Turán Results**, *Journal of the London Mathematical Society*, Ting-Wei Chao and Hung-Hsun Hans Yu.

2026 **Even-Degeneracy of a Random Graph**, *Accepted to Random Structures & Algorithms*, Ting-Wei Chao, Dingding Dong, and Zixuan Xu.

2025 **Uniform Set Systems with Small VC-dimension**, *International Mathematics Research Notices*, Ting-Wei Chao, Zixiang Xu, Chi Hoi Yip, and Shengtong Zhang.

2024 **Kruskal–Katona-Type Problems via Entropy Method**, *Journal of Combinatorial Theory, Series B*, Ting-Wei Chao and Hung-Hsun Hans Yu.

2023 **Several Improved Asymptotic Normality Criteria and Their Applications to Graph Polynomials**, *Discrete Mathematics*, Ting-Wei Chao, Zhibin Du, and Yeong-Nan Yeh.

2022 **Empty Axis-Parallel Boxes**, *International Mathematics Research Notices*, Boris Bukh and Ting-Wei Chao.

2022 **Digital Almost Nets**, *The Electronic Journal of Combinatorics*, Boris Bukh and Ting-Wei Chao.

2022 **A Simple Proof of the Gan-Loh-Sudakov Conjecture**, *The Electronic Journal of Combinatorics*, Ting-Wei Chao and Zichao Dong.

2021 **Sharp Density Bounds on the Finite Field Kakeya Problem**, *Discrete Analysis*, Boris Bukh and Ting-Wei Chao.

2021 **On Convex Holes in d-dimensional Point Sets**, *Combinatorics, Probability and Computing*, Boris Bukh, Ting-Wei Chao, and Ron Holzman.

2019 $1/k$-**Eulerian Polynomials and** k-**Inversion Sequences**, *The Electronic Journal of Combinatorics*, Ting-Wei Chao, Jun Ma, Shi-Mei Ma, and Yeong-Nan Yeh.

Preprints

2026 **On Colorful Kruskal–Katona Theorems**, *arXiv*, Ting-Wei Chao, Maya Sankar, and Hung-Hsun Hans Yu.

2026 **Asymptotics of the Brown–Erdős–Sós Problem at Integer Exponents**, *arXiv*, Ting-Wei Chao, Xinqi Huang, and Hong Liu.

2026 **Asymptotically sharp bounds for affine subspace statistics in** $\mathbb{F}_2^n$, *arXiv*, Ting-Wei Chao, Zixuan Xu, and Dmitrii Zakharov.

2026 **A Dichotomy for Hypergraph Zarankiewicz Problems on Axis-Parallel Boxes**, *arXiv*, Ting-Wei Chao, Zichao Dong, Hong Liu, Xichao Shu, and Shuaichao Wang.

2026 **Vertex-Minor Universality of a Random Graph**, *arXiv*, Ting-Wei Chao and Zixuan Xu.

2026 **Uniform Set Systems with Uniform Witnesses**, *arXiv*, Ting-Wei Chao, Zixuan Xu, and Dmitrii Zakharov.

2026 **Finite Field Nikodym Problem for Spread Line Sets**, *arXiv*, Ting-Wei Chao and Hung-Hsun Hans Yu.

2025 **Edge Inducibility via Local Directed Graphs**, *arXiv*, Ting-Wei Chao, Asaf Cohen Antonir, Anqi Li, and Hung-Hsun Hans Yu.

2025 **The Oddtown Problem Modulo a Composite Number**, *arXiv*, Boris Bukh, Ting-Wei Chao, and Zeyu Zheng.

2024 **Many Cliques with Small Degree Powers**, *arXiv*, Ting-Wei Chao, Zichao Dong, Zijun Shen, and Ningyuan Yang.

2024 **Empty Red-Red-Blue Triangles**, *arXiv*, Ting-Wei Chao, Zichao Dong, and Zhuo Wu.

2024 **A Purely Entropic Approach to the Rainbow Triangle Problem**, *arXiv*, Ting-Wei Chao and Hung-Hsun Hans Yu.

Talks

Conferences/Workshops

- New-sprout Symposium for Young Combinatorists, Soochow University (2026)

- G2T2: Graphs and Groups, Tessellations and Transformations (2026)
- SIAM Conference on Discrete Mathematics (2026)
- Random Structure & Algorithm Conference (2023, 2025)
- AMS Western Sectional Meeting (2024)
- Cross-strait Conference on Graph Theory and Combinatorics (2023)
- One-day Combinatorics Workshop, NCTS, Taiwan (2023)
- Workshop on Dispersion and Fixed Volume Discrepancy, Moscow State University (2021)

Seminar talks

- Yonsei University (2026)
- Undergraduate Math Association Seminar, MIT (2026)
- Northwestern Polytechnical University (2026)
- Shandong University (2025)
- Atlanta Discrete Analysis Seminar, Emory University (2024)
- Taiyuan University of Technology (2024)
- National Yang Ming Chiao Tung University (2024)
- Discrete Math Seminar, Institute for Basic Science (2023, 2026)
- Richard P. Stanley Seminar in Combinatorics, MIT (2023)
- Discrete Math Seminar, Rutgers University (2023)
- Graduate Students and Postdocs Seminar, Carnegie Mellon University (2023)
- ACO seminar, Carnegie Mellon University (2020, 2022)
- National Taiwan University (2021, 2022)
- ISU Discrete Math Seminar, Iowa State University (2021)

Teaching

Summer Schools

2026 Summer **Entropy Method in Combinatorics**, *Institute for Basic Science*.

2024 Summer **Summer Schools on Combinatorics**, *NCTS*, Taiwan.

Courses

2026 Spring **18.01 Calculus**, *MIT*.

Recitations

2025 Fall **18.01 Calculus**, *MIT*, Head TA.

2025 Spring **18.03 Differential Equation**, *MIT*.

2024 Fall **18.02 Calculus**, *MIT*.

2023 Fall **21-228 Discrete Math**, *Carnegie Mellon University*.

2023 Spring **21-228 Discrete Math**, *Carnegie Mellon University*.

Math Competition Related

2023 **Instructor**, *Mathematical Olympiad Program*, United States.

2015 - 2023 **Instructor**, *International Mathematical Olympiad Team Selection Camp*, Taiwan.

2017, 2019 **Observer A**, *International Mathematical Olympiad Taiwan Team*.

2018, 2019 **Problem Proposer**, *Asian Pacific Mathematics Olympiad*.
2018 problem 5 and 2019 problem 4

2016, 2018 **Honorable Mention**, *S.-T. Yau College Student Mathematics Contest*, China.
Honorable mention in probability and applied math.

2016 **Bronze Medalist**, *S.-T. Yau College Student Mathematics Contest*, China.
Bronze medalist in algebra.

2015 - 2018 **Instructor**, *Math Talent High School Student Development Program*, Taiwan.

2015, 2017 **Instructor**, *Taipei First Girls High School Math Camp*, Taiwan.

2014 **Gold Medalist**, *International Mathematical Olympiad*, South Africa.

2013 **Silver Medalist**, *Asian Pacific Mathematics Olympiad*, Kazakhstan.