

Matthew Kwan | CV

Citizenship Australian
Date of Birth 8 January 1992
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Office 382-J, 450 Jane Stanford Way, Building 380, Stanford CA 94305

Employment & Education

Assistant Professor

IST Austria
starting 2021

Szegő Assistant Professor

Stanford University
2018 – 2021

Doctor of Science in Mathematics

With ETH medal
ETH Zürich
2014 – 2018.
Adviser: Benny Sudakov

Bachelor of Commerce and Bachelor of Science (Advanced Mathematics)

With first-class honours and the university medal in pure mathematics
University of New South Wales
2010 – 2014.
Honours adviser: Catherine Greenhill

Awards & Scholarships

Recent prizes

- SIAM Dénes Kónig Prize, 2020
- ETH Medal, 2019
- NWMA (New World Mathematics Awards) Silver Medal, 2019

Major grants and scholarships

- USA National Science Foundation standard grant, 2020–2023
(award number 1953990; US \$179 217)
- Swiss National Science Foundation Early Postdoc.Mobility Fellowship, 2018–2020
(project number 178493; US \$75 150)

Teaching

Introduction to Combinatorics and its Applications (Stanford University)

Spring 2021: instructor

Discrete Probabilistic Methods (Stanford University)

Spring 2019, 2020, 2021: instructor

Graph Theory (Stanford University)

Autumn 2019: instructor

Introduction To Probability (Stanford University)

Winter 2019, 2021: instructor

Graph Theory (ETH Zürich)

Spring 2018: organiser and exercise class teacher

Spring 2016, 2017: exercise class teacher

Spring 2015: creation of course materials

Algebraic methods in combinatorics (ETH Zürich)

Autumn 2017: creation of course materials

Mathematics (for masters students in architecture; ETH Zürich)

Autumn 2015: organiser and exercise class teacher

Academic Service

Student project/thesis supervision

- Mihir Singhal (MIT) did a research project with me in Summer 2019. He wrote a paper “Erdős–Littlewood–Offord problem with arbitrary probabilities”, submitted for publication.
- Zachary Chroman and Mihir Singhal (MIT) did a research project with me in Winter 2020. We wrote a paper “Lower bounds for superpatterns and universal sequences”, submitted for publication.
- Parth Sarin (Stanford) did a small project with me in Spring 2020 to satisfy his “writing in the major” requirements. As a result he wrote an expository paper “The Rödl Nibble”.
- Philippe Pongestu (Stanford) will write his honours thesis under my supervision (expected to finish in Spring 2021).

Conference/workshop organisation

- Minisymposium on Randomness and Pseudorandomness in Combinatorics, SIAM Conference on Discrete Mathematics (postponed due to COVID-19).

Referee for the following journals/conferences: Advances in Combinatorics; Annals of Combinatorics; Combinatorica ($\times 3$); Combinatorics, Probability and Computing ($\times 2$); Discrete Mathematics; Electronic Journal of Combinatorics ($\times 3$); European Journal of Combinatorics; Israel Journal of Mathematics; Journal of Combinatorial Theory, Series A; Journal of Combinatorial Theory, Series B ($\times 2$); Journal of Graph Theory; Journal of the London Mathematical Society; Random Structures and Algorithms ($\times 3$); SIAM Journal on Discrete Mathematics; ACM-SIAM Symposium on Discrete Algorithms.

Personal Skills

Languages

English (native)

German (B1 level, certified in 2016 by the Zürich Graduate School in Mathematics)

Digital Competences

competent programmer

competent with a range of mathematical and statistical software

Talks

Postponed due to COVID-19

- Workshop on Combinatorics, Tsinghua Sanya International Mathematics Forum (TSIMF), Sanya.
- Workshop on Combinatorics, Congressi Stefano Franscini, Ascona.
- Dénes König Prize Lecture, SIAM Conference on Discrete Mathematics.

Invited conferences/workshops

- Special Session on Structural and Extremal Graph Theory, AMS Fall Southeastern Sectional Meeting (online). October 2020.
- Plenary talk, Probabilistic Combinatorics Online 2020. September 2020.
- Workshop on Combinatorics, Mathematisches Forschungsinstitut Oberwolfach. January 2020.
- Workshop on Probabilistic and Extremal Combinatorics, Banff International Research Station for Mathematical Innovation and Discovery (BIRS). September 2019.
- BennyFest (one-day meeting celebrating Benny Sudakov's 50th birthday), ETH Zürich. July 2019.
- Workshop on Combinatorics, Probability and Computing, Mathematisches Forschungsinstitut Oberwolfach. April 2019.
- Minisymposium on Analytic and Probabilistic Techniques in Combinatorics, SIAM Conference on Discrete Mathematics (DM18), University of Colorado, Denver. June 2018.

Departmental seminars/colloquia

- Combinatorics and probability seminar, Ohio State University (online). March 2021.
- Combinatorics reading seminar (hosted online by MIT and Stanford). March 2021.
- Mathematics Department Colloquium, University of California, Berkeley (online). February 2021.
- Webinar on applied analysis, Max Planck institute for Mathematics in the Sciences (online). November 2020.
- Graph theory seminar, Georgia Institute of Technology (online). October 2020.
- Graph theory and combinatorics seminar, University of Illinois (online). September 2020.
- Combinatorics reading seminar (hosted online by MIT and Stanford). July 2020.
- Extremal and probabilistic combinatorics webinar (online). July 2020.
- Matroid Seminar (hosted online by the University of Waterloo). June 2020.

- Probability seminar, Stanford University. November 2019.
- Combinatorics Seminar, Massachusetts Institute of Technology. February 2019.
- Combinatorics Seminar, Emory University. November 2018.
- Mathematics Department Colloquium, Stanford University. November 2018.
- Combinatorics Reading Seminar, Stanford University. October 2018.
- Combinatorics Seminar, Stanford University. October 2018.
- Mittagssseminar (Theory of Combinatorial Algorithms), ETH Zürich. March 2018.
- Horowitz Seminar on Probability, Ergodic Theory and Dynamical Systems, Tel Aviv University. June 2017.
- Graduate Seminar in Probability, ETH Zürich. May 2017.
- Mittagssseminar (Theory of Combinatorial Algorithms), ETH Zürich. November 2016.
- Mittagssseminar (Theory of Combinatorial Algorithms), ETH Zürich. April 2016.
- Pure mathematics seminar, University of New South Wales. August 2015.
- Discrete mathematics seminar, Monash University. August 2015.
- Algebra and Topology seminar, Australian National University. August 2015.
- Mittagssseminar (Theory of Combinatorial Algorithms), ETH Zürich. March 2015.

Contributed conference talks

- 19th International Conference on Random structures and Algorithms, ETH Zürich. July 2019.
- European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB 2017), TU Wien. August 2017.
- 18th International Conference on Random structures and Algorithms, Gniezno. August 2017.
- SIAM Conference on Discrete Mathematics (DM16), Georgia State University. June 2016.
- European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB 2015), Bergen. August 2015.
- 17th International Conference on Random structures and Algorithms, Carnegie Mellon University. July 2015.
- 37th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing. December 2013.

Publications

29. A Ferber, M Kwan and L Saueremann. List-decodability with large radius for Reed–Solomon codes. Submitted.
28. M Kwan and L Saueremann. On the permanent of a random symmetric matrix. Submitted.
27. M Kwan, L Saueremann and Y Zhao. Extension complexity of low-dimensional polytopes. Submitted.
26. A Ferber and M Kwan. Dirac-type theorems in random hypergraphs. Submitted.
25. A Ferber, M Kwan and L Saueremann. Singularity of sparse random matrices: simple proofs. *Combinatorics, Probability and Computing*, to appear.
24. Z Chroman, M Kwan and M Singhal. Lower bounds for superpatterns and universal sequences. *Journal of Combinatorial Theory, Series A*, to appear.

23. J Fox, M Kwan and L Saueremann. Combinatorial anti-concentration inequalities, with applications. *Mathematical Proceedings of the Cambridge Philosophical Society*, to appear.
22. J Fox, M Kwan and L Saueremann. Anticoncentration for subgraph counts in random graphs. *Annals of Probability* 49.3 (2021), 1515–1553.
21. J Fox, M Kwan and B Sudakov. Acyclic subgraphs of tournaments with high chromatic number. *Bulletin of the London Mathematical Society* 53.2 (2021), 619–630.
20. A Ferber and M Kwan. Almost all Steiner triple systems are almost resolvable. *Forum of Mathematics, Sigma* 8:E39 (2020).
19. M Bucic, M Kwan, A Pokrovskiy and B Sudakov. Halfway to Rota’s basis conjecture. *International Mathematics Research Notices* 2020.21 (2020), 8007–8026.
18. X He and M Kwan. Universality of random permutations. *Bulletin of the London Mathematical Society* 52.3 (2020), 515–529.
17. M Bucic, M Kwan, A Pokrovskiy, B Sudakov, T Tran and A Z Wagner. Nearly-linear monotone paths in edge-ordered graphs. *Israel Journal of Mathematics* 238 (2020), 663–685.
16. M Kwan and L Saueremann. An algebraic inverse theorem for the quadratic Littlewood–Offord problem, and an application to Ramsey graphs. *Discrete Analysis* 2020:12 (2020).
15. M Kwan. Almost all Steiner triple systems have perfect matchings. *Proceedings of the London Mathematical Society* 121.6 (2020), 1468–1495.
14. M Kwan, S Letzter, B Sudakov and T Tran. Dense induced bipartite subgraphs in triangle-free graphs. *Combinatorica* 40 (2020), 283–305.
13. M Kwan and B Sudakov. Ramsey graphs induce subgraphs of quadratically many sizes. *International Mathematics Research Notices* 2020.6 (2020), 1621–1638.
12. D Conlon, J Fox, M Kwan and B Sudakov. Hypergraph cuts above the average. *Israel Journal of Mathematics* 233.1 (2019), 67–111.
11. M Kwan and B Sudakov. Proof of a conjecture on induced subgraphs of Ramsey graphs. *Transactions of the American Mathematical Society* 372 (2019), 5571–5594.
10. M Kwan, B Sudakov and T Tran. Anticoncentration for subgraph statistics. *Journal of the London Mathematical Society* 99.3 (2019), 757–777.
9. M Krivelevich, M Kwan, P-S Loh and B Sudakov. The random k -matching-free process. *Random Structures and Algorithms* 53.4 (2018), 692–716.
8. A Ferber, M Kwan and B Sudakov. Counting Hamilton cycles in sparse random directed graphs. *Random Structures and Algorithms* 53.4 (2018), 592–603.
7. M Kwan, B Sudakov and P Vieira. Non-trivially intersecting multi-part families. *Journal of Combinatorial Theory, Series A* 156 (2018), 44–60.
6. M Kwan and B Sudakov. Intercalates and discrepancy in random Latin squares. *Random Structures and Algorithms* 52.2 (2018), 181–196.
5. A S Bandeira, A Ferber and M Kwan. Resilience for the Littlewood–Offord Problem. *Advances in Mathematics* 319 (2017), 292–312.
4. C Greenhill, M Isaev, M Kwan and B McKay. The average number of spanning trees in sparse graphs with given degrees. *European Journal of Combinatorics* 63 (2017), 6–25.
3. M Krivelevich, M Kwan and B Sudakov. Bounded-degree spanning trees in randomly perturbed graphs. *SIAM Journal on Discrete Mathematics* 31.1 (2017), 155–171.
2. M Krivelevich, M Kwan and B Sudakov. Cycles and matchings in randomly perturbed digraphs and hypergraphs. *Combinatorics, Probability and Computing* 25.6 (2016), 909–927.
1. C Greenhill, M Kwan and D Wind. On the number of spanning trees in random regular graphs. *Electronic Journal of Combinatorics* 21(1):P1.45 (2014).