

Matija Bucic | Curriculum Vitae

Department of Mathematics - ETH Zurich, Rämistrasse 101, 8092 Zürich, Switzerland

☎ +41 44 632 8509 • ✉ matija.bucic@math.ethz.ch
🌐 <https://people.math.ethz.ch/~mbucic/>

Education

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| ○ ETH Zurich | Zurich |
| ○ <i>Ph.D. in Mathematics, Advisor: Prof. Benny Sudakov</i> | <i>Sep. 2016– Aug. 2021</i> |
| ○ University of Cambridge, Trinity College | Cambridge |
| ○ <i>Master of Mathematics, with distinction</i> | <i>Oct. 2015–Jun. 2016</i> |
| ○ University of Cambridge, Trinity College | Cambridge |
| ○ <i>Bachelor of Arts in Mathematics, awarded first class in each year</i> | <i>Oct. 2012–Jun. 2015</i> |

Research interests

My research is primarily based in the field of Discrete Mathematics. However, I have a broad range of research interests. These include, but are not limited to: Ramsey Theory, Directed Graph Theory, Algebraic and Probabilistic Methods in Combinatorics, Extremal Set Theory, Theoretical Computer Science and Random Structures.

Awards and scholarships

Prizes and competitions.....

- I have received a Woods Prize 2014 for my mathematical essay on “Random Evolution of Graphs”.
- 2 silver and 1 bronze medal at International Mathematical Olympiads (2010-2012).

Scholarships.....

- Senior Scholarship from Trinity College (2013-2016)
- Cambridge Summer Research Scholarship (2015)
- Trinity Overseas Bursary and Cambridge Overseas Trust (2012-2016) – full scholarship (26254£ p.a.)

Travel awards.....

- I was awarded a SIAM Student Travel Award 2020, Oberwolfach Leibniz Graduate Students Grant 2020 and a BCC 2019 travel award from Clay Mathematics Institute.

Research Talks

Invited talks.....

- Joint Berlin-Tel Aviv workshop on Ramsey theory, *Tel-Aviv University*, Israel, 2020.
- Combinatorics Workshop in Oberwolfach Institute, *Oberwolfach Institute*, Germany, 2020.
- Workshop on Probabilistic and Extremal Combinatorics, *Banff Research Station*, Canada, 2019.
- British Combinatorial Conference, *University of Birmingham*, UK, 2019.
- SIAM Conference on Discrete Mathematics, *University of Colorado Denver*, USA, 2018.

Contributed talks.....

- Random Structures and Algorithms, *ETH Zürich*, Switzerland (July 2019).
- European Conference on Combinatorics, *TU Wien*, Austria (August 2017).
- Random Structures and Algorithms, *Adam Mickiewicz University in Poznań*, Poland (August 2017).

Seminar talks.....

- Tel Aviv Combinatorics Seminar, (November 2020).
- Stanford Online Combinatorics Seminar, (May 2020).
- Extremal and Probabilistic Combinatorics Webinar, (May 2020).
- Combinatorics seminar, *University of Warwick* (November 2019).
- Mittagsseminar, *ETH Zürich* (November 2019).
- Mittagsseminar, *ETH Zürich* (May 2019).
- Mittagsseminar, *ETH Zürich* (October 2018).
- Combinatorics Seminar, *University of Cambridge* (May 2018).
- Graduate Seminar in Probability, *ETH Zürich* (April 2018).
- Mittagsseminar, *ETH Zürich* (February 2018).
- Mittagsseminar, *ETH Zürich* (March 2017).
- Part III Seminar, *University of Cambridge* (March 2016).

Teaching experience

- Course organiser and teaching assistant for Graph Theory at ETH (2018/2019, 2019/2020)
- Course organiser and teaching assistant for Algebraic Methods in Combinatorics at ETH (2019/2020)
- Teaching assistant for Graph Theory course at ETH (2017/2018)
- Supervising a masters thesis of Sven Heberle, resulting in the following publication: “Monochromatic trees in random tournaments”, **published in CPC**.
- Supervising a Bachelor Thesis of Erik Jahn, resulting in the following publication: “2-factors with k cycles in Hamiltonian graphs”, **accepted in JCTB**.
- Supervised a Master Thesis by Michelle Sweering titled “Covering Problems in Hypergraphs”.
- Supervised a semester project by Michelle Sweering titled “Combinatorial Perspective on the Log-rank Conjecture”.
- Supervised a Master Thesis of Vedran Mihal titled “Generalised Ramsey Theories”.
- Leader of the Croatian International Mathematics Olympiad team at the IMO 2018
- Member of the Croatian International Competitions Team Selection Committee (2016-2020)

Organisational skills and service to the community

- Organising a full Minisymposium titled “Extremal Problems Involving Colouring”, accepted at SIAM DM 2020 (postponed due to Corona).
- I participated in the organisation of Random Structures and Algorithms conference in Zurich 2019 and Bennyfest, a one day conference celebrating Benny Sudakov’s 50th birthday.
- I have co-founded The European Mathematical Cup, and was a member of its Central Jury for five years. During this time the competition grew to over 200 high school students, from 14 countries.
- I have refereed papers for many major combinatorial journals: *Combinatorica*, *JCTB*, *JCTA*, *Journal of Graph Theory*, *European Journal of Combinatorics*, *Electronic Journal of Combinatorics*, *Discrete Mathematics*, *Utilitas Mathematica*.

Languages

- Croatian (native speaker)
- English (full professional proficiency)
- German (limited working proficiency)
- Italian (elementary proficiency)

Publications list

23. M. Bucic, N. Draganic, B. Sudakov, T. Tran; *Unavoidable hypergraphs*. Submitted.
22. M. Bucic, S. Glock, B. Sudakov; *The intersection spectrum of 3-chromatic intersecting hypergraphs*. Submitted.
21. M. Bucic, B. Sudakov; *Large independent sets from local considerations*. Submitted.
20. M. Bucic, J. Fox, B. Sudakov; *Clique minors in graphs with forbidden subgraphs and other restrictions*. Submitted.
19. M. Bucic, B. Sudakov, T. Tran; *Erdős-Szekeres theorem for multidimensional arrays*. Submitted.
18. N. Alon, M. Bucic, B. Sudakov; *Large cliques and independent sets all over the place*. **Proceedings of AMS**, accepted.
17. M. Bucic, D. Korándi, B. Sudakov, *Covering random graphs by monochromatic trees and Helly-type results for hypergraphs*. **Combinatorica**, accepted.
16. M. Bucic, N. Draganic, B. Sudakov; *Universal and unavoidable graphs*. **Combinatorics, Probability and Computing**, accepted.
15. M. Bucic, E. Long, A. Shapira, B. Sudakov; *Tournament quasirandomness from local counting*. **Combinatorica**, accepted.
14. M. Bucic, P. Devlin, M. Hendon, D. Horne, B. Lund; *Perfect matchings and derangements on graphs*. **Journal of Graph Theory**, accepted.
13. N. Alon, M. Bucic, T. Kalvari, E. Kuperwasser, T. Szabó; *List Ramsey numbers*. **Journal of Graph Theory**, 96.1 (2021), 109–128.
12. M. Bucic, M. Kwan, A. Pokrovskiy, B. Sudakov, *Halfway to Rota's basis conjecture*, **IMRN (International Mathematics Research Notices)**, 21 (2020), 8007–8026.
11. M. Bucic, M. Kwan, A. Pokrovskiy, B. Sudakov, T. Tran, A. Z. Wagner, *Nearly-linear monotone paths in edge-ordered graphs*. **Israel Journal of Mathematics** 238 (2020), 663–685.
10. M. Bucic, E. Jahn, A. Pokrovskiy, B. Sudakov; *2-factors with k cycles in Hamiltonian graphs*, **Journal of Combinatorial Theory Series B**. 144 (2020) 150–166
9. M. Bucic, S. Heberle, S. Letzter, B. Sudakov, *Monochromatic trees in random tournaments*. **Combinatorics, Probability and Computing** 29.3 (2020), 318–345.
8. M. Bucic, S. Letzter, B. Sudakov, *Multicolour bipartite Ramsey number of paths*. **The Electronic Journal of Combinatorics** 26 (2019), P3.60.
7. M. Bucic, M. Ornik, U. Topcu, *Graph-Based Controller Synthesis for Safety-Constrained, Resilient Systems*, **56th Annual Allerton Conference on Communication, Control, and Computing** (2019).
6. M. Bucic, B. Lidicky, J. Long, A. Z. Wagner, *Partition problems in high dimensional boxes*, **Journal of Combinatorial Theory, Series A** 166 (2019), 315–336.
5. M. Bucic, S. Letzter, B. Sudakov, *Three colour bipartite Ramsey number of cycles*, **Journal of Graph Theory** 92.4 (2019), 445–459.

4. M. Bucic, S. Letzter, B. Sudakov, *Directed Ramsey number for trees*.
Journal of Combinatorial Theory, Series B 137 (2019), 145–177.
3. M. Bucic, S. Letzter, B. Sudakov, *Monochromatic paths in random tournaments*.
Random Structures and Algorithms 54.1 (2019), 69–81.
2. M. Bucic, S. Letzter, B. Sudakov, T. Tran, *Minimum saturated families of sets*,
Bulletin of the London Mathematical Society 50.4 (2018), 725–732.
1. M. Bucic, *An Improved Bound for Disjoint Directed Cycles*.
Discrete Mathematics 341.8 (2018), 2231–2236.