

Matija Bucic | Curriculum Vitae

Department of Mathematics – Princeton University
School of Mathematics – Institute for Advanced Study

✉ matija.bucic@ias.edu • 🌐 www.math.ias.edu/~matija.bucic/

Employment

- **Princeton University and Institute for Advanced Study** **Princeton**
Veblen Research Instructor *Sep. 2021 – Jun. 2024*
- **ETH Zürich** **Zürich**
Research and Teaching Assistant *Sep. 2016 – Aug. 2021*

Education

- **ETH Zurich** **Zurich**
Ph.D. in Mathematics, Advisor: Prof. Benny Sudakov *Sep. 2016 – May. 2021*
- **University of Cambridge, Trinity College** **Cambridge**
Master of Mathematics, with distinction *Oct. 2015 – Jun. 2016*
- **University of Cambridge, Trinity College** **Cambridge**
Bachelor of Arts in Mathematics, awarded first class in each year *Oct. 2012 – Jun. 2015*

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

Grants

- I was awarded an SNSF Grant (84000\$) for a project titled “Local to Global Problems in Extremal and Probabilistic Combinatorics”, which unfortunately I had to reject.

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

- Eurocomb, *online*, 2021

- SIAM Conference on Discrete Mathematics, *online*, 2021.
- Random Structures and Algorithms, *ETH Zürich*, Switzerland, 2019.
- European Conference on Combinatorics, *TU Wien*, Austria, 2017.
- Random Structures and Algorithms, *Adam Mickiewicz University in Poznań*, Poland, 2017.

Seminar talks.....

- Mittagsseminar, *ETH Zürich*, March 2021.
- 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*, 2018.
- Mittagsseminar, *ETH Zürich*, 2018.
- Mittagsseminar, *ETH Zürich*, 2017.
- Part III Seminar, *University of Cambridge*, 2016.

Teaching and supervising experience

Teaching:.....

- Lecturer for Combinatorial Mathematics course at Princeton (2021-2022)
- Course organiser for Graph Theory course at ETH (2018/2019, 2019/2020, 2020-2021)
- Course organiser for Probabilistic Method in Combinatorics at ETH (2020-2021)
- Course organiser and teaching assistant for Algebraic Methods in Combinatorics at ETH (2019/2020).
- Teaching assistant for Graph Theory course at ETH (2017/2018,2018/2019,2019/2020)

Supervising:.....

- Supervising a masters thesis of Domgoj Bradač resulting in a paper: "Covering Random Graphs with Monochromatic Trees" submitted for publication.
- 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", **published in JCTB**.
- Supervised a Master Thesis of Michelle Sweering: "Covering Problems in Hypergraphs".
- Supervised a semester project of Michelle Sweering: "Combinatorial Perspective on the Log-rank Conjecture".
- Supervised a Master Thesis of Vedran Mihal titled "Generalised Ramsey Theories".

Organisational skills and service to the community

- Organising Minisymposiums titled "Extremal Problems Involving Colouring", at SIAM DM 2020, 2021.
- 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: *Annals of Mathematics*, *Proceedings of LMS*, *Proceedings of AMS*, *Combinatorica*, *RS&A*, *JCTB*, *JCTA*, *SIAM Journal on Discrete Mathematics*, *Journal of Graph Theory*, *European Journal of Combinatorics*, *Electronic Journal of Combinatorics*, *Discrete Mathematics*, *Utilitas Mathematica*.
- Leader of the Croatian International Mathematics Olympiad team at the IMO 2018
- Member of the Croatian International Competitions Team Selection Committee (2016-2021)

Languages

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

Publications list

Submitted.....

28. D. Bradač, M. Bucic
Covering random graphs with monochromatic trees.
27. M. Bucic, B. Sudakov
Tight Ramsey bounds for multiple copies of a graph.
26. M. Bucic, O. Janzer, B. Sudakov
Counting H -free orientations of graphs.
25. M. Bucic, L. Gishboliner, B. Sudakov
Cycles of many lengths in Hamiltonian graphs.
24. M. Bucic, S. Glock, B. Sudakov
The intersection spectrum of 3-chromatic intersecting hypergraphs.
23. M. Bucic, A. Khamseh
The $(t - 1)$ -chromatic Ramsey number for paths.
22. M. Bucic, B. Sudakov
Large independent sets from local considerations.
21. M. Bucic, B. Sudakov, T. Tran
Erdős-Szekeres theorem for multidimensional arrays.

Accepted for publication:.....

20. M. Bucic, J. Fox, B. Sudakov
Clique minors in graphs with forbidden subgraphs and other restrictions.
Random Structures and Algorithms, accepted.
19. M. Bucic, N. Draganic, B. Sudakov
Universal and unavoidable graphs.
Combinatorics, Probability and Computing, accepted.

Published:.....

18. M. Bucic, N. Draganic, B. Sudakov, T. Tran
Unavoidable hypergraphs.
Journal of Combinatorial Theory Series B, 151 (2021), 307–338.
17. N. Alon, M. Bucic, B. Sudakov
Large cliques and independent sets all over the place.
Proceedings of AMS, 149 (2021), 3145–3157.
16. M. Bucic, D. Korándi, B. Sudakov
Covering random graphs by monochromatic trees and Helly-type results for hypergraphs.
Combinatorica, 41 (2021), 319–352.
15. M. Bucic, P. Devlin, M. Hendon, D. Horne, B. Lund
Perfect matchings and derangements on graphs.
Journal of Graph Theory, 97.2 (2021), 340–354.
14. M. Bucic, E. Long, A. Shapira, B. Sudakov
Tournament quasirandomness from local counting.
Combinatorica, 41 (2021), 175–208.
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.