Samuel Mohr

curriculum vitæ

currently out of research
no university affiliation
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🌐 *samuel-mohr.de/*

Research Interests

Extremal and Algorithmic Combinatorics (Fixed-Parameter Tractability, Limits, Quasirandomness), Structural Graph Theory (Hadwiger's Conjecture, Rooted Minors, Colorings), and Computer Assisted Mathematical Proofs (Fixed Integer Optimization, Flag Algebras and Semidefinite Programming)

Academic Qualifications

2020–2022   **Postdoc in Informatics**, *Masaryk University Brno, Faculty of Informatics*
supervised by prof. Daniel Kráľ.

2017–2020   **Doctor rerum naturalium in Mathematics**, *Ilmenau University of Technology*
PhD-Thesis: "Rooted Structures in Graphs : A Project on Hadwiger's Conjecture, Rooted Minors, and Tutte Cycles",
project funded by the German Research Foundation (DFG),
supervised by Univ.-Prof. Dr. rer. nat. habil. Matthias Kriesell,
GPA: magna cum laude

2014–2016   **Master of Science in Mathematics**, *Ilmenau University of Technology*
Thesis: "On Lower Bounds on the Independence Number of Graphs",
supervised by Univ.-Prof. Dr. rer. nat. habil. Dr. h. c. Jochen Harant,
GPA: $1{,}0$[1].

2011–2014   **Bachelor of Science in Mathematics**, *Ilmenau University of Technology*
Thesis: "Quadratic Forms on Graphs and Maximum Weighted Induced Subgraphs",
supervised by Univ.-Prof. Dr. rer. nat. habil. Dr. h. c. Jochen Harant,
GPA: $1{,}0$[1].

2003–2011   **High School Diploma (Abitur)**, *Erasmus-Grasser-Gymnasium*, Munich, Germany
GPA: $1{,}2$[1]

Awards and Grants

2022   **MU Global Staff Mobility**
Grant for a two week stay at the University of Montréal, Canada, funded by the Masaryk University in Brno, Czech Republic,
collaborating with Prof. Ben Seamone.
Research: Hamiltonicity of 1-planar Graphs and Planar 3-Connected Graphs.

2021   **Research scholarship for graduated young scientists from the German Academic Exchange Service (DAAD)**
Grant for a three months research stay at the University of Colorado Denver, USA,
collaborating with Prof. Florian Pfender.
Research: Flag Algebra Methods, Inducibility of Cycle Graphs.

2021   **European Research Council**, (Project Number 648509)
Partial financing of research through ERC-grant of prof. Daniel Kráľ.
Research: Combinatorial limits, quasirandomness, fixed parameter tractability.

2017–2020   **German Research Foundation Project**, (Project Number 327533333)
Grant for Ph.D. studies from April 2017 until May 2020,
supervised by Prof. Matthias Kriesell.
Research: Hadwiger's Conjecture, rooted minors, proper colorings, uniquely colorable graphs.

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[1] *Grades in Germany: $1 = A$, $2 = B$, ..., $6 = F$.*

2017–2020	**Two Programs for Project Related Personal Exchange from the German Academic Exchange Service (DAAD)**
	Exchange with Pavol Jozef Šafárik University in Košice, Slovakia,
	workshops in Heyda and Dörnfeld, Germany; and Košice, Slovakia.
	Research: Long cycles, Hamiltonicity, 1-planar graphs, essentially 4-connected planar graphs.
2019	**Travel Scholarship from the German Academic Exchange Service (DAAD)**
	Funding for conference attendance in Vancouver, Canada.
2015–2016	**Erasmus Exchange**, *Research Project*, invited by Prof. Harald Woracek
	Research: operator theory, indefinite inner product, Krein spaces, symmetric operators, selfadjoint extension.
2015	**Honoring of the Bachelor's Degree**
	Conferred by "Society of Friends and Supporters of Mathematics at the Ilmenau University of Technology".
2013, 2015	**"Deutschlandstipendium" supported by Deutsche Kreditbank AG**
	Student fellowship program from Oct 2013 until Sep 2014 and from Oct 2015 until Sep 2016.
2008	**Invitation to Pupils Mathematics Camp**, *Mathematical Kangaroo*, Zakopane, Poland
	First place achieved at the competition; invitation to a math camp.

Stays abroad and Invitations

2022	**Lyon**, *France*, (two weeks)
	Research visit at the Computing Laboratory in Image and Information Systems (LIRIS),
	invited by Prof. Théo Pierron, University Claude Bernard Lyon 1.
2021	**Princeton**, *NJ, United States of America*, (two week)
	Talk: "Uniform Turán density",
	invited by dr. Matija Bucić, Princeton University.
2021	**Ames**, *IA, United States of America*, (one week)
	Talk: "Uniform Turán density",
	invited by Prof. Bernard Lidický, Iowa State University.
2021	**Koper**, *Slovenia*, (three weeks)
	Research visit at the University of Primorska,
	invited by Prof. Matjaž Krnc, University of Primorska.
2021	**Kraków**, *Poland*, (three weeks)
	Research visit at the Theoretical Computer Science Department of Jagiellonian University,
	invited by dr. Andrzej Grzesik, Jagiellonian University.
2021	**Zürich**, *Switzerland*, (five weeks)
	Research visit at the ETH Zürich,
	invited by dr. Matija Bucić, ETH Zürich.
2021	**London**, *United Kingdom*, (replaced by an online event)
	Talk: "Quasirandom Latin squares",
	invited by Amedeo Sgueglia to the PhD Seminar on Combinatorics, Games and Optimisation, London School of Economics and Political Science.
2020	**Brno**, *Czech Republic*, (ten days)
	Courses within the Algorithms and Mathematics Network about extremal graph theory and regularity method,
	Masaryk University in Brno, lecturers: Andrzej Grzesik (JU Cracow), Dan Kráľ (MU Brno).
2018	**Košice**, *Slovakia*, (one week)
	Talk: "Longest Cycles In Essentially 4-Connected Planar Graphs",
	invited by Prof. RNDr. Tomáš Madaras, Pavol Jozef Šafárik University in Košice.
2017	**Košice**, *Slovakia*, (two weeks)
	Talk: "Bounds on the Independence Number of Graphs",
	invited by Prof. RNDr. Tomáš Madaras, Pavol Jozef Šafárik University in Košice.
2015–2016	**Vienna**, *Austria*, (six months)
	Project: "Operator theory in indefinite inner product spaces",
	supervised by ao. Univ.-Prof. Dr. Harald Woracek, Vienna University of Technology,
	http://www.asc.tuwien.ac.at/preprint/2016/asc24x2016.pdf

Organized Conferences and Seminars

06/2021 **Round the World Relay in Combinatorics**, *online*
Local organizer of the special seminar of Joint DIMEA and FORMELA seminar as part of the relay.

06/2021 **ILKE Online Workshop**, *online*
Co-organized with RNDr. Mária Maceková, PhD.

fall 2020 **ITI Online Seminar**, *online*, Czech Republic
Co-organized with prof. Tomáš Kaiser.

07/2020 **Workshop on Graph Theory & Combinatorics in Thuringia**, *Ilmenau (online)*, Germany
Local organizer for IT related issues.

Journal Publications

[16] Christoph Brause, Jochen Harant, Florian Hörsch, and Samuel Mohr: **Spanning trees of smallest maximum degree in subdivisions of graphs**
submitted. arXiv: 2210.04669.

[15] Andrzej Grzesik, Daniel Kráľ, and Samuel Mohr: **Strong modeling limits of graphs with bounded tree-width**
submitted. arXiv: 2103.10354.

[14] Thomas Böhme, Jochen Harant, Matthias Kriesell, Samuel Mohr, and Jens M Schmidt: **Rooted Minors and Locally Spanning Subgraphs**
submitted. arXiv: 2003.04011.

[13] Matthias Kriesell and Samuel Mohr: **Kempe chains and rooted minors**
submitted. arXiv: 1911.09998.

[12] Matija Bucić, Jacob W Cooper, Daniel Kráľ, Samuel Mohr, and David Correia Munhá: **Uniform Turán density of cycles**
Transactions of the American Mathematical Society (2023). to appear. DOI: 10.1090/tran/8873. arXiv: 2112.01385.

[11] Jochen Harant and Samuel Mohr: **New bounds on domination and independence in graphs**
Discussiones Mathematicae Graph Theory 43.3 (2023), pp. 809–824. DOI: 10.7151/dmgt.2406. arXiv: 2008.12601.

[10] Jacob W Cooper, Daniel Kráľ, Ander Lamaison, and Samuel Mohr: **Quasirandom Latin squares**
Random Structures and Algorithms 61.2 (2022), pp. 298–308. DOI: 10.1002/rsa.21060. arXiv: 2011.07572.

[9] Max Hahn-Klimroth, Giulia S. Maesaka, Yannick Mogge, Samuel Mohr, and Olaf Parczyk: **Random perturbation of sparse graphs**
Electronic Journal of Combinatorics 28.2 (2021), P2.26. DOI: 10.37236/9510. arXiv: 2004.04672.

[8] Igor Fabrici, Jochen Harant, Samuel Mohr, and Jens M Schmidt: **Circumference of essentially 4-connected planar triangulations**
Journal of Graph Algorithms and Applications 25.1 (2021), pp. 121–132. DOI: 10.7155/jgaa.00552. arXiv: 2101.03802.

[7] Samuel Mohr: **A construction of uniquely colourable graphs with equal colour class sizes**
Discrete Applied Mathematics 303 (2021), pp. 122–126. DOI: 10.1016/j.dam.2020.11.015. arXiv: 2001.08801.

[6] Igor Fabrici, Jochen Harant, Tomáš Madaras, Samuel Mohr, Roman Soták, and Carol T Zamfirescu: **Long cycles and spanning subgraphs of locally maximal 1-planar graphs**
Journal of Graph Theory 95.1 (2020), pp. 125–137. DOI: 10.1002/jgt.22542. arXiv: 1912.08028.

[5] Igor Fabrici, Jochen Harant, Samuel Mohr, and Jens M Schmidt: **On the circumference of essentially 4-connected planar graphs**
Journal of Graph Algorithms and Applications 24.1 (2020), pp. 21–46. DOI: 10.7155/jgaa.00516. arXiv: 1806.09413.

[4] Igor Fabrici, Jochen Harant, Samuel Mohr, and Jens M Schmidt: **Longer cycles in essentially 4-connected planar graphs**
Discussiones Mathematicae Graph Theory 40.1 (2020), pp. 269–277. DOI: 10.7151/dmgt.2133. arXiv: 1710.05619.

[3] Matthias Kriesell and Samuel Mohr: **Rooted complete minors in line graphs with a Kempe coloring**
Graphs and Combinatorics 35.2 (2019), pp. 551–557. DOI: 10.1007/s00373-019-02012-7. arXiv: 1804.06641.

[2] Jochen Harant and Samuel Mohr: **On Selkow's bound on the independence number of graphs**
Discussiones Mathematicae Graph Theory 39.3 (2019), pp. 655–657. DOI: 10.7151/dmgt.2100. arXiv: 1705.03779.

[1] Jochen Harant and Samuel Mohr: **Maximum weighted induced subgraphs**
Discrete Mathematics 339.7 (2016), pp. 1954–1959. DOI: 10.1016/j.disc.2015.07.013.

Refereed Conference Proceedings

[5] Samuel Mohr: **Rooted Structures in Graphs**
Proceedings of the 3rd BYMAT Conference Vol. 2 (2021), pp. 95–98. URL: https://temat.es/monograficos/issue/view/vol-2.

[4] Andrzej Grzesik, Daniel Král', and Samuel Mohr: **Strong modeling limits of graphs with bounded tree-width**
Extended Abstracts EuroComb 2021. Trends in Mathematics 14 (2021). Eurocomb 2021. DOI: 10.1007/978-3-030-83823-2_43.

[3] Samuel Mohr: **On the circumference of 3-connected maximal 1-planar graphs**
(2019). Bordeaux Graph Workshop 2019, pp. 222–223. URL: http://bgw.labri.fr/2019/booklet.pdf.

[2] Samuel Mohr: **Cycles through a set of specified vertices of a planar graph**
Acta Mathematica Universitatis Comenianae 88.3 (2019). Eurocomb 2019, pp. 963–966. URL: http://www.iam.fmph.uniba.sk/amuc/ojs/index.php/amuc/article/view/1286.

[1] Samuel Mohr: **On uniquely colourable graphs**
(2019). Cologne-Twente Workshop 2019, pp. 103–105. URL: http://wwwhome.math.utwente.nl/~ctw/CTW2019ProceedingsFinal.pdf.

Minor Research Contributions

[1] Henk de Snoo and Harald Woracek: **Compressed resolvents, Q-functions and h_0-resolvents in almost pontryagin spaces**
Indefinite Inner Product Spaces, Schur Analysis, and Differential Equations. Springer, 2018, pp. 425–484. DOI: 10.1007/978-3-319-68849-7_18.

Conferences

09/2021   **European conference on combinatorics, graph theory and applications**, *Barcelona*, resp. online
Extended abstract and talk: "Strong modeling limits of graphs with bounded tree-width"

06/2021   **ILKE online workshop**, *Košice & Ilmenau*, resp. online
Talk: "Uniform Turán density of cycles"

12/2020   **Bringing Young Mathematicians Together (BYMAT)**, *Valencia*, resp. online
Talk: "Rooted Structures in Graphs"

08/2020   **Czech-Slovak Conference Graphs**, *Brno*, Czech Republic
Talk: "Rooted Structures in Graphs"

12/2019   **Operator Theory and Krein Spaces**, *Vienna*, Austria
Talk: "Eigenvalues of Graphs"

11/2019   **Colloquium on Combinatorics**, *Paderborn*, Germany
Talk: "X-minors and X-spanning subgraphs"

10/2019   **Bordeaux Graph Workshop**, *Bordeaux*, France
Extended abstract and talk: "On the Circumference of 3-Connected Maximal 1-Planar Graphs"

09/2019   **Cycles & Colourings**, *Nový Smokovec, High Tatras*, Slovakia
Talk: "On Uniquely Colourable Graphs"

08/2019   **European conference on combinatorics, graph theory and applications**, *Bratislava*, Slovakia
Extended abstract and talk: "Cycles through a set of specified vertices of a planar graph"

08/2019   **Ghent Graph Theory Workshop on Structure and Algorithms**, *Ghent*, Belgium
Invited contributed talk: "X-minors and X-spanning subgraphs"

07/2019   **Cologne-Twente Workshop on Graphs & Combinatorial Optimization**, *Enschede*, Netherlands
Extended abstract and talk: "On Uniquely Colourable Graphs"

06/2019   **Czech-Slovak Conference Graphs**, *Čingov, Slovak Paradise*, Slovakia
Talk: "Hamiltonicity of 1-planar graphs"

05/2019   **Canadian Discrete and Algorithmic Mathematics Conference**, *Vancouver*, Canada
Talk: "Kempe Chains and Rooted Minors"

11/2018   **Colloquium on Combinatorics**, *Paderborn*, Germany
Talk: "Kempe Chains and Rooted Minors"

07/2018   **Building Bridges II**, *Budapest*, Hungary
Poster: "On Selkow's Bound on the Independence Number of Graphs"

07/2018   **International Colloquium on Graph Theory and Combinatorics**, *Lyon*, France

09/2018   **Cycles & Colourings**, *Nový Smokovec, High Tatras*, Slovakia
Talk: "Kempe Chains and Rooted Minors"

11/2017   **Colloquium on Combinatorics**, *Paderborn*, Germany
Talk: "On Selkow's Bound on the Independence Number of Graphs"

09/2017   **Cycles & Colourings**, *Nový Smokovec, High Tatras*, Slovakia
Talk: "Longer Cycles In Essentially 4-Connected Planar Graphs"

09/2014   **Cycles & Colourings**, *Nový Smokovec, High Tatras*, Slovakia
Talk: "Quadratic Forms on Graphs and Maximum Weighted Subgraphs"

Workshops

05/2022	**Courses within the Algorithms and Mathematics Network**, *Kraków*, Poland
05/2022	**C5 Graph Theory Workshop**, *Rathen*
	organised by Prof. Ingo Schiermeyer, TU Bergakademie Freiberg.
03/2022	**Interfaces of the Theory of Combinatorial Limits Workshop**, *Erdős Center – Alfréd Rényi Institute of Mathematics, Budapest*, Hungary
	invited by Prof. Peter Csikvari and Prof. Daniel Král'.
01/2022	**Structural Graph Theory**, *Oberwolfach*
	invited by Prof. Jim Geelen, Waterloo, Prof. Daniel Král', MU Brno, and Prof. Alex Scott, Oxford.
05/2021	**C5 Graph Theory Workshop**, *Rathen*, resp. online
	organised by Prof. Ingo Schiermeyer, TU Bergakademie Freiberg.
02/2020	**Baltic Sea Workshop**, *Lübeck*, Germany
	organised by Prof. Anusch Taraz, TU Hamburg-Harburg.
01/2020	**Courses within the Algorithms and Mathematics Network**, *Brno*, Czech Republic
07/2019	**Košice-Workshop**, *Košice*, Slovakia
03/2019	**Dörnfeld-Workshop**, *Dörnfeld*, Germany
03/2018	**Heyda-Workshop**, *Heyda*, Germany
07/2017	**Košice-Workshop**, *Košice*, Slovakia
03/2017	**Heyda-Workshop**, *Heyda*, Germany

Academic Positions

2018–2019	**Teaching assistant**, *for mathematics in the Department of Engineering*
2014–2015	**Teaching assistant**, *for mathematics in the Department of Information Technology*
2014–2015	**Student assistant in data analysis**, *Institute of Electrical Equipment and Facilities*, Ilmenau University of Technology
	Project: "Protection Concepts for Photovoltaic Systems", supervised by Dr. Felix Erhard.

Social Commitment

2020	**Supporting the "26th annual Days of Mathematics and Science Teaching"**, *March 2020*, Ilmenau
	Talk at the teacher training course about non-geometric applications of the analytic geometry.
2019	**Supporting the "Long Night of Technology"**, *May 2019*, Ilmenau
	Planning and implementation of an "Escape Room", design of physical experiments and mathematical puzzles.
2013–2018	**Supporting the Mathematical Olympiad in Thuringia**
	Several talks to pupils of grade 10 to 12 (age of 16 to 18) within the annual mathematical camp in Ilmenau,
	correction and assessment of the round "Landesrunde".
2014–2016	**Organization of the student representatives conference "Konferenz der deutschsprachigen Mathematikfachschaften"**, *Nov. 2016*, Ilmenau
	Catering, housing, program, sponsoring for 60 students.
2013–2019	**Organization of Ultimate Frisbee tournaments**, *twice a year*, Ilmenau
	About 120 players: catering, schedule, evening activities, hosting.

Hobbies

Sports	Ultimate Frisbee, cycling, marathon, mountain climbing.
IT	Software projects like a management system of customers for covid-19 antigen tests together with Apotheke Bozner Platz in Innsbruck, Austria.
Social activities	Travelling, cooking.