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## 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)

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## Academic Qualifications

- 2020–2022 **Postdoc in Informatics**, *Masaryk University Brno, Faculty of Informatics*  
supervised by prof. Daniel Král.
- 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<sup>1</sup>.
- 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<sup>1</sup>.
- 2003–2011 **High School Diploma (Abitur)**, *Erasmus-Grasser-Gymnasium*, Munich, Germany  
GPA: 1,2<sup>1</sup>

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## Journal Publications

- [14] Andrzej Grzesik, Daniel Král, and Samuel Mohr: **Strong modeling limits of graphs with bounded tree-width**  
submitted. arXiv: 2103.10354.
- [13] Thomas Böhme, Jochen Harant, Matthias Kriesell, Samuel Mohr, and Jens M Schmidt: **Rooted Minors and Locally Spanning Subgraphs**  
submitted. arXiv: 2003.04011.
- [12] Matthias Kriesell and Samuel Mohr: **Kempe chains and rooted minors**  
submitted. arXiv: 1911.09998.
- [11] Jacob W Cooper, Daniel Král, Ander Lamaison, and Samuel Mohr: **Quasirandom Latin squares**  
*Random Structures and Algorithms* (2021). to appear. DOI: 10.1002/rsa.21060. arXiv: 2011.07572.
- [10] Jochen Harant and Samuel Mohr: **New bounds on domination and independence in graphs**  
*Discussiones Mathematicae Graph Theory* (2021). to appear. arXiv: 2008.12601.
- [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.

<sup>1</sup> Grades in Germany: 1 = A, 2 = B, ..., 6 = F.

- [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.

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## 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”

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## 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 Král.  
 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.
- 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 Dörfeld, 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 Sguiglia 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 Král (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>

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## 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.

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## 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.

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## 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.

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## 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.