

# Curriculum Vitae

Markus Schmid

## Personal Data

Place of Birth: München, Germany  
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## Education

2004 High school diploma (“Abitur”, average mark: 1,0), Frankfurt, Germany  
2005 – 2008 Bachelor studies, Goethe University, Frankfurt, Germany  
(with distinction, average mark: 1,3)  
2008 – 2009 Master studies, Goethe University, Frankfurt, Germany  
2009 – 2012 PhD programme, Loughborough University, United Kingdom  
(2010 Master of Philosophy in Theoretical Computer Science)  
(2012 PhD in Theoretical Computer Science)

## Degrees

2008 Bachelor of Science, Computer Science,  
Goethe University, Frankfurt, Germany  
2010 Master of Philosophy, Theoretical Computer Science,  
Loughborough University, Loughborough, United Kingdom  
2012 PhD in Theoretical Computer Science,  
Loughborough University, Loughborough, United Kingdom

## Scholarships

Oct. 2008 – Sep. 2009 Scholarship from the German Academic Scholarship Foundation  
 (“Studienstiftung des deutschen Volkes”)  
Oct. 2009 – Oct. 2012 Scholarship PhD-Programme, Department of Computer Science,  
Loughborough University  
Nov. 2012 – Apr. 2013 Scholarship for returning scientists from the  
German Academic Exchange Service (DAAD)

## Awards

2008 Bachelor degree with distinction, Goethe University Frankfurt  
2010 Ondrej Sykora Prize 2010, Department of Computer Science, Loughborough University  
2011 Graduate School Research Student Prize, Loughborough University

## Research Funding and Scientifically Led Research Projects

1. **Project name:** EFFICIENT ENUMERATION OF PATH QUERY RESULTS FOR GRAPH DATABASES (German title: “Effizientes Aufzählen der Ergebnisse von Pfadanfragen bei Graphdatenbanken”, project number: 416776735).  
**Funding authority:** German Research Foundation (DFG, “Deutsche Forschungsgemeinschaft”).  
**Amount:** ca. 315 000 Euro ( $\approx$  270,000 GBP).  
**Duration:** 3 years (carried out between 2019 and 2023).
2. **Project name:** QUERY EVALUATION OVER SLP-COMPRESSED TREES, GRAPHS, AND RELATIONAL DATA (German title: “Evaluierung von Anfragen für SLP-komprimierte Bäume, Graphen und relationale Daten”, project number: 522576760).  
**Funding authority:** German Research Foundation (DFG, “Deutsche Forschungsgemeinschaft”).  
**Amount:** ca. 324.000 Euro ( $\approx$  280,000 GBP).  
**Duration:** 3 years (started 2023, still ongoing).

## Professional Experience

|                       |                                                                                                        |
|-----------------------|--------------------------------------------------------------------------------------------------------|
| Jan. 2005             | part-time job, homepage design,<br><i>AG Objektive Hermeneutik e.V., Goethe-Universität, Frankfurt</i> |
| Nov. 2006 – Oct. 2007 | part-time job, .NET-Development,<br><i>keen games gmbH &amp; co. kg, Frankfurt</i>                     |
| 2007 – 2009           | student teaching assistant, <i>Goethe University Frankfurt</i>                                         |
| 2010 – 2012           | student teaching assistant, <i>Loughborough University</i>                                             |
| 2012 – 2019           | full position as “Wissenschaftlicher Mitarbeiter”, <i>Trier University</i>                             |
| 2019 – 2025           | full position as “Wissenschaftlicher Mitarbeiter”, <i>Humboldt University Berlin</i>                   |

## Languages

|         |                 |
|---------|-----------------|
| German  | native speaker  |
| English | fluent          |
| French  | basic knowledge |

## Teaching Experience

It follows a complete list of all my past academic teaching (see the following tables for abbreviations):

|     |                                                                                       |
|-----|---------------------------------------------------------------------------------------|
| M   | Master module                                                                         |
| B   | Bachelor module                                                                       |
| L   | Delivering lectures                                                                   |
| L+D | Delivering lectures and design of teaching material                                   |
| T   | Delivering tutorials                                                                  |
| S   | Planning and supervising seminar talks                                                |
| TA  | Tutorial assessment (i.e., designing and marking exercise sheets)                     |
| FA  | Full assessment (i.e., design and holding of oral or written exams including marking) |
| St  | Teaching done as student or graduate student                                          |

## Full Modules

| Topic                                    | Level | Duties         | Contact hours | Year      |
|------------------------------------------|-------|----------------|---------------|-----------|
| Algorithms on Strings                    | M     | L+D, T, TA, FA | ca. 60 h      | 2014/2015 |
| Complexity Theory A                      | M     | L+D, T, TA, FA | ca. 60 h      | 2016/2017 |
| Discrete Structures                      | B     | L, T, TA, FA   | ca. 60 h      | 2016/2017 |
| Formal Languages A - Theory of Compiling | M     | L+D, T, TA, FA | ca. 60 h      | 2017      |
| Algorithms on Strings                    | B     | L+D, T, TA, FA | ca. 60 h      | 2023      |

## Tutorials

| Topic                                           | Level | Duties | Contact hours | Year      |
|-------------------------------------------------|-------|--------|---------------|-----------|
| Data Structures (St)                            | B     | T, TA  | ca. 30 h      | 2007      |
| Algorithm Theory (St)                           | B     | T, TA  | ca. 30 h      | 2007      |
| Formal Languages and Decidability (St)          | B     | T, TA  | ca. 30 h      | 2008      |
| Formal Languages and Decidability (St)          | B     | T, TA  | ca. 30 h      | 2009      |
| Computer Systems (St)                           | B     | T, TA  | ca. 20 h      | 2010      |
| Formal Languages and Theory of Computation (St) | B     | T, TA  | ca. 20 h      | 2010      |
| Computer Systems (St)                           | B     | T, TA  | ca. 20 h      | 2011      |
| Formal Languages and Theory of Computation (St) | B     | T, TA  | ca. 20 h      | 2011      |
| Computer Systems (St)                           | B     | T, TA  | ca. 20 h      | 2012      |
| Foundations of Computer Science II              | B     | T, TA  | ca. 30 h      | 2012/2013 |
| Automata and Formal Languages                   | B     | T, TA  | ca. 30 h      | 2013      |
| Formal Languages A: Regulated Rewriting         | M     | T      | ca. 30 h      | 2013      |
| Discrete Structures                             | B     | T, TA  | ca. 60 h      | 2013/2014 |
| Automata and Formal Languages                   | B     | T, TA  | ca. 30 h      | 2014      |
| Formal Languages B: Tree Languages              | M     | T      | ca. 30 h      | 2014      |
| Discrete Structures                             | B     | T, TA  | ca. 60 h      | 2014/2015 |
| Automata and Formal Languages                   | B     | T, TA  | ca. 30 h      | 2015      |
| Formal Languages A: Formal Power Series         | M     | T      | ca. 30 h      | 2015      |
| Discrete Structures                             | B     | T, TA  | ca. 60 h      | 2015/2016 |
| Formal Languages B: Descriptive Complexity      | M     | T      | ca. 30 h      | 2018      |
| Computational Learning Theory                   | M     | T      | ca. 30 h      | 2018      |
| Introduction to Formal Logics                   | B     | T, TA  | ca. 30 h      | 2020      |

## Seminars

| Topic                                      | Level | Duties | Contact hours | Year      |
|--------------------------------------------|-------|--------|---------------|-----------|
| Modal Logic                                | B     | S, FA  | ca. 15 h      | 2013      |
| Automata Theory                            | B     | S, FA  | ca. 15 h      | 2013/2014 |
| Algorithms on Strings                      | B     | S, FA  | ca. 15 h      | 2014      |
| Formal Verification/Satisfiability Problem | B     | S, FA  | ca. 15 h      | 2015      |
| Boolean Algebra                            | B     | S, FA  | ca. 15 h      | 2015/2016 |
| Graph Theory and Combinatorics             | B     | S, FA  | ca. 15 h      | 2016      |
| Modal Logic                                | B     | S, FA  | ca. 15 h      | 2016/2017 |
| Gems of Theoretical Computer Science       | B     | S, FA  | ca. 15 h      | 2019/2020 |
| Query Languages for Graph Databases        | M     | S, FA  | ca. 15 h      | 2020      |

## Supervised Theses

| Type of thesis                                                            | Year |
|---------------------------------------------------------------------------|------|
| Supervisor and first examiner of a Bachelor thesis (including assessment) | 2015 |
| Second examiner of a Bachelor thesis (including assessment)               | 2016 |
| Second examiner of a Bachelor thesis (including assessment)               | 2017 |
| Second examiner of a Bachelor thesis (including assessment)               | 2018 |
| Second examiner of a Bachelor thesis (including assessment)               | 2020 |
| Supervisor and first examiner of a Bachelor thesis (including assessment) | 2020 |

## Co-Supervision of PhD-Students

Since I never had a permanent position in academia with responsibility for PhD-students, I never *officially* supervised PhD-projects. However, I have worked closely together with PhD-students for well over a decade in different research groups. In this time, I also took on responsibilities in supervising PhD-projects, e.g., joint research with PhD-students, guidance for scientific writing, proof-reading of publications, consultation with respect to publication strategies and the scientific publication culture, providing support for formulating promising research questions. These co-supervision duties are witnessed by several joint publications with PhD-students.

## Publications in Conferences (with peer-reviewed proceedings)

| Overview |                                                                              | # Papers |
|----------|------------------------------------------------------------------------------|----------|
| ICALP    | Int. Colloquium on Automata, Languages, and Programming                      | 2        |
| STACS    | Int. Symposium on Theoretical Aspects of Computer Science                    | 2        |
| PODS     | ACM SIGMOD-SIGACT-SIGAI Symp. on Principles of Database Systems              | 5        |
| SIGMOD   | International Conference on Management of Data                               | 1        |
| MFCS     | Int. Symposium on Mathematical Foundations of Computer Science               | 5        |
| FSTTCS   | Ann. Conf. on Foundations of Software Tech. and Theoretical Computer Science | 1        |
| ICDT     | International Conference on Database Theory                                  | 4        |
| CPM      | Annual Symposium on Combinatorial Pattern Matching                           | 2        |
| ISAAC    | International Symposium on Algorithms and Computation                        | 1        |
| CiE      | Computability in Europe                                                      | 1        |
| DLT      | Int. Conference on Developments in Language Theory                           | 7        |
| LATA     | Int. Conference on Language and Automata Theory and Applications             | 2        |
| CIAA     | Int. Conference on Implementation and Application of Automata                | 3        |
| NCMA     | Workshop on Non-Classical Models of Automata and Applications                | 1        |
| UCNC     | Int. Conference on Unconventional Computation and Natural Computation        | 1        |
| BTW      | Conference on Database Systems for Business, Technology and Web              | 2        |
| IWCIA    | Int. Workshop on Combinatorial Image Analysis                                | 1        |

- [C1] Daniel Reidenbach and Markus L. Schmid. A polynomial time match test for large classes of extended regular expressions. In *Implementation and Application of Automata - 15th International Conference, CIAA 2010, Winnipeg, MB, Canada, August 12-15, 2010. Revised Selected Papers*, pages 241–250, 2010.
- [C2] Daniel Reidenbach and Markus L. Schmid. Finding shuffle words that represent optimal scheduling of shared memory access. In *Language and Automata Theory and Applications - 5th International Conference, LATA 2011, Tarragona, Spain, May 26-31, 2011. Proceedings*, pages 465–476, 2011.
- [C3] Daniel Reidenbach and Markus L. Schmid. Automata with modulo counters and nondeterministic counter bounds. In *Implementation and Application of Automata - 17th International Conference, CIAA 2012, Porto, Portugal, July 17-20, 2012. Proceedings*, pages 361–368, 2012.
- [C4] Daniel Reidenbach and Markus L. Schmid. Patterns with bounded treewidth. In *Language and Automata Theory and Applications - 6th International Conference, LATA 2012, A Coruña, Spain, March 5-9, 2012. Proceedings*, pages 468–479, 2012.
- [C5] Daniel Reidenbach and Markus L. Schmid. Regular and context-free pattern languages over small alphabets. In *Developments in Language Theory - 16th International Conference, DLT 2012, Taipei, Taiwan, August 14-17, 2012. Proceedings*, pages 130–141, 2012.
- [C6] Markus L. Schmid. Inside the class of REGEX languages. In *Developments in Language Theory - 16th International Conference, DLT 2012, Taipei, Taiwan, August 14-17, 2012. Proceedings*, pages 73–84, 2012.
- [C7] Henning Fernau, Rudolf Freund, Sergiu Ivanov, Markus L. Schmid, and K. G. Subramanian. Array insertion and deletion P systems. In *Unconventional Computation and Natural Computation - 12th International Conference, UCNC 2013, Milan, Italy, July 1-5, 2013. Proceedings*, pages 67–78, 2013.
- [C8] Henning Fernau, Markus L. Schmid, and K. G. Subramanian. Two-dimensional pattern languages. In *Fifth Workshop on Non-Classical Models for Automata and Applications - NCMA 2013, Umeå, Sweden, August 13 - August 14, 2013. Proceedings*, pages 117–132, 2013.
- [C9] Henning Fernau, Markus L. Schmid, and Yngve Villanger. On the parameterised complexity of string morphism problems. In *IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science, FSTTCS 2013, December 12-14, 2013, Guwahati, India*, pages 55–66, 2013.
- [C10] Henning Fernau and Markus L. Schmid. Pattern matching with variables: A multivariate complexity analysis. In *Combinatorial Pattern Matching, 24th Annual Symposium, CPM 2013, Bad Herrenalb, Germany, June 17-19, 2013. Proceedings*, pages 83–94, 2013.
- [C11] Joel D. Day, Daniel Reidenbach, and Markus L. Schmid. Closure properties of pattern languages. In *Developments in Language Theory - 18th International Conference, DLT 2014, Ekaterinburg, Russia, August 26-29, 2014. Proceedings*, pages 279–290, 2014.

- [C12] Markus L. Schmid. Characterising REGEX languages by regular languages equipped with factor-referencing. In *Developments in Language Theory - 18th International Conference, DLT 2014, Ekaterinburg, Russia, August 26-29, 2014. Proceedings*, pages 142–153, 2014.
- [C13] Henning Fernau, Meenakshi Paramasivan, and Markus L. Schmid. Jumping finite automata: Characterizations and complexity. In *Implementation and Application of Automata - 20th International Conference, CIAA 2015, Umeå, Sweden, August 18-21, 2015, Proceedings*, pages 89–101, 2015.
- [C14] Henning Fernau, Florin Manea, Robert Mercas, and Markus L. Schmid. Pattern matching with variables: Fast algorithms and new hardness results. In *32nd International Symposium on Theoretical Aspects of Computer Science, STACS 2015, March 4-7, 2015, Garching, Germany*, pages 302–315, 2015.
- [C15] Markus L. Schmid. Finding consensus strings with small length difference between input and solution strings. In *Mathematical Foundations of Computer Science 2015 - 40th International Symposium, MFCS 2015, Milan, Italy, August 24-28, 2015, Proceedings, Part II*, pages 542–554, 2015.
- [C16] Henning Fernau, Meenakshi Paramasivan, Markus L. Schmid, and D. Gnanaraj Thomas. Scanning pictures the boustrophedon way. In *Combinatorial Image Analysis - 17th International Workshop, IWCIA 2015, Kolkata, India, November 24-27, 2015. Proceedings*, pages 202–216, 2015.
- [C17] Markus L. Schmid. Computing equality-free string factorisations. In *Evolving Computability - 11th Conference on Computability in Europe, CiE 2015, Bucharest, Romania, June 29 - July 3, 2015. Proceedings*, pages 313–323, 2015.
- [C18] Katrin Casel, Henning Fernau, Serge Gaspers, Benjamin Gras, and Markus L. Schmid. On the complexity of grammar-based compression over fixed alphabets. In *43rd International Colloquium on Automata, Languages, and Programming, ICALP 2016, July 11-15, 2016, Rome, Italy*, pages 122:1–122:14, 2016.
- [C19] Florin Manea, Dirk Nowotka, and Markus L. Schmid. On the solvability problem for restricted classes of word equations. In *Developments in Language Theory - 20th International Conference, DLT 2016, Montréal, Canada, July 25-28, 2016, Proceedings*, pages 306–318, 2016.
- [C20] Dominik D. Freydenberger and Markus L. Schmid. Deterministic regular expressions with back-references. In *34th Symposium on Theoretical Aspects of Computer Science, STACS 2017, March 8-11, 2017, Hannover, Germany*, pages 33:1–33:14, 2017.
- [C21] Katrin Casel, Henning Fernau, Alexander Grigoriev, Markus L. Schmid, and Sue Whitesides. Combinatorial properties and recognition of unit square visibility graphs. In *42nd International Symposium on Mathematical Foundations of Computer Science, MFCS 2017, August 21-25, 2017 - Aalborg, Denmark*, pages 30:1–30:15, 2017.
- [C22] Laurent Bulteau and Markus L. Schmid. Consensus strings with small maximum distance and small distance sum. In *43rd International Symposium on Mathematical Foundations of Computer Science, MFCS 2018, August 27-31, 2018, Liverpool, UK*, pages 1:1–1:15, 2018.
- [C23] Joel D. Day, Pamela Fleischmann, Florin Manea, Dirk Nowotka, and Markus L. Schmid. On matching generalised repetitive patterns. In *Developments in Language Theory - 22nd International Conference, DLT 2018, Tokyo, Japan, September 10-14, 2018, Proceedings*, pages 269–281, 2018.
- [C24] Katrin Casel, Joel D. Day, Pamela Fleischmann, Tomasz Kociumaka, Florin Manea, and Markus L. Schmid. Graph and string parameters: Connections between pathwidth, cutwidth and the locality number. In *46th International Colloquium on Automata, Languages, and Programming, ICALP 2019, July 9-12, 2019, Patras, Greece*, pages 109:1–109:16, 2019.
- [C25] Markus L. Schmid. Conjunctive regular path queries with string variables. In *Proceedings of the 39th ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems, PODS 2020, Portland, OR, USA, June 14-19, 2020*, pages 361–374, 2020.
- [C26] Markus L. Schmid and Nicole Schweikardt. A purely regular approach to non-regular core spanners. In *24th International Conference on Database Theory, ICDT 2021, March 23-26, 2021, Nicosia, Cyprus*, pages 4:1–4:19, 2021.
- [C27] Katrin Casel and Markus L. Schmid. Fine-grained complexity of regular path queries. In *24th International Conference on Database Theory, ICDT 2021, March 23-26, 2021, Nicosia, Cyprus*, pages 19:1–19:20, 2021.

- [C28] Markus L. Schmid and Nicole Schweikardt. Spanner evaluation over SLP-compressed documents. In *PODS'21: Proceedings of the 40th ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems, Virtual Event, China, June 20-25, 2021*, pages 153–165, 2021.
- [C29] Sarah Kleest-Meißner, Rebecca Sattler, Markus L. Schmid, Nicole Schweikardt, and Matthias Weidlich. Discovering event queries from traces: Laying foundations for subsequence-queries with wildcards and gap-size constraints. In *25th International Conference on Database Theory, ICDT 2022, March 29 to April 1, 2022, Edinburgh, UK (Virtual Conference)*, pages 18:1–18:21, 2022.
- [C30] Markus L. Schmid and Nicole Schweikardt. Query evaluation over slp-represented document databases with complex document editing. In *PODS '22: International Conference on Management of Data, Philadelphia, PA, USA, June 12 - 17, 2022*, pages 79–89, 2022.
- [C31] Joel D. Day, Maria Kosche, Florin Manea, and Markus L. Schmid. Subsequences with gap constraints: Complexity bounds for matching and analysis problems. In *33rd International Symposium on Algorithms and Computation, ISAAC 2022, December 19-21, 2022, Seoul, Korea*, pages 64:1–64:18, 2022.
- [C32] Sarah Kleest-Meißner, Rebecca Sattler, Markus L. Schmid, Nicole Schweikardt, and Matthias Weidlich. Discovering multi-dimensional subsequence queries from traces - from theory to practice. In *Datenbanksysteme für Business, Technologie und Web (BTW 2023), 20. Fachtagung des GI-Fachbereichs „Datenbanken und Informationssysteme”(DBIS), 06.-10, März 2023, Dresden, Germany, Proceedings*, pages 511–533, 2023.
- [C33] Markus Lohrey and Markus L. Schmid. Enumeration for MSO-queries on compressed trees. *Proc. ACM Manag. Data*, 2(2):78, 2024.
- [C34] Florin Manea, Jonas Richardsen, and Markus L. Schmid. Subsequences with generalised gap constraints: Upper and lower complexity bounds. In *35th Annual Symposium on Combinatorial Pattern Matching, CPM 2024, June 25-27, 2024, Fukuoka, Japan*, pages 22:1–22:17, 2024.
- [C35] Pawel Gawrychowski, Florin Manea, and Markus L. Schmid. Revisiting weighted information extraction: A simpler and faster algorithm for ranked enumeration. *Proc. ACM Manag. Data*, 2(5):222:1–222:19, 2024.
- [C36] Rebecca Sattler, Sarah Kleest-Meißner, Steven Lange, Markus L. Schmid, Nicole Schweikardt, and Matthias Weidlich. Embracing change: Incremental updates of discovered event queries. In *Datenbanksysteme für Business, Technologie und Web (BTW 2025), 21. Fachtagung des GI-Fachbereichs „Datenbanken und Informationssysteme”(DBIS), 03.-07, März 2025, Bamberg, Germany, Proceedings*, pages 417–437, 2025.
- [C37] Rebecca Sattler, Sarah Kleest-Meißner, Steven Lange, Markus L. Schmid, Nicole Schweikardt, and Matthias Weidlich. DISCES: systematic discovery of event stream queries. *Proc. ACM Manag. Data*, 3(1):32:1–32:26, 2025.
- [C38] Cristian Riveros, Markus L. Schmid, and Nicole Schweikardt. A framework for extraction and transformation of documents. In *28th International Conference on Database Theory, ICDT 2025, March 25-28, 2025, Barcelona, Spain*, pages 18:1–18:19, 2025.
- [C39] Markus Lohrey, Sebastian Maneth, and Markus L. Schmid. Fo-query enumeration over slp-compressed structures of bounded degree. In Pawel Gawrychowski, Filip Mazowiecki, and Michal Skrzypczak, editors, *50th International Symposium on Mathematical Foundations of Computer Science, MFCS 2025, August 25-29, 2025, Warsaw, Poland*, volume 345 of *LIPIcs*, pages 69:1–69:20. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2025.
- [C40] Antoine Amarilli, Florin Manea, Tina Ringleb, and Markus L. Schmid. Linear time subsequence and supersequence regex matching. In Pawel Gawrychowski, Filip Mazowiecki, and Michal Skrzypczak, editors, *50th International Symposium on Mathematical Foundations of Computer Science, MFCS 2025, August 25-29, 2025, Warsaw, Poland*, volume 345 of *LIPIcs*, pages 9:1–9:19. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2025.
- [C41] Markus L. Schmid. A general information extraction framework based on formal languages. In Sang-Ki Ko and Florin Manea, editors, *Developments in Language Theory - 29th International Conference, DLT 2025, Seoul, South Korea, August 19-22, 2025, Proceedings*, volume 16036 of *Lecture Notes in Computer Science*, pages 197–212. Springer, 2025.

## Publications in Scientific Journals

| Overview     |                                                   | # Papers |
|--------------|---------------------------------------------------|----------|
| ACM TODS     | ACM Transactions on Database Systems              | 1        |
| JCSS         | Journal of Computer and System Sciences           | 3        |
| ToCS         | Theory of Computing Systems                       | 2        |
| Algorithmica | Algorithmica                                      | 1        |
| DCG          | Discrete & Computational Geometry                 | 1        |
| I&C          | Information and Computation                       | 3        |
| ACM TOCT     | ACM Transactions on Computation Theory            | 2        |
| DAM          | Discrete Applied Mathematics                      | 2        |
| TCS          | Theoretical Computer Science                      | 4        |
| LMCS         | Logical Methods in Computer Science               | 2        |
| IJFCS        | Int. Journal of Foundations of Computer Science   | 2        |
| IPL          | Information Processing Letters                    | 2        |
| IJCM         | Int. Journal of Computer Mathematics              | 1        |
| AMAI         | Annals of Mathematics and Artificial Intelligence | 1        |
| Kybernetika  | Kybernetika                                       | 1        |
| JALC         | Journal of Automata, Languages, and Combinatorics | 1        |

- [J1] Daniel Reidenbach and Markus L. Schmid. On multi-head automata with restricted nondeterminism. *Inf. Process. Lett.*, 112(14-15):572–577, 2012.
- [J2] Markus L. Schmid. A note on the complexity of matching patterns with variables. *Inf. Process. Lett.*, 113(19-21):729–733, 2013.
- [J3] Markus L. Schmid. Inside the class of regex languages. *Int. J. Found. Comput. Sci.*, 24(7):1117–1134, 2013.
- [J4] Daniel Reidenbach and Markus L. Schmid. Finding shuffle words that represent optimal scheduling of shared memory access. *Int. J. Comput. Math.*, 90(6):1292–1309, 2013.
- [J5] Daniel Reidenbach and Markus L. Schmid. Regular and context-free pattern languages over small alphabets. *Theor. Comput. Sci.*, 518:80–95, 2014.
- [J6] Daniel Reidenbach and Markus L. Schmid. Automata with modulo counters and nondeterministic counter bounds. *Kybernetika*, 50(1):66–94, 2014.
- [J7] Daniel Reidenbach and Markus L. Schmid. Patterns with bounded treewidth. *Inf. Comput.*, 239:87–99, 2014.
- [J8] Henning Fernau and Markus L. Schmid. Pattern matching with variables: A multivariate complexity analysis. *Inf. Comput.*, 242:287–305, 2015.
- [J9] Henning Fernau, Rudolf Freund, Markus L. Schmid, K. G. Subramanian, and Petra Wiederhold. Contextual array grammars and array P systems. *Ann. Math. Artif. Intell.*, 75(1-2):5–26, 2015.
- [J10] Markus L. Schmid. Computing equality-free and repetitive string factorisations. *Theor. Comput. Sci.*, 618:42–51, 2016.
- [J11] Henning Fernau, Markus L. Schmid, and Yngve Villanger. On the parameterised complexity of string morphism problems. *Theory Comput. Syst.*, 59(1):24–51, 2016.
- [J12] Markus L. Schmid. Characterising REGEX languages by regular languages equipped with factor-referencing. *Inf. Comput.*, 249:1–17, 2016.
- [J13] Markus L. Schmid. Finding consensus strings with small length difference between input and solution strings. *TOCT*, 9(3):13:1–13:18, 2017.
- [J14] Henning Fernau, Meenakshi Paramasivan, Markus L. Schmid, and Vojtech Vorel. Characterization and complexity results on jumping finite automata. *Theor. Comput. Sci.*, 679:31–52, 2017.
- [J15] Joel D. Day, Daniel Reidenbach, and Markus L. Schmid. Closure properties of pattern languages. *J. Comput. Syst. Sci.*, 84:11–31, 2017.
- [J16] Henning Fernau, Florin Manea, Robert Mercas, and Markus L. Schmid. Revisiting shinohara’s algorithm for computing descriptive patterns. *Theor. Comput. Sci.*, 733:44–54, 2018.

- [J17] Henning Fernau, Meenakshi Paramasivan, Markus L. Schmid, and D. Gnanaraj Thomas. Simple picture processing based on finite automata and regular grammars. *J. Comput. Syst. Sci.*, 95:232–258, 2018.
- [J18] Florin Manea, Dirk Nowotka, and Markus L. Schmid. On the complexity of solving restricted word equations. *Int. J. Found. Comput. Sci.*, 29(5):893–909, 2018.
- [J19] Dominik D. Freydenberger and Markus L. Schmid. Deterministic regular expressions with back-references. *J. Comput. Syst. Sci.*, 105:1–39, 2019.
- [J20] Henning Fernau, Florin Manea, Robert Mercas, and Markus L. Schmid. Pattern matching with variables: Efficient algorithms and complexity results. *TOCT*, 12(1):6:1–6:37, 2020.
- [J21] Katrin Casel, Jan Dreier, Henning Fernau, Moritz Gobbert, Philipp Kuinke, Fernando Sánchez Villaamil, Markus L. Schmid, and Erik Jan van Leeuwen. Complexity of independency and cliquy trees. *Discret. Appl. Math.*, 272:2–15, 2020.
- [J22] Laurent Bulteau and Markus L. Schmid. Consensus strings with small maximum distance and small distance sum. *Algorithmica*, 82(5):1378–1409, 2020.
- [J23] Katrin Casel, Henning Fernau, Serge Gaspers, Benjamin Gras, and Markus L. Schmid. On the complexity of the smallest grammar problem over fixed alphabets. *Theory Comput. Syst.*, 65(2):344–409, 2021.
- [J24] Markus L. Schmid. Conjunctive regular path queries with capture groups. *ACM Trans. Database Syst.*, 47(2):5:1–5:52, 2022.
- [J25] Katrin Casel, Henning Fernau, Alexander Grigoriev, Markus L. Schmid, and Sue Whitesides. Combinatorial properties and recognition of unit square visibility graphs. *Discret. Comput. Geom.*, 69(4):937–980, 2023.
- [J26] Katrin Casel and Markus L. Schmid. Fine-grained complexity of regular path queries. *Log. Methods Comput. Sci.*, 19(4), 2023.
- [J27] Katrin Casel, Tobias Friedrich, Stefan Neubert, and Markus L. Schmid. Shortest distances as enumeration problem. *Discret. Appl. Math.*, 342:89–103, 2024.
- [J28] Markus L. Schmid and Nicole Schweikardt. Refl-spanners: A purely regular approach to non-regular core spanners. *Log. Methods Comput. Sci.*, 20(4), 2024.
- [J29] Markus L. Schmid. Regular expressions with backreferences: Polynomial-time matching techniques. *Journal of Automata, Languages and Combinatorics*. accepted for publication.

## Memberships in Programme Committees

- 2017 9th Workshop on *Non-Classical Models of Automata and Applications* (NCMA 2017)
- 2018 22nd International Conference on *Developments in Language Theory* (DLT 2018)
- 2018 20th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing - SYNASC 2018, Track: Advances in the Theory of Computing
- 2020 16th *Computability in Europe* (CiE 2020)
- 2020 15th *International Computer Science Symposium in Russia* (CSR 2020)
- 2021 38th *International Symposium on Theoretical Aspects of Computer Science* (STACS 2021)
- 2023 19th *Computability in Europe* - CiE 2023
- 2023 24th International Symposium on Fundamentals in Computation Theory - FCT 2023
- 2024 27th International Conference on Database Theory - ICDT 2024
- 2025 21st Conference on Database Systems for Business, Technology and Web (Theory Track) - BTW 2025
- 2025 29th International Conference on *Developments in Language Theory* (DLT 2025)
- 2026 29th International Conference on Database Theory - ICDT 2026

## Reviewing Work

CONFERENCES (72 IN TOTAL)      JOURNALS (25 IN TOTAL)

|                     |                                                                     |
|---------------------|---------------------------------------------------------------------|
| NCMA 2010/13/17     | Algorithmica                                                        |
| LATA 2010           | Journal of Computer and System Sciences                             |
| SOFSEM 2012         | Mathematical Structures in Computer Science                         |
| CIAA 2013           | Theoretical Computer Science                                        |
| MFCS 2013/15/19/25  | Information and Computation                                         |
| COCOON 2014         | Algorithms                                                          |
| SWAT 2014           | International Journal of Artificial Intelligence and Soft Computing |
| IPEC 2014           | International Journal of Foundations of Computer Science            |
| STACS 2015/17/19/21 | Journal of Membrane Computing                                       |
| DCFS 2015/16/20     | Fundamenta Informaticae                                             |
| ICGI 2016           | Acta Informatica                                                    |
| SPIRE 2016/19       | Logical Methods in Computer Science                                 |
| CiE 2017/21         | ACM Transactions on Database Systems                                |
| FSTTCS 2017/21/22   | Theory of Computing Systems                                         |
| DLT 2018/19/24/25   | Discrete Applied Mathematics                                        |
| SYNASC 2018         | Journal of Automata, Languages and Combinatorics                    |
| CIAC 2019           | Algorithms for Molecular Biology                                    |
| PODS 2020/22        |                                                                     |
| IWOCA 2022          |                                                                     |
| CPM 2022/23/25      |                                                                     |
| FCT 2023            |                                                                     |
| ICDT 2024/26        |                                                                     |
| ICALP 2024/25       |                                                                     |
| ISAAC 2024          |                                                                     |
| FSCD 2025           |                                                                     |
| BTW 2025            |                                                                     |

## Organisation of Workshops, Special Sessions

- 2015 Co-organisation 25. Theorietag der GI Fachgruppe AFS
- 2015 Co-organisation 70. Theorietag der GI Fachgruppe ALGO/KP
- 2020 Co-organisation of a special session about “Modern Aspects of Formal Languages” as part of the conference “*16th Computability in Europe (CiE 2020)*”.

## Participation of Scientific Workshops (by Invitation)

- 2016 Lorentz Center – Fixed-Parameter Computational Geometry
- 2016 Schloss Dagstuhl – Computation over Compressed Structured Data
- 2024 Schloss Dagstuhl – Regular Expressions: Matching and Indexing

## Scientific Talks Given at Conferences

- 2010 International Conference on Implementation and Application of Automata (CIAA) 2010  
*A Polynomial Time Match Test for Large Classes of Extended Regular Expressions*
- 2011 International Conference on Language and Automata Theory and Applications (LATA) 2011  
*Finding Shuffle Words that Represent Optimal Scheduling of Shared Memory Access*
- 2012 International Conference on Language and Automata Theory and Applications (LATA) 2012  
*Patterns with Bounded Treewidth*  
International Conference Implementation and Application of Automata (CIAA) 2012  
*Automata with Modulo Counters and Nondeterministic Counter Bounds*  
International Conference on Developments in Language Theory (DLT) 2012, two talks  
*Regular and Context-Free Pattern Languages over Small Alphabets*  
*Inside the Class of REGEX Languages*
- 2013 Annual Symposium on Combinatorial Pattern Matching (CPM) 2013  
*Pattern Matching with Variables: A Multivariate Complexity Analysis*  
Workshop on Non-Classical Models of Automata and Applications (NCMA) 2013  
*Two-dimensional pattern languages*  
Ann. Conf. on Foundations of Software Technology and Theoretical Comp. Sc. (FSTTCS) 2013  
*Pattern Matching with Variables: A Multivariate Complexity Analysis*
- 2014 International Conference on Developments in Language Theory (DLT) 2014, two talks  
*Closure Properties of Pattern Languages*  
*Characterising REGEX Languages by Regular Languages Equipped with Factor-Referencing*
- 2015 International Symposium on Theoretical Aspects of Computer Science (STACS) 2015  
*Pattern Matching with Variables: Fast Algorithms and New Hardness Results*  
Computability in Europe (CiE) 2015  
*Computing Equality-Free String Factorisations*  
International Symposium on Mathematical Foundations of Computer Science (MFCS) 2015  
*Finding Consensus Strings with Small Length Difference Between Input and Solution Strings*
- 2016 International Colloquium on Automata, Languages, and Programming (ICALP) 2016  
*On the Complexity of Grammar-Based Compression over Fixed Alphabets*
- 2017 International Symposium on Mathematical Foundations of Computer Science (MFCS) 2017  
*Combinatorial Properties and Recognition of Unit Square Visibility Graphs*
- 2018 International Symposium on Mathematical Foundations of Computer Science (MFCS) 2018  
*Consensus Strings with Small Maximum Distance and Small Distance Sum*
- 2020 ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems (PODS) 2020,  
(pre-recorded, online)  
*Conjunctive Regular Path Queries with String Variables*
- 2021 International Conference on Database Theory (ICDT) 2021, two talks, (online)  
*A Purely Regular Approach to Non-Regular Core Spanners*  
*Fine-Grained Complexity of Regular Path Queries*  
ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems (PODS) 2021,  
(pre-recorded, online)  
*Spanner Evaluation over SLP-Compressed Documents*
- 2022 ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems (PODS) 2022,  
*Query Evaluation over SLP-Represented Document Databases with Complex Document Editing*
- 2024 ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems (PODS) 2024,  
*Enumeration for MSO-Queries on Compressed Trees*
- 2025 ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems (PODS) 2025,  
*Revisiting Weighted Information Extraction: A Simpler and Faster Algorithm for Ranked Enumeration*  
International Conference on Developments in Language Theory (DLT) 2025,  
*A General Information Extraction Framework Based on Formal Languages*  
International Symposium on Mathematical Foundations of Computer Science (MFCS) 2025,  
*FO-Query Enumeration over SLP-Compressed Structures of Bounded Degree*

## Scientific Talks Given at Workshops

- 2010 20. Theorietag der GI Fachgruppe AFS  
*Common Supersequences with Minimum Scope Coincidence Degree*
- 2011 21. Theorietag der GI Fachgruppe AFS  
*Automata for Languages Defined by Backreferencing*
- 2012 22. Theorietag der GI Fachgruppe AFS  
*Inside the Class of REGEX Languages*
- 2014 24. Theorietag der GI Fachgruppe AFS  
*Characterising REGEX Languages by Regular Languages with Factor-Referencing*  
68. Theorietag der GI Fachgruppe ALGO/KP  
*Pattern Matching with Variables*
- 2015 25. Theorietag der GI Fachgruppe AFS  
*Revisiting Shinohara's Algorithm for Computing Descriptive Patterns*  
70. Theorietag der GI Fachgruppe ALGO/KP  
*A New Parameterisation for Consensus Strings Problems*
- 2016 Schloss Dagstuhl – Computation over Compressed Structured Data  
*On the Complexity of Grammar-Based Compression over Fixed Alphabets*
- 2017 74. Theorietag der GI Fachgruppe ALGO/KP  
*On the Complexity of the Smallest Grammar Problem over Fixed Alphabets*
- 2018 76. Theorietag der GI Fachgruppe ALGO/KP  
*Consensus Strings with Small Maximum Distance and Small Distance Sum*
- 2019 24. Theorietag der GI Fachgruppe AFS  
*Regular Expressions with Backreferences: Polynomial Time Matching Techniques*  
76. Theorietag der GI Fachgruppe ALGO/KP  
*Graph and String Parameters: Connections Between Pathwidth, Cutwidth and the Locality Number*
- 2025 Schloss Dagstuhl – Regular Expressions: Matching and Indexing  
*Subsequence Expressions with Gap Constraints*

## Invited Talks at Conferences

- 2022 32. Theorietag der GI Fachgruppe AFS  
*Regular Languages in Database Theory*
- 2023 Joint Events' Invited Speaker of DLT & WORDS 2023  
*On Structural Tractability Parameters for Hard String Problems*
- 2024 SOFSEM 2024  
*The Information Extraction Framework of Document Spanners -  
An Overview of Concepts, Results, and Recent Developments*
- 2024 DLT 2024 (Highlights Talk)  
*Enumeration for MSO-Queries on Compressed Trees*

## Other

- 2022 - 2025 Member of the leadership of the special interest group  
“Automaten und Formale Sprachen” (Automata and Formal Language Theory)  
of the German association of computer science (“Gesellschaft für Informatik” (GI))