

Curriculum Vitae

Prof. Dr. rer. nat. habil. Markus Lohrey
Institut für Informatik, Universität Leipzig
Johannisgasse 26
04103 Leipzig
phone.: +49-341-97-32201
fax: +49-341-97-32209
e-mail: lohrey@informatik.uni-leipzig.de
WWW: <http://www.informatik.uni-leipzig.de/~lohrey/>

1. Academic Employments

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| Jan. 1997 – Nov. 1997 | Ph.D. scholarship in the postgraduate program <i>Specification of Discrete Processes and Systems of Processes by Operational Models and Logics</i> at Dresden University of Technology, Germany |
| Dec. 1997 – Apr. 2000 | Research associate (German BAT IIa) at the Computer Science Department (Theoretical Computer Science) at the University of Stuttgart, Germany |
| May 2000 – March 2004 | Assistant lecturer (German C 1) at the Computer Science Department (Theoretical Computer Science) at the University of Stuttgart, Germany |
| Apr. 2004 – Sep. 2004 | Temporary professorship at the chair for <i>Algorithms and Complexity</i> at the RWTH Aachen, Germany |
| Oct. 2004 – Sep. 2005
Oct. 2006 – Mar. 2007 | University lecturer (German C 2) at the Computer Science Department (Theoretical Computer Science) at the University of Stuttgart, Germany |
| Oct. 2005 – Sep. 2006 | Temporary professorship at the chair for <i>Data Structures and Efficient Algorithms</i> at the Martin-Luther-University of Halle-Wittenberg, Germany |
| since April 2007 | Full professor at the the Computer Science Department (Algebraic and Logical Foundations of Computer Science) at the University of Leipzig, Germany |

2. Long term visits

- July 2001 – Apr. 2002 Post-doc researcher at Laboratoire d'Informatique Algorithmique: Fondements et Applications (LIAFA, University Paris 7, France) and Institut de Recherche en Informatique et Systèmes Aléatoires (IRISA, University Rennes 1, France)
- March 2005 Invited professor at Laboratoire d'Informatique Algorithmique: Fondements et Applications (LIAFA, University Paris 7, France)
- March 2008 Invited professor at Laboratoire Bordelais de Recherche en Informatique (LABRI, University Bordeaux 1, France)

3. Education

- 1989 – 1990 Study of Computer Science at Georg-Simon-Ohm University for applied sciences, Nürnberg, Germany
Degree: Prediploma
- 1991 – 1996 Study of Computer Science at Friedrich-Alexander University of Erlangen-Nürnberg, Germany
Degree: Diploma in Computer Science
- July 1999 Ph.D. (Dr. rer. nat.) in Computer Science from the University of Stuttgart, Germany
Title of the thesis: On the confluence problem for trace rewriting systems
Thesis advisor: Prof. Dr. Volker Diekert
Magna Cum Laude
- June 2003 Habilitation in Computer Science from the University of Stuttgart, Germany
Title of the thesis: Computational aspects of infinite monoids

4. Research Interests

Computational complexity of problems in automata theory and algebra (word problems in monoids and groups, word equations, tree automata, rewriting systems, etc.)

Logic in Computer Science (decidable theories, complexity of theories, model-checking hierarchical structures)

Finitely generated infinite graphs (context-free graphs, automatic graphs etc.)

Data compression (algorithms on compressed strings and trees, compression of XML data)

Verification of concurrent processes

Process algebras (stochastic calculi, axiomatization)

5. Publications

The following publications can be found at

http://www.informatik.uni-leipzig.de/~lohrey/veroeff_eng.html

Fully refereed papers in international journals

1. Some natural decision problems in automatic graphs (with Dietrich Kuske) to appear in *Journal of Symbolic Logic*
2. Fixpoint logics on hierarchical structures (with Stefan Göller) to appear in *Theory of Computing Systems*
3. Model-checking hierarchical structures, to appear in *Journal of Computer and System Sciences*
4. PDL with intersection and converse: satisfiability and infinite-state model checking (with Stefan Göller and Carsten Lutz), *Journal of Symbolic Logic* 74(1), pp. 279–314, 2009
5. Partially commutative inverse monoids (with Volker Diekert and Alexander Miller), *Semigroup Forum* 77(2), pp. 196–226, 2008
6. The submonoid and rational subset membership problems for graph groups (with Benjamin Steinberg), *Journal of Algebra* 320(2), pp. 728–755, 2008
7. Word equations over graph products (with Volker Diekert), *International Journal of Algebra and Computation* 18(3), pp. 493–533, 2008
8. Algorithmic problems on inverse monoids over virtually-free groups (with Volker Diekert und Nicole Ondrusch), *International Journal of Algebra and Computation* 18(1), pp. 181–208, 2008

9. Rational subsets of HNN-extensions and amalgamated free products (with Géraud Sénizergues), *International Journal of Algebra and Computation* 18(1), pp. 111–163, 2008
10. First-order and counting theories of ω -automatic structures (with Dietrich Kuske), *Journal of Symbolic Logic* 73, pp. 129–150, 2008
11. Efficient memory representation of XML document trees (with Giorgio Busatto and Sebastian Maneth), *Information Systems* 33(4-5), pp. 456–474, 2008
12. Inverse monoids: decidability and complexity of algebraic questions (with Nicole Ondrusch), *Information and Computation* 205(8), pp. 1212–1234, 2007
13. When is a graph product of groups virtually-free? (with Géraud Sénizergues), *Communications in Algebra* 35(2), pp. 617–621, 2007
14. The complexity of tree automata and XPath on grammar-compressed trees (with Sebastian Maneth), *Theoretical Computer Science* 363(2), pp. 196–210, 2006
15. Logical aspects of Cayley-graphs: the monoid case (with Dietrich Kuske), *International Journal of Algebra and Computation* 16(2), pp. 307–340, 2006
16. Word problems and membership problems on compressed words, *SIAM Journal on Computing* 35(5), pp. 1210–1240, 2006
17. Axiomatising divergence (with Pedro D’Argenio and Holger Hermanns), *Information and Computation* 203(2), pp. 115–144, 2005
18. Decidability and complexity in automatic monoids, *International Journal of Foundations of Computer Science* 16(4), pp. 707–722, 2005
19. Complexity results for prefix grammars (with Holger Petersen), *R.A.I.R.O. — Informatique Théorique et Applications* 39, pp. 391–401, 2005
20. On the theory of one-step rewriting in trace monoids (with Dietrich Kuske), *Theory of Computing Systems* 38(1), pp. 39–81, 200
21. Logical aspects of Cayley-graphs: the group case (with Dietrich Kuske), *Annals of Pure and Applied Logic* 131(1–3), pp. 263–286, 2005
22. Bounded MSC communication (with Anca Muscholl), *Information and Computation* 189(2), pp. 160–181, 2004
23. Existential and positive theories of equations in graph products (with Volker Diekert), *Theory of Computing Systems* 37(1), pp. 133–156, 2003
24. Realizability of high-level message sequence charts: closing the gaps, *Theoretical Computer Science* 309(1–3), pp. 529–554, 2003
25. A note on the existential theory of equations in plain groups (with Volker Diekert), *International Journal of Algebra and Computation* 12, pp. 1–7, 2002

26. Confluence problems for trace rewriting, *Information and Computation* 170, pp. 1–25, 2001
27. NP-completeness results concerning the transformation of logic programs into attribute grammars, *Acta Cybernetica* 13, pp. 209–224, 1998

Papers submitted to international journals

1. Tilings and submonoids of metabelian groups (with Benjamin Steinberg)

Conference publications

1. Compressed word problems in HNN-extensions and amalgamated products (with Niko Haubold) to appear in *Proceedings of CSR 2009*
2. Parameter reduction in grammar-compressed trees (with Sebastian Maneth and Manfred Schmidt-Schauss) *Proceedings of FOSSACS 2009*, Lecture Notes in Computer Science 5504, pp. 212–226, 2009
3. Leaf languages and string compression, *Proceedings of FSTTCS 2008*, pp. 292–303
4. Hamiltonicity of automatic graphs (with Dietrich Kuske), *Proceedings of IFIP-TCS 2008*, pp. 445–459, 2008
5. Compressed membership problems revisited, *Proceedings of AFL 2008*, pp. 31–53
6. Euler paths and ends in automatic and recursive graphs (with Dietrich Kuske), *Proceedings of AFL 2008*, pp.245–256
7. Efficient computation in groups via compression (with Saul Schleimer), *Proceedings of CSR 2007*, Lecture Notes in Computer Science 4649, pp. 249–258, 2007
8. The submonoid and rational subset membership problems for graph groups (with Benjamin Steinberg), *Proceedings of LATA 2007*
9. PDL with intersection and converse is 2EXP-complete (with Stefan Göller and Carsten Lutz), *Proceedings of FOSSACS 2007*, Lecture Notes in Computer Science 4423, pp. 198–212, 2007
10. Infinite state model-checking of propositional dynamic logics (with Stefan Göller), *Proceedings of CSL 2006*, Lecture Notes in Computer Science 4207, pp. 349–364, 2006
11. Partially commutative inverse monoids (with Volker Diekert and Alexander Miller), *Proceedings of MFCS 2006*, Lecture Notes in Computer Science 4162, pp. 292–304, 2006
12. Querying and Embedding Compressed Texts (with Yury Lifshits), *Proceedings of MFCS 2006*, Lecture Notes in Computer Science 4162, pp. 681–692, 2006

13. Monadic chain logic over iterations and applications to pushdown systems (with Dietrich Kuske), *Proceedings of LICS 2006*, pp. 91–100, 2006
14. Theories of HNN-extensions and amalgamated products (with Géraud Sénizergues), *Proceedings of ICALP 2006*, Lecture Notes in Computer Science 4052, pp. 504–515, 2006
15. First-order and counting theories of ω -automatic structures (with Dietrich Kuske), *Proceedings of FOSSACS 2006*, Lecture Notes in Computer Science 3921, pp. 322–336, 2006
16. Tree automata and XPath on compressed trees (with Sebastian Maneth), *Proceedings of CIAA 2005*, Lecture Notes in Computer Science 3845, pp. 225–237, 2006
17. Fixpoint logics over hierarchical structures (with Stefan Göller), *Proceedings of FST&TCS 2005*, Lecture Notes in Computer Science 3821, pp. 483–494, 2005
18. Efficient memory representation of XML documents (with Giorgio Busatto and Sebastian Maneth), *Proceedings of DBPL 2005*, Lecture Notes in Computer Science 3774, pp. 199–216, 2005
19. Inverse monoids: decidability and complexity of algebraic questions (with Nicole Ondrusch), *Proceedings of MFCS 2005*, Lecture Notes in Computer Science 3618, pp. 664–675, 2005
20. Model-checking hierarchical structures, *Proceedings of LICS 2005*, pp. 168–177, 2005
21. Decidability and complexity in automatic monoids, *Proceedings of DLT 2004*, Lecture Notes in Computer Science 3340, pp. 308–320, 2004
22. Word problems on compressed words, *Proceedings of ICALP 2004*, Lecture Notes in Computer Science 3142, pp. 906–918, 2004
23. Word equations over graph products (with Volker Diekert), *Proceedings of FST&TCS 2003*, Lecture Notes in Computer Science 2914, pp. 156–167, 2003
24. Automatic structures of bounded degree, *Proceedings of LPAR 2003*, Lecture Notes in Artificial Intelligence 2850, pp. 344–358, 2003
25. Decidable theories of Cayley-graphs (with Dietrich Kuske), *Proceedings of STACS 2003*, Lecture Notes in Computer Science 2607, pp. 463–474, 2003
26. Safe realizability of high-level message sequence charts, *Proceedings of CONCUR 2002*, Lecture Notes in Computer Science 2421, pp. 177–192, 2002
27. On the theory of one-step rewriting in trace monoids (with Dietrich Kuske), *Proceedings of ICALP 2002*, Lecture Notes in Computer Science 2380, pp. 752–763, 2002

28. Axiomatising divergence (with Pedro D'Argenio und Holger Hermanns), *Proceedings of ICALP 2002*, Lecture Notes in Computer Science 2380, pp. 585–596, 2002
29. Bounded MSC communication (with Anca Muscholl), *Proceedings of FOSSACS 2002*, Lecture Notes in Computer Science 2303, pp. 295–309, 2002
30. Existential and positive theories of equations in graph products (with Volker Diekert), *Proceedings of STACS 2001*, Lecture Notes in Computer Science 2285, pp. 501–512, 2002
31. Word problems for 2-homogeneous monoids and symmetric logspace, *Proceedings of MFCS 2001*, Lecture Notes in Computer Science 2136, pp. 500–511, 2001
32. On the parallel complexity of tree automata, *Proceedings of RTA 2001*, Lecture Notes in Computer Science 2051, pp. 201–216, 2001
33. Implementing Luby's algorithm on the Cray T3E (with Jürgen Gross) *High Performance Computing in Science and Engineering*, pp. 467–477, Springer 2000
34. Word problems and confluence problems for restricted semi-Thue systems, *Proceedings of RTA 2000*, Lecture Notes in Computer Science 1833, pp. 172–186, 2000
35. Complexity results for confluence problems, *Proceedings of MFCS 99*, Lecture Notes in Computer Science 1672, pp. 114–124, 1999
36. On the confluence of trace rewriting systems, *Proceedings of FST&TCS 98*, Lecture Notes in Computer Science 1530, pp. 319–330, 1998
37. Priority and maximal progress are completely axiomatisable (extended abstract) (with Holger Hermanns), *Proceedings of CONCUR 98*, Lecture Notes in Computer Science 1466, pp. 237–252, 1998

Other publications

1. Computational aspects of infinite monoids, Habilitation thesis, University of Stuttgart, 2003
2. Das Konfluenzproblem für Spurerersetzungssysteme, PhD thesis, University of Stuttgart, 1999

9. Third-party funds

GELO (Graphen mit entscheidbaren Logiken), granted by the German Research Foundation

project volume: 1 research associate (German BAT IIa) for five years

ALKODA (Algorithmen auf komprimierten Daten), granted by the German Research Foundation

project volume: 1 research associate (German BAT IIa) for three years

10. Organisational activities

Member of the program committee of the conference *Symposium on Theoretical Aspects of Computer Science* (STACS 2006), Marseille, Frankreich 2006

Member of the program committee of the conference *Automata: from Mathematics to Applications* (AutoMathA 2007), Palermo, Italy 2007

Organisation of the workshop *Computational Complexity and Decidability in Algebra* (colocated with CSR 2007), Ekaterinburg, Russia, 2007

Organisation of the 17. *Theorietag Automaten und Formale Sprachen* (with Manfred Droste), Leipzig, Germany, September 2007

Organisation of the Dagstuhl seminar *Algorithmic-logical theory of infinite structures* (with R. Downey, B. Khoussainov, D. Kuske, and M. Vardi), October 2007

Organisation of the Dagstuhl seminars *Structure-based compression of complex massive data* (with S. Böttcher, S. Maneth and W. Rytter), June 2008

Member of the program committee of the conference *Current Trends in Theory and Practice of Computer Science* (SOFSEM 2008), Novy Smokovec, Slovakia, 2008

Member of the program committee of the conference *Developments in Language Theory* (DLT 2008), Kyoto, Japan 2008

Member of the program committee of the conference *Conference on Implementation and Application of Automata* (CIAA 2009), Sydney, Australia 2009

Organisation of the workshop *Automata and Algorithmic Logic* (colocated with DLT 2009), Stuttgart, Germany 2007

Co-chair of the program committee for the workshop *Logic and Computational Complexity* (LCC 2009), Los Angeles, USA 2009

11. Teaching experience

see <http://inf.informatik.uni-stuttgart.de/fmi/ti/personen/Lohrey/lehre.html> for more details

I have given courses in a wide range of different topics in theoretical computer science, e.g: automata theory and formal languages, logic, computability, complexity theory, theory of algorithms, cryptography, formal semantics, data compression.

PhD students

Stefan Göller, Computational complexity of propositional dynamic logic, University of Leipzig, July 2008

Student research projects and diploma theses that I have supervised

Reachability in undirected graphs in logspace, by Thomas Baumann
student research project, University of Stuttgart, 2007

Subword problems on compressed strings, by T. Nonner
diploma thesis, University of Stuttgart, 2005

Parity games on hierarchical graphs, by S. Göller
diploma thesis, University of Stuttgart, 2005

Definability and data compression, by R. Wittmann
student research project, University of Stuttgart, 2002

Word equations in hyperbolic groups, by M. Kufleitner
diploma thesis, University of Stuttgart, 2001

Parallel complexity and space complexity of some problems for Mazurkiewicz traces, by A. Miller
diploma thesis, University of Stuttgart, 2001

An implementation of Luby's algorithm on the Cray T3E, by J. Gross
diploma thesis, University of Stuttgart, 1999

12. Invited talks

Complexity of automatic structures

International Workshop on Automata, Structures and Logic 2004 (satellite workshop of Developments in Language Theory 2004), Auckland, New Zealand, 2004

The submonoid and rational subset membership problems for graph groups

North British Geometric Group Theory Seminar 2007, York, UK, 2007

Algorithmics on compressed strings

Automata and Formal Languages 2008, Balatonfüred, Hungary, 2008

Rational subsets in groups

Automata, Formal Languages and Algebraic Systems 2008 (satellite workshop of Developments in Language Theory 2008), Kyoto, Japan, 2008