Curriculum Vitae

Dr. Achim Blumensath
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Faculty of Informatics
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Education

Habilitation in Mathematics, TU Darmstadt, 2008.
Thesis: *Simple Monadic Theories*

PhD in Mathematics, RWTH Aachen, 2003.
Thesis: *Structures of Bounded Partition Width.*
Advisor: Prof. Erich Grädel

Diploma in Computer Science, RWTH Aachen, 1999.
Thesis: *Automatic Structures.*
Advisor: Prof. Erich Grädel

Research Interests

(a) Computational and algorithmic model theory, finite model theory.

(b) Model theory for monadic second-order logic.

(c) Automata theory and algebraic language theory.

(d) Graph theory and combinatorics.

(e) Model checking and verification, decision procedures for fixed-point logics and fragments of second-order logic.

Employment

since 2016	Assistant professor at Masaryk University Brno
2015–2016	Research associate at TU Darmstadt
2014–2015	Temporary professorship for Discrete Mathematics at TU Darmstadt
2012–2014	Research associate at TU Darmstadt
2011–2012	Research associate at Université Paris 7
2005–2011	Assistant professor at TU Darmstadt
2004	Postdoc position at Université Bordeaux 1
2000–2003	PhD student position at RWTH Aachen
1997–1999	various occupations as tutor or teaching assistant

Research Projects and Grants

2015 *On the Expressive Power of Monadic Second-Order Logic,* Deutsche Forschungsgemeinschaft (DFG), TU Darmstadt
(principal researcher; amount of funding: € 244 100).

2012–2014 *The Expressive Power of Monadic Second-Order Logic, its Fragments, and its Variants,* Deutsche Forschungsgemeinschaft (DFG), TU Darmstadt
(principal researcher; amount of funding: € 166 000).

2008 *Algebraic Characterisations of Regular ω-Tree Languages,*
ESF AutoMathA – Short Visit Grant
(principal researcher; amount of funding: € 800).

2004 *Games and Automata for Synthesis and Validation,*
EU Research and Training Network (post-doctoral research assistant).

2000–2003 *Computational Model Theory,* Deutsche Forschungsgemeinschaft (DFG),
RWTH Aachen (research assistant; principal researcher: Prof. Erich Grädel).

Teaching Experience

For the last decade I have been responsible for tutorials, exercises, and seminars, mostly on undergraduate mathematics, on mathematical logic, and on its applications in computer science. In addition I taught some courses of my own:

summer term 2003	Model Theory
summer term 2005	The Monadic Second-Order Theory of Graphs
winter term 2007/2008	Non-Classical Model Theory
winter term 2008/2009	Graph Theory
summer term 2009	Formal Foundations of Computer Science 1
summer term 2010	Logic and Foundations
winter term 2012/2013	Analysis 1 (English)
summer term 2013	Analysis 2 (English)
summer term 2014	Monadic Second-Order Logic
winter term 2014/2015	Higher Mathematics 1
spring term 2016	Principles of Programming Languages

Five of these were undergraduate courses, while the others were advanced ones. As is typically the case in the German system, these lecture courses were individually and independently developed. Five of the courses were subject to a quality evaluation with respectable results. Two of them were given in English.

Publications

Unpublished papers

[U1] *Logic, Algebra, and Geometry,* book in preparation. A draft is available at www.fi.muni.cz/~blumens

[U2] *A Syntactic Congruence for Infinite Trees,* in preparation.

Handbook chapters

[H1] (with Thomas Colcombet and Christof Löding) *Logical theories and compatible operations,* in Logic and Automata (J. Flum, E. Grädel, T. Wilke, eds.), Amsterdam University Press, 2007, pp. 72–106.

[H2] (with Dietmar Berwanger) *The Monadic Theory of Tree-like Structures,* in Automata, Logic, and Infinite Games (E. Grädel, W. Thomas, T. Wilke, eds.), LNCS 2500 (2002), pp. 285–301.

[H3] (with Dietmar Berwanger) *Automata for Guarded Fixed Point Logics,* in Automata, Logic, and Infinite Games (E. Grädel, W. Thomas, T. Wilke, eds.), LNCS 2500 (2002), pp. 343–355.

Journal articles

[J1] (with David Janin) *A Syntactic Congruence for Languages of Birooted Trees,* Semigroup Forum, 91 (2015), pp. 675–698.

[J2] (with Martin Otto and Mark Weyer) *Decidability Results for the Boundedness Problem,* Logical Methods in Computer Science, 10 (2014).

[J3] (with Bruno Courcelle) *Monadic second-order definable graph orderings,* Logical Methods in Computer Science, 10 (2014).

[J4] *An Algebraic Proof of Rabin's Tree Theorem,* Theoretical Computer Science, 478 (2013), pp. 1–21.

[J5] *Erratum to "On the structure of graphs in the Caucal hierarchy",* Theoretical Computer Science, 475 (2013), pp. 126–127.

[J6] *Locality and Modular Ehrenfeucht-Fraïssé Games,* Journal of Applied Logic, 10 (2012), pp. 144–162.

[J7] *Recognisability for Algebras of Infinite Trees,* Theoretical Computer Science, 412 (2011), pp. 3463–3486.

[J8] *Simple Monadic Theories and Partition Width,* Mathematical Logic Quarterly, 57 (2011), pp. 409–431.

[J9] *Simple Monadic Theories and Indiscernibles,* Mathematical Logic Quarterly, 57 (2011), pp. 65–86.

[J10] (with Bruno Courcelle) *The Monadic Second-Order Transduction Hierarchy,* Logical Methods in Computer Science, 6 (2010).

[J11] *Guarded Second-Order Logic, Spanning Trees, and Network Flows,* Logical Methods in Computer Science, 6 (2010).

[J12] *On the Structure of Graphs in the Caucal Hierarchy,* Theoretical Computer Science, 400 (2008), pp. 19–45.

[J13] (with Bruno Courcelle) *Recognizability, Hypergraph Operations, and Logical Types,* Information and Computation, 204 (2006), pp. 853–919.

[J14] *A Model Theoretic Characterisation of Clique-Width,* Annals of Pure and Applied Logic, 142 (2006), pp. 321–350.

[J15] (with Stephan Kreutzer) *An Extension to Muchnik's Theorem,* Journal of Logic and Computation, 15 (2005), pp. 59–74.

[J16] (with Erich Grädel) *Finite Presentations of Infinite Structures: Automata and Interpretations,* Theory of Computing Systems, 37 (2004), pp. 641–674.

[J17] *Axiomatising tree-interpretable structures,* Theory of Computing Systems, 37 (2004), pp. 3–27.

Papers in refereed conferences

[C1] (with Thomas Colcombet and Paweł Parys), *On a Fragment of AMSO and Tiling Systems,* Proc. 33th Symposium on Theoretical Aspects of Computer Science STACS, 2016.

[C2] (with Olivier Carton and Thomas Colcombet), *Asymptotic Monadic Second-Order Logic,* Mathematical Foundations of Computer Science MFCS (1), 2014, pp. 87–98.

[C3] (with Thomas Colcombet, Denis Kuperberg, Paweł Parys, and Michael Vanden Boom), *Two-Way Cost Automata and Cost Logics over Infinite Trees,* Logic in Computer Science LICS, 2014.

[C4] (with Martin Otto and Mark Weyer) *Boundedness of Monadic Second-Order Formulae Over Finite Words,* ICALP, LNCS 5556 (2009), pp. 67–78.

[C5] (with Erich Grädel) *Finite Presentations of Infinite Structures: Automata and Interpretations,* Proc. 2nd Int. Workshop on Complexity in Automated Deduction, CiAD 2002.

[C6] *Axiomatising tree-interpretable structures,* Proc. 19th Int. Symp. on Theoretical Aspects of Computer Science, LNCS 2285 (2002), pp. 596–607.

[C7] *Bounded Arithmetic and Descriptive Complexity,* Proc. 14th Ann. Conference of the European Association for Computer Science Logic, LNCS 1862 (2000), pp. 232–246.

[C8] (with Erich Grädel) *Automatic Structures,* Proc. 15th IEEE Symp. on Logic in Computer Science, 2000, pp. 51–62.

Theses

[T1] *Simple Monadic Theories,* Habilitation Thesis, TU Darmstadt, 2008.

[T2] *Structures of Bounded Partition Width,* Ph.D. Thesis, RWTH Aachen, 2003.

[T3] *Automatic Structures,* Diploma Thesis, RWTH Aachen, 1999.

Preprints of all my papers are available from:

http://www.mathematik.tu-darmstadt.de/~blumensath/Publications.html

Supervised Theses

[1] Felix Wolf, *Bisimulation Invariant MSO over Classes of Finite Transition Systems,* Master Thesis, 2015.

[2] Elisabeth Jacobi, *Weak Monadic Second-Order Logic on Infinitely Branching Trees,* Diploma Thesis, 2013.

[3] Johanna Stumpf, *Operationen zwischen geordneten Graphklassen,* Bachelor Thesis, 2013.

[4] Daniel Günzel, *The Transduction Hierarchy for Infinite Structures,* Bachelor Thesis, 2010.

Invited Talks

Invited talks at conferences and workshops

[1] *Automata, Logic, and Infinite Games,* Dagstuhl, 2001.

[2] *Workshop on Automata, Structures and Logic,* Auckland, 2004.

[3] *Finitely Represented Infinite Graphs,* Rennes, 2005.

[4] *Logic and Combinatorics,* Szeged, 2006.

[5] *Algorithmic-Logical Theory of Infinite Structures,* Dagstuhl, 2007.

[6] *Logic and Algorithms,* Edinburgh, 2008.

[7] *ASL Winter Meeting, Special Session on Model Theoretic Methods in Finite Combinatorics,* Washington, 2009.

[8] *Higher-Order Recursion Schemes & Pushdown Automata,* Paris, 2010.

[9] *Logic, Combinatorics and Computation,* Brno, 2010.

[10] *Journées Complexité et Modèles Finis,* Paris, 2011.

[11] *Finite Model Theory,* Les Houches, 2012.

[12] *Journées Courcelle,* Bordeaux, 2012.

[13] *Coalgebraic Semantics of Reflexive Economics,* Dagstuhl, 2015.

Invited lectures and stays at universities

[1] University of Dresden, 2003.

[2] University of Paris 7, 2008.

[3] RWTH Aachen, 2008.

[4] Université Bordeaux 1, 2009.

[5] Kurt Gödel Research Center, Vienna, 2011.

[6] Université Bordeaux 1, 2011.

[7] University of Paris 7, 2011.

[8] University of Paris 7, 2013.

[9] University of Warsaw, 2014.

[10] University of Paris 7, 2014.

[11] Simons Institute, Berkley, 2016

Programme committees

I was member of the programme committees of the following conferences:

[1] FoSSaCS 2016

[2] CSL 2015

[3] ICLA 2011

Other academic engagements and activities

I serve as an accountant for the EACSL.
I act as referee for journals and conferences, as illustrated by the (incomplete) listings below.

Refereeing for journals: Journal of Symbolic Logic, Logical Methods in Computer Science, ACM Transactions on Computational Logic, Discrete Mathematics, Discrete Applied Mathematics, Information and Computation, Transactions on Database Systems, Fundamenta Informaticae, Theoretical Computer Science.

Refereeing for conferences: Logic in Computer Science LICS, Computer Science Logic CSL, International Colloquium on Automata, Languages and Programming ICALP, Foundations of Software Technology and Theoretical Computer Science FSTTCS, Symposium on Theoretical Aspects of Computer Science STACS.