# Sasha Rubin – Curriculum Vitae, December 2012


Contact

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University

**Postdoctoral Researcher** (3.2012 – present)
IST Austria and TU Vienna, Austria.

**Visiting Lecturer** (2.2010 – 5.2010)
Department of Mathematics, University of Cape Town, South Africa.

**Visiting Assistant Professor** (08.2008 – 12.2009)
Department of Mathematics, Cornell University, USA.

**Honorary Research Fellow** (12.2004 – 02.2008)
Department of Computer Science, University of Auckland, New Zealand.
Supported by New Zealand Science and Technology Postdoctoral Fellowship.

**PhD** Mathematics and Computer Science (2004)
University of Auckland, New Zealand.
Supervisor: Bakhadyr Khoussainov
Title: Automatic Structures
Awards: Vice-chancellor's prize for the best doctoral thesis in the Faculty of Science, and Montgomery memorial prize in logic from the Department of Philosophy.

Research Interest

I work in theoretical computer science studying the power of automata theory and mathematical logic for describing mathematical structures. Concretely, I have contributed to the following areas: automatic structures, formal verification, and finite model theory. I am currently working on the theory of distributed systems and distributed algorithms using logical and automata-theoretic methods.

Recent Invited Workshop-Talks

*Finite and Algorithmic Model Theory*, Les Houches, France (05.2012)
*Automata theory and Applications*, IMS programme, Singapore (09.2011)
*Computational Model Theory*, CNRS SIG, Bordeaux, France (06.2008)
*Algorithmic-Logical Theory of Infinite Structures*, Dagstuhl, Germany (10.2007)
*Finite and Algorithmic Model Theory*, Newton Institute programme, Durham, England (01.2006)

Recent research visits

Topic: Application of Logic to AI
Host: Łukasz Kaiser, Université Paris Diderot, France (10.2011)

Topic: Games of Imperfect Information and Pushdown Automata
Host: Aniello Murano, Università degli Studi di Napoli Federico II., Italy (08.2011).

Topic: Logical-Interpretability and Trees
Host: Alexander Rabinovich, Tel Aviv University, Israel (5.2011 – 8.2011)

## Refereed

### Journals

Journal of Symbolic Logic, Logical Methods in Computer Science, Central European Journal of Mathematics, Information and Computation, Journal of Logic and Computation, Theory and Practice of Logic Programming, Handbook of Model Checking

### Conferences

LICS, STACS, FoSSaCS, FSTTCS, CSL, CiE, LATA

## Publications (19)

### Book chapters

*Automatic Structures* in *Automata: From mathematics to applications*, J.E. Pin, Ed., to be published by EMS.

*Automata based presentations of infinite structures* with V. Bárány and E. Grädel, in *Finite and Algorithmic Model Theory*, J. Esparza, C. Michaux, and C. Steinhorn, Eds., Series: London Mathematical Society Lecture Note Series (379), 1 – 76, 2011.

### LICS Proceedings

*Interpretations in trees with countably many branches*, with A. Rabinovich, 551 – 560, 2012.

*Automatic Structures: Richness and Limitations*, with B. Khoussainov, A. Nies and F. Stephan, 44 – 53, 2004.

*Automatic Partial Orders*, with B. Khoussainov and F. Stephan, 168 – 177, 2003.

*Some Results on Automatic Structures*, with B. Khoussainov and H. Ishihara, 235 – 244, 2002.

### STACS Proceedings

*Cardinality and counting quantifiers on omega-automatic structures*, with V. Bárány and Ł. Kaiser, 385 – 396, 2008.

*Order invariant MSO is stronger than counting MSO*,with T. Ganzow, 313 – 324, 2008.

*Definability and Regularity in Automatic Structures*, with B. Khoussainov and F. Stephan, 440 – 451, 2004.

### CAV Proceedings

*Verifying $\omega$-regular Properties of Markov Chains*, with D. Bustan and M. Vardi, 189 – 201, 2004.

### Other conferences

*How to Travel Between Languages* with K. Chatterjee and S. Chaubal, *LATA*, 2013.

*A Myhill-Nerode Theorem for Automata with Advice* with A. Kruckman, J. Sheridan and B. Zax, *GandALF*, 238 – 246, 2012.

**Journals**

*Alternating Traps in Parity Games* with P. Phalitnonkiat, A. Grinshpun, A.Tarfulea, accepted to *Theoretical Computer Science*.

*Automata presenting structures: A survey of the finite-string case*, The Bulletin of Symbolic Logic, $14(2), 169 - 209, 2008$.

*Automatic Structures: Richness and Limitations*, with B. Khoussainov, A. Nies and F. Stephan, Logical Methods in Computer Science, Vol 3, 2007.

*Automatic linear orders and trees*, with B. Khoussainov and F. Stephan, ACM Transactions on Computational Logic, $6(4), 675 - 700, 2005$.

*Automatic Structures - Overview and Future Directions*, with B. Khoussainov, Journal of Automata, Languages and Combinatorics, $8(2), 287 - 301, 2003$.

*Graphs with Automatic Presentations over a Unary Alphabet* Journal of Automata, Languages and Combinatorics, $6(4), 467 - 480, 2001$.

*Finite Automata and Well Ordered Sets*, New Zealand Journal of Computing, $7(2), 39 - 46, 1999$.

## Undergraduate Teaching philosophy

My goal as a teacher is to guide students through the material (eg. I point out which ideas are fundamental and which are technicalities), show students how the material is relevant to their degree, and help students think deeply. In order to discover good teaching principles I regularly self-evaluate and engage colleagues. I employ questions which encourage students to express themselves clearly and internalise the material, eg. 'can anyone help A with her answer?', 'can you explain B's idea to me?', 'what do you mean by X?', 'are you sure?'. Another successful technique I have used to engage students is to administer an easy online quiz on textbook material to be covered in the next lecture; as a result, students were much more prepared to understand the material when they came to class.

## Supervision and Teaching

**Supervision**

Ongoing PhD project
Topic: Synthesis of Distributed Systems.
*IST Austria* (2013)

Summer undergraduate project
Topic: Edit-distance and Formal Languages.
*IST Austria* (2012)

Summer research experience for undergraduates
Topic 1: Parity Games.
Topic 2: Automatic Structures with Advice.
*Cornell University, Department of Mathematics* (2009)

**Teaching**

Logical Definability and Random Graphs (graduate)
*Cornell University, Department of Mathematics* (2009)

Logic and Computation (undergraduate)
*University of Cape Town, Department of Mathematics* (2010)

Calculus for Engineers (undergraduate)
*Cornell University, Department of Mathematics* (2008 – 2009)

Computational Biology (undergraduate, TA)
*University of Auckland, Department of Computer Science* (2008)

Discrete Structures in Mathematics and Computer Science (undergraduate)
Mathematical Foundations of Software Engineering (undergraduate)
*University of Auckland, Department of Computer Science* (2007)

Logic and Computation in Finitely Presentable Infinite Structures (five day advanced course)
*European Summer School in Logic, Language and Information, Malaga* with V. Goranko (2006)

## Academic References

**Erich Grädel**
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**Bakhadyr Khoussainov**
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## Teaching References

**Maria Terrell**
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**David Way**
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