

# Curriculum Vitae of Mikhail Alekhnovich

*Citizenship:* Russian

*Address:*

School of Mathematics

Institute for Advanced Study

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## Objective

Faculty position in Theoretical Computer Science for Fall 2005

## Research Interests

Computational Complexity

Propositional Complexity

Algorithms

## References

### **Avi Wigderson**

Faculty member of School of Mathematics

Institute for Advanced Study, Princeton NJ

### **Alexander A. Razborov**

Visiting professor of School of Mathematics

Institute for Advanced Study, Princeton NJ

On leave from Steklov Mathematical Institute, Moscow, Russia

### **Madhu Sudan**

Professor of Computer Science Department

Massachusetts Institute of Technology, Cambridge MA

### **Toniann Pitassi**

Professor of Computer Science Department

University of Toronto, Canada

## Education

### Massachusetts Institute of Technology

Fall 2001-2003:

Graduate student in Department of Mathematics

*Degree awarded:*

Ph.D. of Science (Applied Mathematics and Computer Science)

*Diploma thesis:*

Propositional Proof Systems: Efficiency and Automatizability

*Thesis Supervisor:*

Prof. Madhu Sudan

## Moscow State University

Fall 1995-2000: Student in Department of Mathematics and Mechanics  
*Degree awarded:* Diploma with Honors (B.A. equivalent)  
*Diploma thesis:* Pseudorandom generators in Propositional Proof Complexity  
*Thesis Supervisor:* Prof. Alexander A. Razborov

## Professional Experience

### Institute for Advanced Study

Fall 2003-2005: Member  
*Host:* Prof. Avi Wigderson

### Massachusetts Institute of Technology

Fall 2002-2003: Research Assistant  
*Supervisor:* Prof. Madhu Sudan

### Institute for Advanced Study

Fall 2000-2001: Member in the special program on *Computational Complexity*  
*Host:* Prof. Avi Wigderson

## Awards

- Recipient of the MIT Applied Mathematics Fellowship Award, 2000-2001

## Conferences, Speaking and Refereeing

### Invited participant

- Workshop on: The Propositional Satisfiability Problem – Algorithms and Lower Bounds  
Schloss Dagstuhl, 2003
- Workshop on Complexity of Boolean Functions  
Schloss Dagstuhl, 2002
- Workshop on Circuit and Proof Complexity  
ICMS Edinburgh, 2001

### Invited speaker

- Analysis of the Random Walk Algorithm on Random CNF Formulas  
NEC Labs Research Seminar, 2003
- More on Average case vs. approximation complexity  
NYU Cryptography Seminar, 2003

## Conference talks

- *More on Average Case vs Approximation Complexity*  
44th Annual IEEE Symposium on FOCS 2003, Cambridge, MA, 2003
- *Linear Diophantine Equations over Polynomials and Soft Decoding of Reed-Solomon Codes*  
43rd Annual IEEE Symposium on FOCS, Vancouver, Canada, 2002
- *Satisfiability, Branch-Width and Tseitin Tautologies*  
43rd Annual IEEE Symposium on FOCS, Vancouver, Canada, 2002
- *An exponential separation between regular and general resolution*  
34th Annual ACM STOC, Montréal, Québec, Canada, 2002
- *Resolution is Not Automatizable Unless  $W[P]$  is Tractable*  
42nd Annual IEEE Symposium on FOCS, Las Vegas, Nevada, 2001
- *Pseudorandom Generators in Propositional Proof Complexity*  
41st Annual IEEE Symposium on FOCS, Redondo Beach, California, 2000
- *Minimum Propositional Proof Length is NP-Hard to Linearly Approximate*  
23rd International Symposium MFCS, Brno, Czech Republic, 1998

## Referee for

- ACM Transactions on Computational Logic
- SIAM Journal on Computing
- IEEE Transactions on Information Theory
- Information Processing Letters
- 45th Annual IEEE Symposium on FOCS, 2004
- 36th Annual ACM STOC, 2004
- 19th Annual IEEE Conf. on Computational Complexity, 2004

## Publications

### Recently Submitted

- Hardness of approximating the closest vector problem with pre-processing  
Michael Alekhnovich, Subhash Khot, Guy Kindler, Nisheeth Vishnoi
- Inapproximability of Fixed Parameter Problems  
Michael Alekhnovich, Subhash Khot, Toniann Pitassi

### In Journals

- Learnability and Automatizability  
Michael Alekhnovich, Mark Braverman, Vitaly Feldman, Adam Klivans, Toniann Pitassi  
To appear in *JCSS* special issue on learning theory papers of 2004
- Exponential lower bounds for the running time of DPLL algorithms on satisfiable formulas  
Michael Alekhnovich, Edward A. Hirsch, Dmitry Itsykson  
To appear in 2005 SAT special issue of the *Journal of Automated Reasoning*
- Linear Diophantine Equations over Polynomials and Soft Decoding of Reed-Solomon Codes  
Michael Alekhnovich  
To appear in *IEEE Transactions on Information Theory*
- Mutilated chessboard problem is exponentially hard for resolution  
Michael Alekhnovich  
*Theoretical Computer Science*, 2004
- Lower Bounds for Polynomial Calculus: Non-Binomial Case  
Michael Alekhnovich, Alexander A. Razborov  
In *Proceedings of the Steklov Institute of Mathematics*, 2003
- Pseudorandom Generators in Propositional Proof Complexity  
Michael Alekhnovich, Eli Ben-Sasson, Alexander A. Razborov, Avi Wigderson  
*SIAM Journal on Computing*, 2004
- Space Complexity in Propositional Calculus  
Michael Alekhnovich, Eli Ben-Sasson, Alexander A. Razborov, Avi Wigderson  
*SIAM Journal on Computing*, 2002
- Minimum Propositional Proof Length is NP-Hard to Linearly Approximate  
Michael Alekhnovich, Samuel R. Buss, Shlomo Moran, Toniann Pitassi  
*Journal of Symbolic Logic*, 2001

- Toward a Model for Backtracking and Dynamic Programming  
Michael Alekhnovich, Allan Borodin, Joshua Buresh-Oppenheim, Russell Impagliazzo, Avner Magen, Toniann Pitassi  
To appear in *Proc. 20th Annual Conference on Computational Complexity*, 2005
- Towards strong nonapproximability results in the Lovász-Schrijver hierarchy  
Michael Alekhnovich, Sanjeev Arora, Iannis Turlakis  
To appear in *Proc. 37th Annual ACM STOC*, 2005
- Lower bounds for k-DNF Resolution on random 3-CNFs  
Michael Alekhnovich  
To appear in *Proc. 37th Annual ACM STOC*, 2005
- Learnability and Automatizability  
Michael Alekhnovich, Mark Braverman, Vitaly Feldman, Adam Klivans, Toniann Pitassi  
In *Proc. 44th IEEE Symposium on FOCS*, 2004
- Exponential lower bounds for the running time of DPLL algorithms on satisfiable formulas  
Michael Alekhnovich, Edward A. Hirsch, Dmitry Itsykson  
In *Proc. 31st ICALP*, 2004
- More on Average Case vs Approximation Complexity  
Michael Alekhnovich  
In *Proc. 44th IEEE Symposium on FOCS*, 2003
- Linear Upper Bounds for Random Walk on Small Density Random 3-CNF  
Michael Alekhnovich, Eli Ben-Sasson  
In *Proc. 44th IEEE Symposium on FOCS*, 2003
- Linear Diophantine Equations over Polynomials and Soft Decoding of Reed-Solomon Codes  
Michael Alekhnovich  
In *Proc. 43rd IEEE Symposium on FOCS*, 2002
- Satisfiability, Branch-Width and Tseitin Tautologies  
Michael Alekhnovich, Alexander A. Razborov  
In *Proc. 43rd IEEE Symposium on FOCS*, 2002
- An exponential separation between regular and general resolution  
Michael Alekhnovich, Jan Johannsen, Toniann Pitassi, Alasdair Urquhart  
In *Proc. 34th Annual ACM STOC*, 2002
- Lower Bounds for Polynomial Calculus: Non-Binomial Case  
Michael Alekhnovich, Alexander A. Razborov  
In *Proc. 42nd IEEE Symposium on FOCS*, 2001
- Resolution is Not Automatizable Unless  $W[P]$  is Tractable  
Michael Alekhnovich, Alexander A. Razborov  
In *Proc. 42nd IEEE Symposium on FOCS*, 2001

- Pseudorandom Generators in Propositional Proof Complexity  
Michael Alekhnovich, Eli Ben-Sasson, Alexander A. Razborov, Avi Wigderson  
In *Proc. 41st IEEE Symposium on FOCS*, 2000
- Space Complexity in Propositional Calculus  
Michael Alekhnovich, Eli Ben-Sasson, Alexander A. Razborov, Avi Wigderson  
In *Proc. 32nd Annual ACM STOC*, 2000
- Minimum Propositional Proof Length is NP-Hard to Linearly Approximate  
Michael Alekhnovich, Samuel R. Buss, Shlomo Moran, Toniann Pitassi  
In *Proc. 23rd International Symposium MFCS*, 1998