

Dmitry Sokolov

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Biographical Data

Citizenship Russia

Date and place of birth 23th August 1988, Leningrad, USSR

Research Interests

Proof complexity, computational complexity, communication complexity, average-case complexity

Education

2011–2015 **PhD.**, *St. Petersburg Department of V.A. Steklov Institute of Mathematics of the Russian Academy of Sciences, St. Petersburg, Russia.*

- Advisors: E. A. Hirsch, D. M. Itsykson
- Area of study: proof complexity, computational complexity
- Thesis title: *On the Complexity of Splitting Algorithms for Boolean Satisfiability Problem (in russian)*

2009–2011 **Master**, *St. Petersburg Academic University of the Russian Academy of Science, St. Petersburg, Russia.*

- Advisor: D. M. Itsykson
- Major: Theoretical Computer Science
- Thesis title: *Hard examples for heuristic DPLL algorithm's for SAT*

2009–2011 **Master**, *St. Petersburg University of Information Technology, Mechanic and Optics, St. Petersburg, Russia.*

- Advisor: D. M. Itsykson
- Major: Applied Mathematics and Computer Science
- Thesis title: *Lower bounds of inversion of Goldreich's function*

2005–2009 **Bachelor**, *St. Petersburg University of Information Technology, Mechanic and Optics, St. Petersburg, Russia.*

- Major: Applied Mathematics and Computer Science
- Thesis title: *An application of genetic algorithms in creation of finite automaton operating the tank model in game Robocode*

Additional Education

Computer Science Club

Mathematics and physics club

Research Positions

2017–present Postdoc at KTH university

2014–2017 Junior Researcher at St. Petersburg Department of V.A. Steklov Institute of Mathematics of the Russian Academy of Sciences

2013–2013 Early stage researcher at Charles University Participant of Prague Special Semester in Logic and Complexity

Publications

Mika Göös, Pritish Kamath, Robert Robere, and Dmitry Sokolov. Adventures in monotone complexity and tfnp. In *Proceedings of the Innovations in Theoretical Computer Science*, ITCS 2019, 2019. <https://eccc.weizmann.ac.il/report/2018/163/>.

Sam Buss, Dmitry Itsykson, Alexander Knop, and Dmitry Sokolov. Breaking Through the Reordering Obstacle in OBDD Proof Systems. Submitted to STACS 2019.

Sam Buss, Dmitry Itsykson, Alexander Knop, and Dmitry Sokolov. Reordering Rule Makes OBDD Proof Systems Stronger. In Rocco A. Servedio, editor, *33rd Computational Complexity Conference (CCC 2018)*, volume 102 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 16:1–16:24, Dagstuhl, Germany, 2018. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.

Ankit Garg, Mika Göös, Pritish Kamath, and Dmitry Sokolov. Monotone circuit lower bounds from resolution. In *Proceedings of the 50th Annual ACM SIGACT Symposium on Theory of Computing*, STOC 2018, pages 902–911, New York, NY, USA, 2018. ACM. <https://eccc.weizmann.ac.il/report/2017/175/>.

Dmitry Sokolov. Dag-like communication and its applications. In *Computer Science – Theory and Applications: 12th International Computer Science Symposium in Russia, CSR 2017, Kazan, Russia, June 8–12, 2017, Proceedings*, pages 294–307. Springer International Publishing, 2017.

Dmitry Itsykson, Alexander Knop, Andrey Romashchenko, and Dmitry Sokolov. On OBDD-Based Algorithms and Proof Systems That Dynamically Change Order of Variables. In Heribert Vollmer and Brigitte Vallée, editors, *34th Symposium on Theoretical Aspects of Computer Science (STACS 2017)*, volume 66 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 43:1–43:14, Dagstuhl, Germany, 2017. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.

Dmitry Itsykson, Alexander Knop, and Dmitry Sokolov. Complexity of Distributions and Average-Case Hardness. In Seok-Hee Hong, editor, *27th International Symposium on Algorithms and Computation (ISAAC 2016)*, volume 64 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 38:1–38:12, Dagstuhl, Germany, 2016. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.

Dmitry Itsykson, Vsevolod Oparin, Mikhail Slabodkin, and Dmitry Sokolov. Tight lower bounds on the resolution complexity of perfect matching principles. *Fundam. Inform.*, 145(3):229–242, 2016.

Dmitry Itsykson, Alexander Knop, and Dmitry Sokolov. Heuristic time hierarchies via hierarchies for sampling distributions. In Khaled Elbassioni and Kazuhisa Makino, editors, *Algorithms and Computation*, volume 9472 of *Lecture Notes in Computer Science*, pages 201 – 211. Springer Berlin Heidelberg, 2015.

Edward A. Hirsch and Dmitry Sokolov. On the probabilistic closure of the loose unambiguous hierarchy. *Inf. Process. Lett.*, 115(9):725–730, 2015.

Dmitry Itsykson, Anna Malova, Vsevolod Oparin, and Dmitry Sokolov. Tree-like resolution complexity of two planar problems. *CoRR*, abs/1412.1124, 2014.

Dmitry Itsykson and Dmitry Sokolov. Lower bounds for splittings by linear combinations. In *Mathematical Foundations of Computer Science 2014 - 39th International Symposium, MFCS 2014, Budapest, Hungary, August 25-29, 2014. Proceedings, Part II*, pages 372–383, 2014.

Dmitry Sokolov. Lower bounds for DPLL algorithms with splitting over linear functions. 2014. PDMI Preprint.

Dmitry Itsykson and Dmitry Sokolov. On fast heuristic non-deterministic algorithms and short heuristic proofs. *Fundam. Inf.*, 132(1):113–129, January 2014.

Dmitry Itsykson and Dmitry Sokolov. Lower bounds for myopic DPLL algorithms with a cut heuristic. In *Proceedings of the 22nd international conference on Algorithms and Computation, ISAAC'11*, pages 464–473, Berlin, Heidelberg, 2011. Springer-Verlag. ECCS TR12-141.

Dmitry Itsykson and Dmitry Sokolov. The complexity of inversion of explicit goldreich's function by DPLL algorithms. In *Proceedings of the 6th international conference on Computer science: theory and applications, CSR'11*, pages 134–147, Berlin, Heidelberg, 2011. Springer-Verlag.

Talks

- 2018 “Reordering Rule Makes OBDD Proof Systems Stronger.” CCC-2018, San Diego, USA
- 2018 “Monotone Circuit Lower Bounds from Resolution.” Dagstuhl seminar “Proof Complexity”, Germany
- 2017 “Dag-like communication and its application.” CSR-2017, Kazan, Russia
- 2016 “Dag-like communication and its application.” Problems in Theoretical Computer Science, Moscow, Russia
- 2015 “Complexity of distributions and average-case hardness.” Problems in Theoretical Computer Science, Moscow, Russia
- 2015 “Lower Bounds for Splittings by Linear Combinations.” ELC mini-workshop, Tokyo, Japan
- 2014 “Examples of heuristic proof.” Dagstuhl seminar “Optimal algorithms and proofs” (14421)
- 2014 “Lower Bounds for Splittings by Linear Combinations.” Mathematical Foundations of Computer Science 2014 - 39th International Symposium, Budapest, Hungary
- 2013 “Lower bounds on DPLL algorithms with splitting over linear functions on unsatisfiable formulas.” Franco-Russian workshop on Algorithms, complexity and applications, Moscow, Russia
- 2013 “On short heuristic proofs.” MALOA Final Conference Logic and Interactions, Luminy, France
- 2012 “On short heuristic proofs.” Second Russian Finnish Symposium on Discrete Mathematics (RuFiDim'12) , Turku, Finland
- 2011 “Lower bounds for myopic DPLL algorithms with a cut heuristic.” The 22nd International Symposium on Algorithms and Computation (ISAAC'11), Yokohama, Japan
- 2011 “Lower bounds for myopic DPLL algorithms with a cut heuristic.” First Russian Finnish Symposium on Discrete Mathematics (RuFiDim'11), St. Petersburg, Russia

- 2011 “Inverting the explicit Goldreich’s function with DPLL algorithms” The 6th International Computer Science Symposium in Russia (CSR’11), St. Petersburg, Russia

Schools

- 2017 Swedish Summer School in Computer Science ($S^3CS'17$), Stockholm, Sweden
2015 Swedish Summer School in Computer Science ($S^3CS'15$), Stockholm, Sweden
2014 Swedish Summer School in Computer Science ($S^3CS'14$), Stockholm, Sweden
2013 Computer Science E-Days (CSEDays’13), Ekaterinburg, Russia
2012 17th Estonian Winter School in Computer Science (EWSCS’12), Palmse, Estonia

Teaching

- 2011–present St. Petersburg Academic University
2011–present Computer Science Center

Achievements and awards

- 2014 Young Russian Math Contest (“Dynasty foundation”). Winner
2013 The medal of Foundation for support of education and science (Alferov’s foundation)
2009 Third diploma of North-Easter European Subregional Contest. Results

Technical skills

C/C++, Java, Linux, Latex