Dmitry Sokolov

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Biographical Data

Citizenship: Russia

Date and place of birth: 23^{th} 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

Ankit Garg, Mika Göös, Pritish Kamath, and Dmitry Sokolov. Monotone circuit lower bounds from resolution. https://eccc.weizmann.ac.il/report/2017/175/.

Sam Buss, Dmitry Itsykson, Alexander Knop, and Dmitry Sokolov. Reordering rule makes OBDD proof systems stronger. In progress.

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. ECCC 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

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