

Alexander S. Kulikov

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Present Positions

- 2005–present Steklov Institute of Mathematics at St. Petersburg, Russian Academy of Sciences, Senior research fellow
- 2007–present Computer Science Center, Founder and board member

Education

- 2009–2017 Dr.Sc. in Computer Science (advanced version of Ph.D.), Steklov Institute of Mathematics at St. Petersburg, Russian Academy of Sciences
- 2005–2009 Ph.D. in Computer Science, Steklov Institute of Mathematics at St. Petersburg, Russian Academy of Sciences
- 2000–2005 M.Sc. in Computer Science, St. Petersburg State University (Diploma cum laude, GPA: 5.0/5.0)

Research Interests

Algorithms, Computational Complexity

Honors and Awards

- 2016 Best Young Researcher Award by Steklov Institute of Mathematics at St. Petersburg, Russian Academy of Sciences
- 2015 Scopus Award Russia by Elsevier
- 2012 Euler Award by the Government of St. Petersburg
- 2004, 2005 3rd degree Diplomas of All-Russian School Contests in Mathematics

Teaching

- 2018 Algorithms and data structures, Computer Science Center
- 2017 Algorithms for NP-hard Problems, St. Petersburg State University
- 2017 Design and analysis of algorithms (CSE 202), UCSD
- 2016 Algorithms and data structures, Harbour.Space
- 2016 Algorithms for NP-hard problems, Kazan Federal University
- 2015 Algorithms (CSE 101), UCSD
- 2014 Algorithms and data structures, St. Petersburg Academic University
- 2014 Parameterized algorithms, St. Petersburg Academic University
- 2014 Circuit complexity, Computer Science Center
- 2013 Algorithms and data structures, St. Petersburg Academic University
- 2013 Algorithms for NP-hard problems, Ural Federal University
- 2012 Algorithms and data structures, St. Petersburg Academic University
- 2012 Algorithms for NP-hard problems, St. Petersburg Academic University
- 2011 Algorithms and data structures, St. Petersburg Academic University

- 2011 Circuit complexity, St. Petersburg Academic University
- 2010 Algorithms and data structures, St. Petersburg Academic University
- 2010 Algorithms for NP-hard problems, St. Petersburg Academic University
- 2009 Algorithms and data structures, St. Petersburg Academic University

MOOCs

- 2017 Discrete Mathematics, six courses long specialization at Coursera, joint with Alexander Golovnev, Michael Levin, Vladimir Podolskii, Alexander Shen
- 2016 Data Structures and Algorithms, six courses long specialization at Coursera, joint with Daniel Kane, Michael Levin, Pavel Pevzner, Neil Rhodes
- 2015 Data Structures, Stepic (in Russian)
- 2014 Algorithms, Stepic (in Russian)

Books

- 2018 Learning Algorithms through Programming and Puzzle Solving, with Pavel Pevzner, Leanpub.

Invited Talks

- 2018 13th International Computer Science Symposium in Russia (CSR 2018)
- 2018 Design, Automation and Test in Europe (DATE 2018)

Program Committees

- 2018 13th International Computer Science Symposium in Russia (CSR 2018)
- 2016 11th Computer Science Symposium in Russia (CSR 2016), St. Petersburg, Russia
- 2014 (co-chair) 25th Annual Symposium on Combinatorial Pattern Matching (CPM 2014), Moscow, Russia
- 2013 8th Computer Science Symposium in Russia (CSR 2013), Ekaterinburg, Russia
- 2013 (chair) Computer Science E-Days (CSEDays 2013), Ekaterinburg, Russia, 2013
- 2012 RECOMB Satellite Conference on Open Problems in Algorithmic Biology (RECOMB-AB 2012), St. Petersburg, Russia

Organizing Committees

- 2018 (chair) Second Recent Advances in Algorithms Student School (RAA 2018), St. Petersburg, Russia
- 2017 (chair) Recent Advances in Algorithms Student School (RAA 2017), St. Petersburg, Russia
- 2016 (chair) 11th Computer Science Symposium in Russia (CSR 2016), St. Petersburg, Russia
- 2016 (chair) 15th International Symposium on Experimental Algorithms (SEA 2016), St. Petersburg, Russia
- 2014 25th Annual Symposium on Combinatorial Pattern Matching (CPM 2014), Moscow, Russia, 2014
- 2014 9th Computer Science Symposium in Russia (CSR 2014), Moscow, Russia

- 2013 Computer Science E-Days (CSEDays 2013), Ekaterinburg, Russia
- 2013 Microsoft School on Algorithms for Massive Data (ALMADA 2013), Moscow, Russia
- 2012 (chair) RECOMB Satellite Conference on Open Problems in Algorithmic Biology (RECOMB-AB 2012), St. Petersburg, Russia
- 2011 (chair) 6th Computer Science Symposium in Russia (CSR 2011), St. Petersburg, Russia
- 2010 Microsoft School on Data Structures and Algorithms (MIDAS 2010), St. Petersburg, Russia
- 2009 (chair) NoNA Summer School on Complexity Theory (SSCT 09), St. Petersburg, Russia
- 2006 Computer Science Symposium in Russia (CSR 2006), St. Petersburg, Russia

Refereeing

- Journals Algorithmica, Discrete Math, IJFCS, IPL, TALG, Theor Comput Sci, TOCT
- Conferences COCOON, CPM, CSR, FCT, IPEC, MFCS, SAT, SODA, STACS

Editing

- 2016 Proceedings of the 11th Computer Science Symposium in Russia (CSR 2016), Volume 9691 of Lecture Notes in Computer Science, Springer
- 2016 Proceedings of the 15th International Symposium on Experimental Algorithms (SEA 2016), Volume 9685 of Lecture Notes in Computer Science, Springer
- 2014 Proceedings of the 25th Annual Symposium on Combinatorial Pattern Matching (CPM 2014), Volume 8486 of Lecture Notes in Computer Science, Springer
- 2012 Notes of Scientific Seminars of the St. Petersburg Department of the Steklov Mathematical Institute, Russian Academy of Sciences. Computational Complexity Theory, Part X. Volume 399, 2012. English translation: Journal of Mathematical Sciences, Springer, Volume 188, Issue 1, 2013
- 2011 Proceedings of the 6th Computer Science Symposium in Russia (CSR 2011), Volume 6651 of Lecture Notes in Computer Science, Springer

Publications

- [1] Alexander S. Kulikov and Gerhard J. Woeginger. Preface to the special issue on computer science in russia 2016. *Theory Comput. Syst.*, 62(3):465–466, 2018.
- [2] Alexander Golovnev, Alexander S. Kulikov, Alexander V. Smal, and Suguru Tamaki. Gate elimination: Circuit size lower bounds and #SAT upper bounds. *Theor. Comput. Sci.*, 719:46–63, 2018.
- [3] Alexander S. Kulikov. Lower bounds for unrestricted boolean circuits: Open problems. In *Computer Science - Theory and Applications - 13th International Computer Science Symposium in Russia, CSR 2018, Moscow, Russia, June 6-10, 2018, Proceedings*, pages 15–22, 2018.
- [4] Alexander S. Kulikov. Improving circuit size upper bounds using sat-solvers. In *2018 Design, Automation & Test in Europe Conference & Exhibition, DATE 2018, Dresden, Germany, March 19-23, 2018*, pages 305–308, 2018.

- [5] Ivan Bliznets, Fedor V. Fomin, Petr A. Golovach, Nikolay Karpov, Alexander S. Kulikov, and Saket Saurabh. Parameterized complexity of superstring problems. *Algorithmica*, 79(3):798–813, 2017.
- [6] Marek Cygan, Fedor V. Fomin, Alexander Golovnev, Alexander S. Kulikov, Ivan Mihajlin, Jakub Pachocki, and Arkadiusz Socala. Tight lower bounds on graph embedding problems. *J. ACM*, 64(3):18:1–18:22, 2017.
- [7] Fedor V. Fomin, Petr A. Golovach, Nikolay Karpov, and Alexander S. Kulikov. Parameterized complexity of secluded connectivity problems. *Theory Comput. Syst.*, 61(3):795–819, 2017.
- [8] Marek Cygan, Fedor V. Fomin, Alexander Golovnev, Alexander S. Kulikov, Ivan Mihajlin, Jakub Pachocki, and Arkadiusz Socala. Tight bounds for graph homomorphism and subgraph isomorphism. *Journal of the ACM*, 2017.
- [9] Alexander S. Kulikov and Vladimir V. Podolskii. Computing majority by constant depth majority circuits with low fan-in gates. In Vollmer and Vallée [10], pages 49:1–49:14.
- [10] Heribert Vollmer and Brigitte Vallée, editors. *34th Symposium on Theoretical Aspects of Computer Science, STACS 2017, March 8-11, 2017, Hannover, Germany*, volume 66 of *LIPICs*. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2017.
- [11] Alexander Golovnev, Alexander S. Kulikov, and Ivan Mihajlin. Families with infants: Speeding up algorithms for NP-hard problems using FFT. *ACM Trans. Algorithms*, 12(3):35:1–35:17, 2016.
- [12] Magnus Gausdal Find, Alexander Golovnev, Edward A. Hirsch, and Alexander S. Kulikov. A better-than- $3n$ lower bound for the circuit complexity of an explicit function. In *FOCS*, pages 89–98. IEEE Computer Society, 2016.
- [13] Alexander Golovnev and Alexander S. Kulikov. Weighted gate elimination: Boolean dispersers for quadratic varieties imply improved circuit lower bounds. In *ITCS*, pages 405–411. ACM, 2016.
- [14] Alexander Golovnev, Alexander S. Kulikov, Alexander V. Smal, and Suguru Tamaki. Circuit size lower bounds and #SAT upper bounds through a general framework. In *MFCS*, volume 58 of *LIPICs*, pages 45:1–45:16. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2016.
- [15] Alexander Golovnev, Edward A. Hirsch, Alexander Knop, and Alexander S. Kulikov. On the limits of gate elimination. In *MFCS*, volume 58 of *LIPICs*, pages 46:1–46:13. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2016.
- [16] Marek Cygan, Fedor V. Fomin, Alexander Golovnev, Alexander S. Kulikov, Ivan Mihajlin, Jakub Pachocki, and Arkadiusz Socala. Tight bounds for graph homomorphism and subgraph isomorphism. In *SODA*, pages 1643–1649. SIAM, 2016.
- [17] Alexander S. Kulikov and Gerhard J. Woeginger, editors. *Computer Science - Theory and Applications - 11th International Computer Science Symposium in Russia, CSR 2016, St. Petersburg, Russia, June 9-13, 2016, Proceedings*, volume 9691 of *Lecture Notes in Computer Science*. Springer, 2016.

- [18] Andrew V. Goldberg and Alexander S. Kulikov, editors. *Experimental Algorithms - 15th International Symposium, SEA 2016, St. Petersburg, Russia, June 5-8, 2016, Proceedings*, volume 9685 of *Lecture Notes in Computer Science*. Springer, 2016.
- [19] Evgeny Demenkov, Alexander S. Kulikov, Olga Melanich, and Ivan Mihajlin. New lower bounds on circuit size of multi-output functions. *Theory Comput. Syst.*, 56(4):630–642, 2015.
- [20] Ivan Bliznets, Fedor V. Fomin, Petr A. Golovach, Nikolay Karpov, Alexander S. Kulikov, and Saket Saurabh. Parameterized complexity of superstring problems. In *CPM*, volume 9133 of *Lecture Notes in Computer Science*, pages 89–99. Springer, 2015.
- [21] Alexander S. Kulikov, Sergey Savinov, and Evgeniy Sluzhaev. Greedy conjecture for strings of length 4. In *CPM*, volume 9133 of *Lecture Notes in Computer Science*, pages 307–315. Springer, 2015.
- [22] Fedor V. Fomin, Petr A. Golovach, Nikolay Karpov, and Alexander S. Kulikov. Parameterized complexity of secluded connectivity problems. In *FSTTCS*, volume 45 of *LIPICs*, pages 408–419. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2015.
- [23] Fedor V. Fomin, Alexander Golovnev, Alexander S. Kulikov, and Ivan Mihajlin. Lower bounds for the graph homomorphism problem. In *ICALP (1)*, volume 9134 of *Lecture Notes in Computer Science*, pages 481–493. Springer, 2015.
- [24] Alexander Golovnev, Alexander S. Kulikov, and Ivan Mihajlin. Solving SCS for bounded length strings in fewer than 2^n steps. *Inf. Process. Lett.*, 114(8):421–425, 2014.
- [25] Alexander Golovnev, Alexander S. Kulikov, and Ivan Mihajlin. Families with infants: A general approach to solve hard partition problems. In *ICALP (1)*, volume 8572 of *Lecture Notes in Computer Science*, pages 551–562. Springer, 2014.
- [26] Alexander S. Kulikov, Sergei O. Kuznetsov, and Pavel A. Pevzner, editors. *Combinatorial Pattern Matching - 25th Annual Symposium, CPM 2014, Moscow, Russia, June 16-18, 2014. Proceedings*, volume 8486 of *Lecture Notes in Computer Science*. Springer, 2014.
- [27] Alexander Golovnev, Alexander S. Kulikov, and Ivan Mihajlin. Approximating shortest superstring problem using de bruijn graphs. In *CPM*, volume 7922 of *Lecture Notes in Computer Science*, pages 120–129. Springer, 2013.
- [28] Alexander Golovnev, Alexander S. Kulikov, and Ivan Mihajlin. Solving 3-superstring in $3^{n/3}$ time. In *MFCS*, volume 8087 of *Lecture Notes in Computer Science*, pages 480–491. Springer, 2013.
- [29] Anton Bankevich, Sergey Nurk, Dmitry Antipov, Alexey A. Gurevich, Mikhail Dvorkin, Alexander S. Kulikov, Valery M. Lesin, Sergey I. Nikolenko, Son K. Pham, Andrey D. Prjibelski, Alex Pyshkin, Alexander Sirotkin, Nikolay Vyahhi, Glenn Tesler, Max A. Alekseyev, and Pavel A. Pevzner. Spades: A new genome assembly algorithm and its applications to single-cell sequencing. *Journal of Computational Biology*, 19(5):455–477, 2012.
- [30] Alexander S. Kulikov, Olga Melanich, and Ivan Mihajlin. A $5n - o(n)$ lower bound on the circuit size over u_2 of a linear boolean function. In *CiE*, volume 7318 of *Lecture Notes in Computer Science*, pages 432–439. Springer, 2012.

- [31] Evgeny Demenkov, Alexander S. Kulikov, Ivan Mihajlin, and Hiroki Morizumi. Computing all mod-functions simultaneously. In *CSR*, volume 7353 of *Lecture Notes in Computer Science*, pages 81–88. Springer, 2012.
- [32] Alexander S. Kulikov and Nikolay K. Vereshchagin, editors. *Computer Science - Theory and Applications - 6th International Computer Science Symposium in Russia, CSR 2011, St. Petersburg, Russia, June 14-18, 2011. Proceedings*, volume 6651 of *Lecture Notes in Computer Science*. Springer, 2011.
- [33] Evgeny Demenkov and Alexander S. Kulikov. An elementary proof of a $3n - o(n)$ lower bound on the circuit complexity of affine dispersers. In *MFCs*, volume 6907 of *Lecture Notes in Computer Science*, pages 256–265. Springer, 2011.
- [34] Evgeny Demenkov, Arist Kojevnikov, Alexander S. Kulikov, and Grigory Yaroslavtsev. New upper bounds on the boolean circuit complexity of symmetric functions. *Inf. Process. Lett.*, 110(7):264–267, 2010.
- [35] Pavel Hrubes, Stasys Jukna, Alexander S. Kulikov, and Pavel Pudlák. On convex complexity measures. *Theor. Comput. Sci.*, 411(16-18):1842–1854, 2010.
- [36] Arist Kojevnikov and Alexander S. Kulikov. Circuit complexity and multiplicative complexity of boolean functions. In *CiE*, volume 6158 of *Lecture Notes in Computer Science*, pages 239–245. Springer, 2010.
- [37] Stasys Jukna and Alexander S. Kulikov. On covering graphs by complete bipartite subgraphs. *Discrete Mathematics*, 309(10):3399–3403, 2009.
- [38] Edward A. Hirsch, Arist Kojevnikov, Alexander S. Kulikov, and Sergey I. Nikolenko. Complexity of semialgebraic proofs with restricted degree of falsity. *JSAT*, 6(1-3):53–69, 2009.
- [39] Arist Kojevnikov, Alexander S. Kulikov, and Grigory Yaroslavtsev. Finding efficient circuits using sat-solvers. In *SAT*, volume 5584 of *Lecture Notes in Computer Science*, pages 32–44. Springer, 2009.
- [40] Alexander S. Kulikov and Konstantin Kutzkov. New bounds for MAX-SAT by clause learning. In *CSR*, volume 4649 of *Lecture Notes in Computer Science*, pages 194–204. Springer, 2007.
- [41] Arist Kojevnikov and Alexander S. Kulikov. Complexity of semialgebraic proofs with restricted degree of falsity. In *SAT*, volume 4121 of *Lecture Notes in Computer Science*, pages 11–21. Springer, 2006.
- [42] Arist Kojevnikov and Alexander S. Kulikov. A new approach to proving upper bounds for MAX-2-SAT. In *SODA*, pages 11–17. ACM Press, 2006.
- [43] Alexander S. Kulikov. Automated generation of simplification rules for SAT and MAXSAT. In *SAT*, volume 3569 of *Lecture Notes in Computer Science*, pages 430–436. Springer, 2005.
- [44] Sergey S. Fedin and Alexander S. Kulikov. Automated proofs of upper bounds on the running time of splitting algorithms. In *IWPEC*, volume 3162 of *Lecture Notes in Computer Science*, pages 248–259. Springer, 2004.