

# Alexander Knop

## Curriculum Vitae

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## Employment

- since 2017 **SEW Assistant Professor**, *UC San Diego*, San Diego, California, USA
- 2016 – 2017 **Junior Researcher**, *Steklov Institute of Mathematics at St Petersburg*, St Petersburg, Russia
- 2013 – 2015 **Teacher**, *School #533*, St Petersburg
- 2013– 2014 **Developer**, *GGA Software*, St Petersburg, Russia  
Developing software for drug discovery robots. Duties included developing current release using Java.
- 2009 – 2010 **Developer**, *Yandex*, St Petersburg, Russia  
Developing of robots for semi-automatic extraction of information and framework for it. Duties included developing current release using Java and supporting of existing robots.
- 2008 **Intern**, *Devexperts*, St Petersburg, Russia  
Developing 3D Graph plotter. Duties included developing current release using Java and OpenGL

## Education

- 2013 – 2016 **Ph.D in Mathematics**, *Steklov Institute of Mathematics at St Petersburg*, St Petersburg
- 2008–2013 **Master in Mathematics**, *St Petersburg State University*, St Petersburg
  - [Master Thesis](#)
    - Title *Circuit Lower Bounds for Heuristic MA*
    - Supervisors Edward A. Hirsch
  - [Ph.D Thesis](#)
    - Title *Complexity of Heuristic Computation and Interactive Protocols*
    - Supervisors Edward A. Hirsch

## Papers

- 2020 Dmitry Itsykson, Alexander Knop, Andrey Romaschenko, Dmitry Sokolov. **On OBDD based algorithms and proof systems that dynamically change order of variables**, Accepted to Journal of Symbolic Logic (this is extended version of the STACS'17 paper)
- 2020 Sam Buss, Anupam Das, Alexander Knop. **Proof complexity of sytems of (non-deterministic) decision trees and branching programs**, Proceedings of CSL'20

- 2019 Sam Buss, Alexander Knop. **Strategies for Stable Merge Sorting**, Proceedings of SODA'19
- 2018 Sam Buss, Dmitry Itsykson, Alexander Knop, Dmitry Sokolov. **Reordering Rule Makes OBDD Proof Systems Stronger**, Proceedings of CCC'18
- 2018 Alexander Golovnev, Edward Hirsch, Alexander Knop, Alexander Kulikov. **On the Limits of Gate Elimination**, Journal of Computer and System Sciences 96 (2018), pp. 107–119 (this is extended version of the MFCS'16 paper)
- 2017 Alexander Knop. **IPS-like Proof Systems Based on Binary Decision Diagrams**, ECCC - Electronic Colloquium on Computational Complexity, <https://eccc.weizmann.ac.il/report/2017/179/>
- 2017 Kamil Khadiev, Aliya Khadiev, Alexander Knop. **Exponential Separation between Quantum and Classical Ordered Binary Decision Diagrams, Reordering Method and Hierarchies**, ECCC - Electronic Colloquium on Computational Complexity, <https://eccc.weizmann.ac.il/report/2017/176/>
- 2017 Dmitry Itsykson, Alexander Knop. **Hard satisfiable formulas for splittings by linear combinations**, Proceedings of SAT'17
- 2016 Dmitry Itsykson, Alexander Knop, Dmitry Sokolov. **Complexity of distributions and average-case hardness**, Proceedings of ISAAC'16
- 2015 Alexander Knop. **Circuit Lower Bounds for Average-Case MA**, Proceedings of CSR'15
- 2015 Dmitry Itsykson, Alexander Knop, Dmitry Sokolov. **Heuristic time hierarchies via hierarchies for sampling distributions**, Proceedings of ISAAC'15
- 2013 Alexander Knop. **Diophantine hierarchy**, Journal of Mathematical Sciences 188(1) (2013), pp. 59–69

## Outreach

- 2019 Organizer of Summer School “Caleidoscope”, Institut Henri Poincaré, Paris.
- 2008 – 2016 Teacher in “Junior Mathematical School” (extracurricular mathematical classes and summer camps for middle school students).

## Grants and Awards

- 2019 The NSF grant CCF-1930589, dedicated to support students participating in the summer school “Caleidoscope”, \$7,875.
- 2019 Young Support Exploration Project (PEPS) “Optimalite statistique et complexite algorithmique” with Eddie Aamari and Sylvain Perifel, \$3,855.
- 2016 – 2018 The Russian Science Foundation grant 16-11-10123 as a coPI, \$263,700.
- 2014 – 2018 The Russian Foundation for Basic Research grant 14.Z50.31.0030 as a coPI, \$1,547,965.
- 2015 – 2016 Rokhlin Scholarship, \$4,500 ([url: pdmi.ras.ru/ru/rokhlin\\_grant/](http://pdmi.ras.ru/ru/rokhlin_grant/)).
- 2012 – 2013 Computer Science Center at St Petersburg’s scholarship for undergraduate students, \$6000 ([url: compscicenter.ru](http://compscicenter.ru)).

2011 Winner of contest research for undergraduate students by High School of Economics.

## Teaching

- Jun 2017 **SEW Assistant Professor**, UC SAN DIEGO , San Diego, California
- Calculus III in Fall 2018,
  - Linear Algebra in Spring 2017,
  - Introduction to Discrete Mathematics in Winter 2018 and Winter 2019,
  - Mathematical Reasoning in Fall 2018,
  - Elementary Mathematical Logic I in Spring 2019,
  - Elementary Mathematical Logic II in Winter 2020,
  - Combinatorics in Winter 2018 and Spring 2019,
  - Applicable Math and Computing in Spring 2018 and Winter 2020.
- Sep 2013 – **Teacher Assistant**, ST PETERSBURG ACADEMIC UNIVERSITY , St Petersburg
- Jun 2017 Undergraduate classes:
- Math Logic in Fall 2015 and Spring 2017,
  - Complexity Theory in Spring 2016,
  - Algebra in Spring 2015,
  - Combinatorics in Spring 2016,
  - Foundations of Discrete Mathematics in Fall 2014, Fall 2015, and Fall 2016.
- Graduate classes:
- Expanders and Error-correcting Codes in Spring 2015,
  - Complexity Theory II in Spring 2017,
  - Discrete Mathematics in Fall 2016.
- Sep 2013 – **Teacher**, SCHOOL #533 , St Petersburg
- Jun 2015
- Introduction to Mathematics in 2013 and 2014,
  - Algebra in Spring 2015 and Fall 2016,
  - Mathematical Logic in Spring 2016.
- Sep 2007 – **Teacher**, JUNIOR MATHEMATICAL SCHOOL , St Petersburg
- Jun 2015 Math teacher in mathematical club for talented schoolchildren

## Talks

- Jan 19 – Jan 24, 2020 Proof Complexity Workshop, BIRS, Banff, Canada
- Nov 19, 2019 Computer Science Department, Brown University, Providence, Rhode Island, USA
- Oct 26, 2019 Postdocs Seminar, UC San Diego, San Diego, California, USA
- Mar 26, 2019 Algorithms and complexity, IRIF, Paris, France
- Jan 7, 2019 ACM-SIAM Symposium on Discrete Algorithms (SODA 2019), San Diego, USA
- Aug 26 – Aug 31, 2018 Theory and Practice of Satisfiability Solving, Oaxaca, Mexico
- Jul 7 – Jul 8, 2018 Proof Complexity Workshop, FLOC 2018, Oxford, Great Britain
- Aug 22 – Aug 26, 2016 41st International Symposium on Mathematical Foundations of Computer Science (MFCS 2016), Krakow, Poland

- Dec 12 – Dec 14, 2016 The 27th International Symposium on Algorithms and Computation (ISAAC 2016), Sydney, Australia
- Jul 13 – Jul 17, 2015 The 10th International Computer Science Symposium in Russia (CSR'2015), Listvyanka, Russia
- Dec 9 – Dec 11, 2015 The 26th International Symposium on Algorithms and Computation (ISAAC 2015), Nagoya, Japan
- Dec 3, 2015 ELC Mini Workshop, Tokyo, Japan
- Mar 1 – Mar 6, 2015 20th Estonian Winter School in Computer Science (EWSCS'2015), Palmse, Estonia
- Sep 23 – Sep 27, 2013 Eighth International Conference on Computability, Complexity and Randomness, Moscow, Russia
- Jun 21 – Jun 23, 2013 Franco-Russian workshop on Algorithms, complexity and applications, Moscow, Russia
- Jun 29 – Jul 01, 2013 CSEDays 2013, Ekaterinburg, Russia
- Feb 26 – Mar 2, 2012 17th Estonian Winter School in Computer Science (EWSCS'2012), Palmse, Estonia
- Feb 2 – Feb 9, 2012 Winter School in Mathematics of Higher School of Economics, Moscow, Russia
- Oct 1 – Nov 10, 2012 Leonhard-Euler Scholarship Programme, St Petersburg School in Probability and Statistical Physics, Bielefeld, Germany