

# Grigory Yaroslavtsev, <http://grigory.us>

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INTERESTS Algorithms for big data analysis, machine learning and data science, data privacy.

2014– **University of Pennsylvania**, Philadelphia, PA.

Postdoctoral Fellow at the **Warren Center for Network and Data Sciences**, hosted by the departments of **Computer and Information Sciences** and **Statistics at the Wharton Business School**. Mentors: Michael Kearns (CIS) and Elchanan Mossel (Stat).

2013–2014 **Brown University ICERM**, Providence, RI.

Institute Postdoctoral Fellow. Mentor: Philip Klein.

2010–2013 **Pennsylvania State University**, State College, PA (**Joined by invitation, didn't apply to any other Ph.D. programs**)

Ph.D., Thesis: “Efficient Combinatorial Techniques in Sparsification, Summarization and Testing of Large Datasets.”

2008–2010 **Academic University of the Russian Academy of Sciences**, St. Petersburg, Russia

M.S. in Applied Mathematics and Physics.

2004–2008 **St. Petersburg State Polytechnic University**, St. Petersburg, Russia

B.S. in Physics and Technology.

RESEARCH **Microsoft Research, Redmond**, May 2013 – August 2013.

INTERNSHIPS Theory group, mentored by Konstantin Makarychev.

- Approximation algorithms for correlation clustering (with S. Chawla, K. Makarychev, T. Schramm, STOC'15).

**Microsoft Research, Silicon Valley**, August 2012 – October 2012.

Theory group, mentored by Alexandr Andoni.

- MapReduce algorithms for large-scale geometric problems, including minimum-spanning trees, single-linkage clustering and bichromatic matching (with A. Andoni, A. Nikolov and K. Onak, STOC'14).

**IBM Research, Almaden**, May 2012 – July 2012.

Theory group, mentored by David P. Woodruff.

- Optimal bounds on one-way communication and space complexity of sketching multiple instances of data (with M. Molinaro and D. Woodruff, SODA'13).
- A protocol for computing the intersection of distributed databases with almost optimal round vs. communication tradeoffs (with D. Woodruff, PODC'14; U.S. patent pending).

**AT&T Labs – Research**, May 2011 — August 2011.

Database theory group, mentored by Graham Cormode, Cecilia M. Procopiuc, Divesh Srivastava and Howard Karloff.

- Design and implementation of efficient differentially private mechanisms for linear queries (with G. Cormode, M. Procopiuc and D. Srivastava, ICDE'13)

## ACHIEVEMENTS

### AND AWARDS

- **Warren Center Postdoctoral Fellowship** at University of Pennsylvania, 2014 —.
- **Institute Postdoctoral Fellowship** at Brown University, ICERM, 2013 — 2014.
- **Best Graduate Research Assistant at Computer Science and Engineering Department**, 2012.
- **TopCoder Open Algorithm Competition Finalist (Top 24 worldwide)**, 2010.
- **College of Engineering Fellowship**, 2010 — 2013.
- **University Graduate Fellowship**, 2010 — 2011.
- **Yandex personal research grant**, 2009 — 2010.

CONFERENCE PAPERS Authors listed in alphabetical order unless otherwise specified:

### PAPERS

- “Tight Bounds on Linear Sketches of Approximate Matchings”, with S. Assadi, S. Khanna and Y. Li.  
SODA 2016 (27th Annual ACM-SIAM Symposium on Discrete Algorithms).
- “Amplification of One-Way Information Complexity via Codes and Noise Sensitivity”, with M. Molinaro and D. Woodruff.  
ICALP 2015 (42nd International Colloquium on Automata, Languages and Programming).
- “Near Optimal LP Rounding Algorithm for Correlation Clustering on Complete and Complete k-partite Graphs”, with S. Chawla, K. Makarychev and T. Schramm.  
STOC 2015 (47th ACM Symposium on the Theory of Computing).
- “Certifying Equality with Limited Interaction”, with J. Brody, A. Chakrabarti, R. Kondapally and D. Woodruff.  
RANDOM 2014 (18th International Workshop on Randomization and Computation).
- “Beyond Set Disjointness: The Communication Complexity of Finding the Intersection”, with J. Brody, A. Chakrabarti, R. Kondapally and D. Woodruff.  
PODC 2014 (33rd ACM SIGACT-SIGOPS Symposium on Principles of Distributed Computing).
- “Parallel Algorithms for Geometric Graph Problems”, with A. Andoni, K. Onak and A. Nikolov.  
STOC 2014 (46th ACM Symposium on the Theory of Computing).
- “ $L_p$ -testing”, with P. Berman and S. Raskhodnikova.  
STOC 2014 (46th ACM Symposium on the Theory of Computing).
- “Lower Bounds for Testing Properties of Functions over Hypergrid Domains”, with E. Blais and S. Raskhodnikova.  
CCC 2014 (29th IEEE Conference on Computational Complexity).
- <sup>1</sup>“Accurate and Efficient Private Release of Datacubes and Contingency Tables”. G. Yaroslavtsev, G. Cormode, C. Procopiuc and D. Srivastava.  
ICDE 2013 (29th IEEE International Conference on Data Engineering).
- “Beating the Direct Sum Theorem in Communication Complexity with Implications for Sketching”, with Marco Molinaro and David Woodruff.  
SODA 2013 (24th Annual ACM-SIAM Symposium on Discrete Algorithms).

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<sup>1</sup>This is the only paper with non-alphabetical ordering of authors

**Invited to a special issue of "Algorithmica" on "Information Complexity and Applications".**

- "Learning Pseudo-Boolean k-DNF and Submodular Functions", with S. Raskhodnikova. SODA 2013 (24th Annual ACM-SIAM Symposium on Discrete Algorithms).
- "Primal-dual algorithms for Node-Weighted Network Design in Planar Graphs", with . Berman. APPROX 2012 (15th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems).
- "Private Analysis of Graph Structure", with V. Karwa, S. Raskhodnikova and A. Smith. VLDB 2011 (37th International Conference on Very Large Data Bases), Research track.
- "Improved Approximation for the Directed Spanner Problem", with P. Berman, A. Bhattacharyya, K. Makarychev and S. Raskhodnikova. ICALP 2011 (38th International Colloquium on Automata, Languages and Programming).

**Runner-up for the Best Paper Award, invited to a special issue of a journal "Information and Computation".**

- "Steiner Transitive-Closure Spanners of Low-Dimensional Posets", with P. Berman, A. Bhattacharyya, E. Grigorescu, S. Raskhodnikova and D. Woodruff. ICALP 2011 (38th International Colloquium on Automata, Languages and Programming).
- "Finding Efficient Circuits using SAT-solvers", with A. Kojevnikov and A. Kulikov. SAT 2009 (12th International Conference on Theory and Applications of Satisfiability Testing).

#### JOURNAL PAPERS

Authors listed in alphabetical order:

- "Private Algorithms for the Protected in Social Network Search", with M. Kearns, A. Roth and S. Wu. PNAS (Proceedings of the National Academy of Sciences), via direct submission, 2016.
- "Certifying Equality with Limited Interaction", with J. Brody, A. Chakrabarti, R. Kondapally and D. Woodruff. Algorithmica, special issue on "Information Complexity and Applications", to appear.
- "Private Analysis of Graph Structure", with V. Karwa, S. Raskhodnikova and A. Smith. ACM Transactions on Database Systems, 2014.
- "Steiner Transitive-Closure Spanners of Low-Dimensional Posets", with P. Berman, A. Bhattacharyya, E. Grigorescu, S. Raskhodnikova and D. Woodruff. Combinatorica, 2014.
- "Approximation Algorithms for Spanner Problems and Directed Steiner Forest", with P. Berman, A. Bhattacharyya, K. Makarychev and S. Raskhodnikova. Information and Computation, special issue for ICALP'11, 2012.
- "New upper bounds on the Boolean Circuit Complexity of Symmetric Functions", with E. Demenkov, A. Kojevnikov and A. Kulikov. Information Processing Letters, 2010.

PREPRINTS	<p>Authors listed in alphabetical order:</p> <ul style="list-style-type: none"> <li>• “Going for Speed: Sublinear Algorithms for Dense r-CSPs”. <a href="#">ArXiv:1407.7887</a></li> <li>• “Online Algorithms for Machine Minimization”, with N. Devanur, K. Makarychev and D. Panigrahi. <a href="#">ArXiv:1403.0486</a></li> </ul>
TEACHING	<p>“<b>Algorithms for Big Data</b>” (Instructor)</p> <ul style="list-style-type: none"> <li>• University of Pennsylvania, CIS 700, Fall 2015.</li> </ul> <p>“<b>Computational Learning Theory</b>” (Co-Instructor)</p> <ul style="list-style-type: none"> <li>• University of Pennsylvania, CIS 625, Spring 2015 (co-teaching with Michael Kearns).</li> </ul> <p>“<b>Sublinear Algorithms for Big Data</b>” (Instructor)</p> <ul style="list-style-type: none"> <li>• University of Buenos Aires, Argentina. 15-hour crash course. July – August 2014.</li> </ul> <p>Tutorial “<b>Algorithms for MapReduce and Beyond</b>” (with Sergei Vassilvitskii, Google)</p> <ul style="list-style-type: none"> <li>• 24th International Conference on Information and Knowledge Management (CIKM 2015), Melbourne, Australia.</li> </ul> <p>Guest lecturer at undergraduate classes:</p> <ul style="list-style-type: none"> <li>• CIS 399, “Foundations of Data Science”, University of Pennsylvania, Spring 2016.</li> <li>• CMPSC 464, “Introduction to the Theory of Computing”, Pennsylvania State University, Fall 2010.</li> </ul> <p>Extracurricular education for high-school students:</p> <ul style="list-style-type: none"> <li>• Prepared training contests for the United States team in International Olympiad in Informatics 2011.</li> <li>• Co-founder and coordinator of St. Petersburg network of extracurricular education in informatics for high-school students (<a href="http://spbtc.ru">http://spbtc.ru</a>) (2009-2010).</li> </ul>
SERVICE	<p>Program committees:</p> <ul style="list-style-type: none"> <li>• <b>28th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA’17)</b>.</li> <li>• 24th Annual European Symposium on Algorithms (ESA’16), Design and Analysis Track.</li> <li>• 41st International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM’15), Foundations of Computer Science Track.</li> </ul> <p>Organizer:</p> <ul style="list-style-type: none"> <li>• <b>Big Data through the Lens of Sublinear Algorithms</b> 2-day workshop at Rutgers University, DIMACS, Aug 2015. <a href="http://grigory.us/mpc-workshop-dimacs.html">http://grigory.us/mpc-workshop-dimacs.html</a></li> <li>• <b>Algorithmic Frontiers of Modern Massively Parallel Computation</b> 1-day workshop at ACM FCRC/STOC, Jun 2015. <a href="http://grigory.us/mpc-workshop-fcrc.html">http://grigory.us/mpc-workshop-fcrc.html</a></li> <li>• <b>Sublinear Algorithms and Big Data Day</b> at Brown University, ICERM, Apr 2014. <a href="http://grigory.us/big-data-day.html">http://grigory.us/big-data-day.html</a></li> <li>• <b>Theory Seminar</b> at the University of Pennsylvania, Computer and Information Sciences Department (2014 – 2015). <a href="http://theory.cis.upenn.edu/seminar/">http://theory.cis.upenn.edu/seminar/</a></li> <li>• <b>Theory Seminar</b> at Brown CS Department and Brown University, ICERM (2013 – 2014). <a href="http://grigory.us/theory-seminar-brown-spring14.html">http://grigory.us/theory-seminar-brown-spring14.html</a></li> </ul> <p>Reviewing:</p> <ul style="list-style-type: none"> <li>• Conferences: NIPS’16, CCC’16, STOC’16, PODS’16, SODA’16, ESA’15, RANDOM’15, FOCS’15, ICALP’15, STOC’15, CIKM’14, ALT’14, RANDOM’14, FOCS’14, ICALP’14, FOCS’13, MFCS’13, ICALP’13, SODA’13, APPROX’12, FOCS’12, COCOA’12, SWAT’12, SODA’12, VLDB’12, WADS’11, MFCS’10, SAT’10.</li> </ul>

- Journals: SIAM Journal on Computing (SICOMP), SIAM Journal on Discrete Mathematics (SIDMA), Information and Computation (I&C), IEEE Transactions on Knowledge and Data Engineering (TKDE), Theory of Computing (ToC), Random Structures and Algorithms (RSA), Algorithmica.

## SELECTED TALKS

- Fast Fourier Sparsity Testing over the Boolean Hypercube
  - University of Wisconsin, Madison. Theory Seminar. August 2015.
- Near Optimal LP Rounding for Correlation Clustering
  - Cornell University, Ithaca, NY. Theory Seminar. May 2015.
  - MIT, Boston, MA. Algorithms and Complexity Seminar. April 2015.
  - Microsoft Research, Redmond, WA. Theory Seminar. March 2015.
  - Google Research, NYC. Google Tech Talk. February 2015.
  - Rutgers University, New Brunswick, NJ. Theory Seminar. January 2015.
  - Carnegie Mellon University, Pittsburgh, PA. Theory Lunch. January 2015.
  - Pennsylvania State University, State College, PA. CSE Departmental Colloquium. January 2015.
- Beyond Set Disjointness: The Communication Complexity of Finding the Intersection
  - MIT, Boston, MA. Theory of Distributed Systems Seminar. May 2014.
- “The Big Data Theory” and Randomized Algorithms
  - Georgia Tech, Atlanta, GA. ARC Colloquium. March 2014.
- Approximating Graph Problems: The Old and The New
  - Yahoo! Research, NYC. February 2014.
  - MIT, Boston, MA. Algorithms and Complexity Seminar. February 2014.
  - Toyota Technological Institute, Chicago IL. Theory Seminar. February 2014.
- $L_p$ -Testing
  - University of Pennsylvania, Statistics Student Seminar, November 2014.
  - Columbia University, New York, NY. Theory Seminar. October 2014.
  - Microsoft Research, Redmond. Theory Lunch. January 2014.
  - Harvard University, Boston MA. Theory Seminar. November 2013.
  - Brown University, Providence RI. Theory Seminar. November 2013.
  - IBM Almaden Research Center, San Jose, CA. October 2013.
- Property Testing and Communication Complexity
  - MIT, Boston, MA. Algorithms and Complexity Seminar. September 2013.
- Beating the Direct Sum in Communication Complexity with Implications for Sketching.
  - Aarhus University, Denmark. Theory Seminar. May 2013.
  - MIT, Boston, MA. Algorithms and Complexity Seminar. December 2012.
  - Princeton University, Princeton, NJ. Theory lunch. November 2012.
- Parallel Algorithms for Geometric Problems
  - ISMP’15 (22nd International Symposium on Mathematical Programming). July 2015.
  - Johns Hopkins University, Baltimore, MD. Theory Seminar. November 2014.
  - University of Maryland, College Park, MD. Capital Area Theory Seminar. October 2014.
  - University of Pennsylvania, Philadelphia, PA. Theory Seminar. August 2014.
  - University of Massachusetts, Amherst. Theory Seminar. May 2014.
  - Google Research, NYC. Google Tech Talk. March 2014.
  - Sandia Labs, Livermore, CA. March 2014.
  - Stanford University, Stanford, CA. Theory Seminar. March 2014.
  - Microsoft Research SVC, Mountain View, CA. Lab Meeting. October 2012.
- Learning and Testing Submodular Functions.
  - Microsoft Research, Redmond. Theory Seminar. June 2013.
  - University of Melbourne, Theory Seminar, April 2013.
  - UCLA, Los Angeles, LA. Theory Seminar. February 2013.

- Weizmann Institute of Science, Rehovot, Israel. Theory Seminar. December 2012.
- Harvard University, Boston, MA. Theory Seminar. December 2012.
- Carnegie-Mellon University, Pittsburgh, PA. Theory Lunch, December 2012.
- Carnegie-Mellon University, Pittsburgh, PA. Operations Research Seminar. December 2012.
- IBM T.J. Watson Research Center, Yorktown Heights, NY. Integer Programming Seminar. November 2012.
- Columbia University, New York, NY. Theory Seminar. October 2012.
- Microsoft Research SVC, Mountain View, CA. Theory Seminar. October 2012.
- IBM Almaden Research Center, San Jose, CA. Theory Seminar. May 2012.
- Advances in Directed Spanners.
  - University of Sydney, Theory Seminar, April 2013.
  - Carnegie-Mellon University, Theory Lunch, November 2011.
  - University of Maryland, Capital Area Theory Seminar, November 2011.
- Private Analysis of Graph Structure
  - AT&T Labs – Research, Florham Park, NJ. August 2011.
- Improved Approximation for the Directed Spanner Problem
  - AT&T Labs – Research, Florham Park, NJ. Mathematics Research Colloquium and Informal Seminar. June 2011.
  - Moscow State University. Combinatorial Optimization Seminar. May 2011.
  - IBM T.J. Watson Research Center, Yorktown Heights, NY. Integer Programming Seminar. April 2011.
  - St. Petersburg Institute of Fine Mechanics and Optics. Theory Seminar. December 2010.
- Linear bounds on circuit complexity and feebly one-way permutations
  - Pennsylvania State University, State College, PA. Theory Seminar. April 2010.

#### MEDIA COVERAGE

For paper “Private Algorithms for the Protected in Social Network Search”:

- Schneier on Secuity [“Research on Balancing Privacy with Surveillance.”](#)
- Association of American Universities [“Penn Researchers Balance Privacy and Security in Network Analysis.”](#)
- ACM Tech News / The Daily Pennsylvanian: [“Penn Professor’s Computer Algorithm Could Fight Terrorism While Protecting Privacy.”](#)
- Quartz: [“There may be a way to allow mass surveillance and preserve our privacy at the same time.”](#)
- Pacific Standard: [“Searching Private Data, and Ensuring It Stays Private.”](#)
- Wired (German): [“Ein neuer bewachungs-Algorithmus soll in Social Media nur auf Terroristen zielen.”](#)
- Vice Motherboard: [“Algorithms Claim to Hunt Terrorists While Protecting the Privacy of Others.”](#)
- The Naked Scientists Podcast: [“National Security Algorithm.”](#)

#### VISITS AND CONSULTING

- Google Research, NYC. (Weekly visitor in Fall’14– Spring’15). (Host: Silvio Lattanzi)
- Microsoft Research, Redmond, WA. 03/08/15–03/14/15, 01/08/14–01/12/14. (Host: Konstantin Makarychev)
- IBM T.J. Watson Research Center, Yorktown Heights, NY. 04/19/11–04/21/11, 11/13/12–11/15/12. (Hosts: Konstantin Makarychev, Vishwanath Nagarajan)
- AT&T Labs – Research, Florham Park, NJ. 11/18/11–11/25/11. (Host: Howard Karloff)
- Weizmann Institute of Science, Rehovot, Israel. 12/27/12–01/04/13. (Host: Robert Krauthgamer)
- University of Melbourne, Australia. 04/12/13–04/20/13. (Host: Anthony Wirth)

- Aarhus University, Denmark. 05/17/13–05/25/13. (Host: Joshua Brody)

GRADUATE  
STUDENTS  
MENTORED

- Sepehr Assadi (University of Pennsylvania), joint paper in SODA'16.
- Yang Li (University of Pennsylvania), joint paper in SODA'16.
- Steven Wu (University of Pennsylvania), joint paper in PNAS'16.
- Tselil Schramm (UC Berkeley), joint paper in STOC'15.
- Eli Fox-Eppstein (Brown University).
- David Meierfrankenfeld (Brown University).

PATENTS

- “A Communication and Message-Efficient Protocol for Computing the Intersection Between Different Sets of Data”, with David P. Woodruff. U.S. patent application publication #20150172425. IBM Almaden Research Center, San Jose, CA.

PROFESSIONAL MEMBERSHIP    ACM SIGACT, IEEE

TECHNICAL SKILLS    C/C++, STL, Java, Windows/Linux,  $\text{\LaTeX}$ , CPLEX/Gurobi/AMPL, MapReduce/Hadoop.