

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

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ADDRESS	430F Lindley Hall, Bloomington, IN, 47405	<i>E-mail:</i> <a href="mailto:grigory@grigory.us">grigory@grigory.us</a>
INTERESTS	Algorithms for big data analysis, machine learning and data science, data privacy.	
2016–	<b>Indiana University</b> , Bloomington, IN. Assistant Professor of Computer Science.	
2014–2016	<b>University of Pennsylvania</b> , Philadelphia, PA. Postdoctoral Fellow at the <b>Warren Center for Network and Data Sciences</b> , hosted by the departments of <b>Computer and Information Sciences</b> and <b>Statistics at the Wharton Business School</b> . Mentors: Michael Kearns (CIS) and Elchanan Mossel (Stat).	
2013–2014	<b>Brown University ICERM</b> , Providence, RI. Institute Postdoctoral Fellow. Mentor: Philip Klein.	
2010–2013	<b>Pennsylvania State University</b> , State College, PA ( <b>Joined by invitation, didn't apply to any other Ph.D. programs</b> ) Ph.D., Thesis: “Efficient Combinatorial Techniques in Sparsification, Summarization and Testing of Large Datasets.” Advisor: Sofya Raskhodnikova.	
2008–2010	<b>Academic University of the Russian Academy of Sciences</b> , St. Petersburg, Russia M.S. in Applied Mathematics and Physics.	
2004–2008	<b>St. Petersburg State Polytechnic University</b> , St. Petersburg, Russia B.S. in Physics and Technology.	
RESEARCH INTERNSHIPS	<b>Microsoft Research, Redmond</b> , May 2013 – August 2013. Theory group, mentored by Konstantin Makarychev. <ul style="list-style-type: none"><li>• Approximation algorithms for correlation clustering (with S. Chawla, K. Makarychev, T. Schramm, STOC'15).</li></ul> <b>Microsoft Research, Silicon Valley</b> , August 2012 – October 2012. Theory group, mentored by Alexandr Andoni. <ul style="list-style-type: none"><li>• 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).</li></ul> <b>IBM Research, Almaden</b> , May 2012 – July 2012. Theory group, mentored by David P. Woodruff. <ul style="list-style-type: none"><li>• Optimal bounds on one-way communication and space complexity of sketching multiple instances of data (with M. Molinaro and D. Woodruff, SODA'13).</li><li>• 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).</li></ul> <b>AT&amp;T Labs – Research</b> , May 2011 — August 2011. Database theory group, mentored by Graham Cormode, Cecilia M. Procopiuc, Divesh Srivastava and Howard Karloff. <ul style="list-style-type: none"><li>• Design and implementation of efficient differentially private mechanisms for linear queries (with G. Cormode, M. Procopiuc and D. Srivastava, ICDE'13)</li></ul>	

## ACHIEVEMENTS

### AND AWARDS

- **Warren Center Postdoctoral Fellowship** at University of Pennsylvania, 2014 — 2016.
- **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. Yaroslavltssev, G. Cormode, C. Procopiuc and D. Srivastava.  
ICDE 2013 (29th IEEE International Conference on Data Engineering).

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

- “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).  
**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 Authors listed in alphabetical order:

- “Going for Speed: Sublinear Algorithms for Dense r-CSPs”. [ArXiv:1407.7887](https://arxiv.org/abs/1407.7887)
- “Online Algorithms for Machine Minimization”, with N. Devanur, K. Makarychev and D. Panigrahi. [ArXiv:1403.0486](https://arxiv.org/abs/1403.0486)

TEACHING “**Algorithms for Big Data**” (Instructor)

- University of Pennsylvania, CIS 700, Fall 2015.

“**Computational Learning Theory**” (Co-Instructor)

- University of Pennsylvania, CIS 625, Spring 2015 (co-teaching with Michael Kearns).

“**Sublinear Algorithms for Big Data**” (Instructor)

- University of Buenos Aires, Argentina. 15-hour crash course. July – August 2014.

Tutorial “**Algorithms for MapReduce and Beyond**” (with Sergei Vassilvitskii, Google)

- 24th International Conference on Information and Knowledge Management (CIKM 2015), Melbourne, Australia.

Guest lecturer at undergraduate classes:

- CIS 399, “Foundations of Data Science”, University of Pennsylvania, Spring 2016.
- CMPSC 464, “Introduction to the Theory of Computing”, Pennsylvania State University, Fall 2010.

Extracurricular education for high-school students:

- Prepared training contests for the United States team in International Olympiad in Informatics 2011.
- Co-founder and coordinator of St. Petersburg network of extracurricular education in informatics for high-school students (<http://spbtc.ru>) (2009-2010).

SERVICE

Program committees:

- 23rd International Computing and Combinatorics Conference (COCOON’17).
- **28th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA’17).**
- 24th Annual European Symposium on Algorithms (ESA’16), Design and Analysis Track.
- 41st International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM’15), Foundations of Computer Science Track.

Organizer:

- **Big Data through the Lens of Sublinear Algorithms**  
2-day workshop at Rutgers University, DIMACS, Aug 2015.  
<http://grigory.us/mpc-workshop-dimacs.html>
- **Algorithmic Frontiers of Modern Massively Parallel Computation**  
1-day workshop at ACM FCRC/STOC, Jun 2015.  
<http://grigory.us/mpc-workshop-fcrc.html>
- **Sublinear Algorithms and Big Data Day** at Brown University, ICERM, Apr 2014.  
<http://grigory.us/big-data-day.html>

- **Theory Seminar** at the University of Pennsylvania, Computer and Information Sciences Department (2014 – 2016). <http://theory.cis.upenn.edu/seminar/>
- **Theory Seminar** at Brown CS Department and Brown University, ICERM (2013 – 2014). <http://grigory.us/theory-seminar-brown-spring14.html>

Reviewing:

- Conferences: COLT'16, 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.
- 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.

## INVITED TALKS

- Linear Sketching over  $\mathbb{GF}_2$ 
  - Microsoft Research, Redmond, WA. Theory Seminar, June 2016.
- What's New in "The Big Data Theory"?
  - College of William and Mary, Williamsburg, VA. Departmental Colloquium, February 2016.
  - Georgetown University, Washington, DC. Departmental Colloquium, February 2016.
  - Indiana University, Bloomington, IN. Departmental Colloquium, February 2016.
  - University of Colorado, Boulder, CO. Departmental Colloquium, February 2016.
  - Boston University, Boston, MA. Departmental Colloquium, February 2016.
  - Drexel University, Philadelphia, PA. Departmental Colloquium, March 2016.
- 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”:

- PBS Newshour [“The secret things you give away through your phone metadata”](#)
- Schneier on Security [“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)

#### STUDENTS MENTORED

Graduate students mentored while a postdoc:

- 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

TECHNICAL SKILLS C/C++, STL, Java, Windows/Linux, L<sup>A</sup>T<sub>E</sub>X, CPLEX/Gurobi/AMPL, MapReduce/Hadoop.