Richard Ryan Williams

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POSITIONS Massachusetts Institute of Technology (Cambridge, MA) Professor of Electrical Engineering and Computer Science, July 2020 - present. Associate Professor (with tenure) of EECS, Jan. 2017 - Jun. 2020. University of California, Berkeley Visiting Professor of EECS, Aug. 2018 - Dec. 2018. Visiting Scientist at the Simons Institute, Aug. 2014 – Dec. 2014 and Aug. 2015 – Dec. 2015. Stanford University (Stanford, CA) Assistant Professor of Computer Science, Sept. 2011 - Dec. 2016. IBM Almaden Research Center (San Jose, CA) Josef Raviv Postdoctoral Fellow, Sept. 2009 - Sept. 2011. Managers: T. S. Jayram and Ken Clarkson. Institute for Advanced Study (Princeton, NJ) Member of the School of Mathematics, Sept. 2008 - Sept. 2009. Mentor: Avi Wigderson. Carnegie Mellon University (Pittsburgh, PA) Postdoctoral Research Fellow, Sept. 2007 - August 2008. Mentor: Manuel Blum. **EDUCATION** Carnegie Mellon University (Pittsburgh, PA) Ph.D. in Computer Science, August 2007. Thesis Title: Algorithms and Resource Requirements for Fundamental Problems Advisor: Manuel Blum Cornell University (Ithaca, NY) Master of Engineering in Computer Science, 2002 Bachelor of Arts in Computer Science and Mathematics with Honors, 2001. SELECTED • Gödel Prize, 2024. HONORS • Frank Quick Faculty Research Innovation Fellowship, 2021. • SIGEST Award, SIAM Review, 2021. • Best Paper Award, 22nd Conference on Satisfiability Testing (SAT), 2019. • Google Faculty Research Award, 2019. • NSF CAREER Award, 2015. • Invited speaker, International Congress of Mathematicians (ICM), 2014. • Microsoft Research Faculty Fellow, 2013. • Alfred P. Sloan Research Fellow, 2013-2015. • Notable Article of 2013 by ACM Computing Reviews. • US Junior Oberwolfach Fellow, 2013. • Best Paper Award from the IEEE Conf. on Computational Complexity, 2011. • Carnegie Mellon SCS Distinguished Dissertation Award (Honorable Mention), 2008. • Best Student Paper from the IEEE Conf. on Computational Complexity, 2005 and 2007. • Highest ranked paper at SPAA 2005. • Best Student Paper Award at ICALP, 2004.

• NSF Graduate Research Fellowship, 2001-2004.

Special Issue Invitations	<i>Invited journal articles considered to be among the top 5-10 papers in a given conference:</i> ICALP 2004, CCC 2005, SPAA 2005, CCC 2007, COCOON 2009, STOC 2010, CCC 2011, PODS 2011, CCC 2012, STOC 2013, CCC 2013, STOC 2014, SODA 2016, SODA 2017, IPEC 2017, STOC 2018, SAT 2019, STACS 2020, FOCS 2024
COURSES TAUGHT	• 6.1420: Fixed-Parameter and Fine-Grained Complexity MIT, Fall 2022, Fall 2024.
	• 6.042: Discrete Mathematics for Computer Science
	MIT, Spring 2021, Fall 2021, Fall 2023.
	• CS 294-152. Lower Bounds: Beyond the Bootcamp
	UC Berkeley, Fall 2018.
	• 6.S078: Fine-Grained Algorithms and Complexity
	MIT, Spring 2018, Fall 2020.
	6.841/18.405: Advanced Complexity Theory
	MIT, Fall 2017, Fall 2019, Spring 2022, Spring 2024.
	• 6.045/18.400: Automata, Computability, and Complexity
	MIT, Spring 2017, Spring 2019, Spring 2020.
	CS254: Computational Complexity Theory
	Stanford, Spring 2015 and Autumn 2016.
	• CS266: Parameterized Algorithms and Complexity
	Stanford, Spring 2013 and Autumn 2014.
	CS154: Automata and Complexity Theory
	Stanford, Winters 2011-12, 2012-13, 2013-14, 2014-15, 2015-16.
	CS354: Topics in Circuit Complexity
	Stanford, Autumn 2011, Spring 2014.
	• Wonderful and Crazy Ideas in TCS and Math (with V. Vassilevska Williams)
	NJ Governor's School for Engineering and Technology (for high school students), Rut- gers University, Summer 2009.
	• 15-453 Formal Languages, Automata, and Computation (with L. Blum)
	Carnegie Mellon, Spring 2008.
	• 15-859P Theoretical Cryptography (with M. Blum and S. Rudich)
	Carnegie Mellon, Fall 2007.
Postdocs Mentored	Michael Forbes (2016)
	Roei Tell (2020)
PhD Students	Huacheng Yu (2017)
	Cody Murray (2018)
	Josh Alman (2019), co-advised with Virginia Vassilevska Williams
	Dylan McKay (2020)
	Brynmor Chapman (2022)
	Lijie Chen (2022)
	Nikhil Vyas (2022)
	Shyan Akmal (2023), co-advised with Virginia Vassilevska Williams
	Rahul Ilango (2019-present)
	Ce Jin (2020-present), co-advised with Virginia Vassilevska Williams
	Ted Pyne (2022-present)
	Jiatu Li (2023-present)
Research Interns	Tianqi Yang, undergrad at Tsinghua (2021, 2022)
Mentored	Gabriel Bathie, master student at ENS Lyon (2022)
	Hongxun Wu, undergrad at Tsinghua (2021)
	Xin Lyu, undergrad at Tsinghua (2020)

	Hanlin Ren, undergrad at Tsinghua (2019) Ce Jin, undergrad at Tsinghua (2019) Kaifeng Lyu, undergrad at Tsinghua (2018) Alexander Golovnev, PhD student at NYU (2016)
Past Undergraduate Research Advisees	Korina Digalaki, MIT '21 (PhD MIT) Malvika Joshi, MIT '20 (PhD UC Berkeley) Magdalen Dobson, MIT '19 (PhD CMU) Abhijit Mudigonda, MIT '19 (PhD UChicago) Rio LaVigne, Stanford '15 (PhD MIT) Joshua Wang, Stanford '13 (PhD Stanford) Will Monroe, Stanford '13 (PhD Stanford) Jeremiah Blocki, CMU '09 (PhD CMU) Brendan Meeder, CMU '07 (PhD CMU) Brendan Juba, CMU '05 (PhD MIT) David Charlton, CMU '04 (PhD MIT)
Other PhD Thesis Committees	Michael Columbe, MIT, December 2023 Dhiraj Holden, MIT, December 2021 Jayson Lynch, MIT, August 2020 Andrea Lincoln, MIT, June 2020 Luke Schaeffer, MIT, August 2019 Daniel Grier, MIT, August 2019 Saeed Mehraban, MIT, May 2019 Alex Arkhipov, MIT, July 2017 Shalev Ben-David, MIT, June 2017 Adam Bouland, MIT, June 2017 Adam Bouland, MIT, June 2017 Amir Abboud, Stanford University, May 2017 Matthew Coudron, MIT, May 2017 Alexander Golovnev, NYU, April 2017 Joe Zimmerman, Stanford University, May 2016 Kevin Lewi, Stanford University, April 2016 Mark Zhandry, Stanford University, May 2015 Peifung Eric Lam, Stanford University, August 2014 Hart Montgomery, Stanford University, May 2014 Qiqi Yan, Stanford University, May 2012 Serge Gaspers, University of Bergen (Norway), December 2008
PROFESSIONAL ACTIVITIES AND SERVICE	 Conference Program Committees: AAAI 2006: 21st Conference on Artificial Intelligence IPEC 2010: 5th Intn'l Symposium on Parameterized and Exact Computation STOC 2011: 43rd ACM Symposium on Theory of Computing FCT 2011: 18th Intn'l Symposium on Fundamentals of Computation Theory MFCS 2011: 36th Intn'l Symposium on Mathematical Foundations of Computer Science IPEC 2011: 5th Intn'l Symposium on Parameterized and Exact Computation SODA 2012: 23rd ACM-SIAM Symposium on Discrete Algorithms PODS 2013: 32nd ACM Symposium on Principles of Database Systems STOC 2013: 45th ACM Symposium on Theory of Computing ITCS 2014: 5th Innovations in Theoretical Computer Science Conference CCC 2014: 29th IEEE Conference on Computational Complexity ICALP 2014: 40th Intn'l Colloquium on Automata, Languages, and Programming FOCS 2014: 55th IEEE Symposium on Foundations of Computer Science

- CSR 2016: 11th International Computer Science Symposium in Russia
- SPAA 2017: 29th ACM Symposium on Parallelism in Algorithms and Architectures
- FOCS 2018: 57th IEEE Symposium on Foundations of Computer Science
- HALG 2019: Highlights of Algorithms Conference
- CCC 2020: 35th Annual Conference on Computational Complexity
- STOC 2022: ACM Symposium on Theory of Computing
- IPEC 2024: Intn'l Symposium on Parameterized and Exact Computation
- ITCS 2025: Innovations in Theoretical Computer Science Conference
- STOC 2025: ACM Symposium on Theory of Computing

Conference Reviewing: STOC, FOCS, SODA, CCC, ICALP, STACS, IPEC, AAAI, IJCAI, LICS, PODS, LATIN, FSTTCS, ESA, CP, APPROX-RANDOM, *etc.*

Journal Reviewing: Journal of the ACM, SIAM Journal on Computing, SIAM Journal on Discrete Mathematics, Journal of Computational Complexity, ACM Transactions on Algorithms, Electronic Journal of Combinatorics, Discrete Applied Mathematics, Theoretical Computer Science, Annals of Mathematics and Artificial Intelligence, Information and Computation, Information Processing Letters, Discussiones Mathematicae Graph Theory, *etc.*

Grant Reviewing: National Science Foundation (NSF), Israel Science Foundation (ISF), Netherlands Organisation for Scientific Research (NWO), National Sciences and Engineering Research Council of Canada (NSERC), Royal Society (UK)

Leadership Activities:

- Co-Organizer of DIMACS Frontiers in Complexity Theory Workshop, a four-day event with four lecturers introducing 60+ graduate students to cutting-edge research in complexity theory, July 2024.
- ACM Doctoral Dissertation Awards Committee, 2022–2024.
- Committee Member, 2021 Computing Innovation Fellows (Postdoc) Program.
- Editorial Board, Electronic Colloquium on Computational Complexity, 2021-present.
- Co-Organizer of STOC Workshop on MCSP and Hardness Magnification, 2020.
- Awards Chair, Computational Complexity Foundation, 2019–2022.
- Co-Organizer at the Simons Institute for the Theory of Computing (UC Berkeley), semester on *Lower Bounds in Computational Complexity*, Fall 2018.
- Associate Editor, ACM Transactions on Theory of Computing, 2017-present.
- STOC Theory Fest Organizing Committee, 2017–2018.
- Board of Editors, Theory of Computing (journal), 2016–present.
- Co-Organizer at the Simons Institute for the Theory of Computing (UC Berkeley), semester on *Fine-Grained Algorithms and Complexity*, Fall 2015.
- SIGACT Executive Committee, 2015–2018.
- Co-Organizer for Seminar at the Schloss Dagstuhl Leibniz Center for Informatics, on *Theory and Practice of SAT Solving*, April 2015.
- Editor of Special Issue for CCC, Computational Complexity (journal), 2014.
- IEEE Complexity Conference Steering Committee, 2011–2014.
- Co-Organizer for Seminar at the Schloss Dagstuhl Leibniz Center for Informatics, on *Exact Complexity of NP-hard Problems*, August 2013.
- Former moderator and frequent contributor to CSTheory.Stackexchange, a Q & A site for researchers in theoretical computer science, 2010–present.
- Co-Organizer for MSR-CMU MindSwap Workshop on Privacy, Fall 2007.
- CMU Computer Science Department Speaker's Club, 2006–2008.
- Local Arrangements Committee: FOCS 2005 (Pittsburgh), CCC 2013 (Stanford)

PLENARY LECTURES AND INVITED TALKS

1. A Dogged Pursuit for Satisfaction

- Distinguished Lecture in Computer Science, University of Washington, October 2024.

- 2. The Orthogonal Vectors Conjecture and Non-Uniform Circuit Lower Bounds
 - Columbia University Theory Seminar, October 2024.
- University of Warwick Algorithms and Complexity Day, October 2024.
- 3. Circuit Analysis Algorithms and Circuit Lower Bounds
 - Gödel Prize Lecture, Talinn, Estonia, July 2024.
 - Plenary Lecture at DIMACS Frontiers in Complexity workshop, July 2024.
- 4. Circuit Complexity from Circuit Analysis Algorithms
- MIT Theory of Computation Colloquium, May 2024.
- 5. Beating Brute Force for Compression Problems
 - Simons Institute (Reunion Workshop for Meta-Complexity), April 2024.
 - UT Austin Theory Seminar, March 2024.
- 6. *Towards Stronger Depth Lower Bounds* - Talk at ITCS, Berkeley, January 2024.
- 7. Around the Fine-Grained Complexity of SAT
- Plenary talk at the SAT conference, July 2023.
- Self-Improvement for Circuit-Analysis Problems
 - Talk at Simons Institute, May 2023.
 - Oxford-Warwick Complexity Seminar, June 2023.
 - University of Massachusetts Theory Seminar, October 2023.
- 9. The Mystery of the Missing String
 - Invited talk at Simons Institute workshop, UC Berkeley, February 2023.
 - Invited talk at the Theory Seminar in Saarbrucken (virtual), February 2023.
- 10. How to Prove Lower Bounds With Algorithms
 - Four lectures at the Swiss Winter School in Theoretical Computer Science, Zinal, Switzerland, January 2023.
- 11. Strange Connections Between Algorithms and Complexity.
 - Invited (virtual) guest lecture for Introduction to Computer Science at Tsinghua IIIS, October 2022.
- 12. Around the Complexity of SAT

 Invited talk at Schloss Dagstuhl seminar on "Theory and Practice of SAT and Combinatorial Solving", October 2022.
- 13. Complexity Lower Bounds From Algorithm Design
 - Invited talk at IEEE Logic in Computer Science, July 2021.

- Invited talk at the Logic Colloquium (2021 ASL European Summer Meeting), July 2021.

- 14. On the Strong Exponential Time Hypothesis
 - Invited talk at Simons Institute workshop on "Fifty Years of Satisfiability", Febrary 2021.
- 15. Lower Bounds from Algorithms: An Overview - Invited talk at ACM-SIAM Symposium on Discrete Algorithms, January 2021.
- 16. More Thinking Algorithmically About Impossibility
 - Invited talk at "Matches made in heaven Crypto and TCS", joint workshop between FOCS and TCC, November 2020.
- 17. Almost-everywhere circuit lower bounds from circuit-analysis algorithms - Invited talk at Oxford-Warwick Seminar on Complexity, October 2020.
- 18. Inspiration From My REU at DIMACS
 - Invited talk at DIMACS 30th Anniversary Symposium, November 2019.
- 19. Circuit Lower Bounds from Algorithm Design: A Progress Report
 - Plenary Lecture at 69th Midwest Theory Day, Purdue University, April 2019.
 - Invited Lecture at Clay Mathematics Institute Workshop on Complexity Theory, Oxford (England), July 2018.
 - Plenary Lecture at International Colloquium on Automata, Languages, and Computation (ICALP), Prague (Czech Republic), July 2018.

20. Weak Lower Bounds on Resource-Bounded Compression Imply Strong Separations of Complexity Classes

- Princeton Theory Seminar, March 2019.

- 21. Fine-Grained Complexity of Solving Polynomial Systems of Equations
 - Simons Institute workshop on "Algebraic Methods", December 2018.
- 22. Circuit Lower Bounds for Nondeterministic Quasi-Polynomial Time
 - Theory Seminar, UC Berkeley, November 2018.
 - Mathematisches Forschungsinstitut Oberwolfach (Germany), November 2018.
 - Theory Seminar, Northeastern University, March 2018.
 - Theory Seminar, University of Texas at Austin, January 2018.
- 23. Circuit Lower Bounds from Algorithm Design: An Overview
- Simons Institute Boot Camp on Lower Bounds, UC Berkeley, August 2018.
- 24. Thinking Algorithmically About Impossibility
 - Logic Colloquium, UC Berkeley, November 2018.
 - Theory Seminar, University of Massachusetts at Amherst, December 2017.
 - Very Informal Gathering of Logicians, UCLA Institute for Pure and Applied Mathematics, February 2017.
- 25. Strong ETH Breaks With Merlin and Arthur: Proof Systems for UNSAT That Beat 2ⁿ (With Randomness)
 - Invited Lecture at "Proof Complexity and Beyond", Mathematisches Forschungsinstitut Oberwolfach (Germany), August 2017.
 - Workshop on "Theoretical Foundations of SAT Solving", Fields Institute, Toronto, August 2016.
- 26. Algorithms and Lower Bounds: A Love Story.

- 15 Lectures at the Swedish Summer School in Computer Science, Stockholm, July 2017.

27. Sam and Me versus P versus NP.

- OMNI BUSS Celebration of Samuel Buss's 60th Birthday, UC San Diego, July 2017.

Approximately Counting Solutions to Systems of Quadratic Equations.
 Simons Symposium on New Directions in Approximation Algorithms, Schloss Elmau (Germany), April 2017.

- Simons Institute Workshop on "Proving and Using Pseudorandomness", UC Berkeley, March 2017.

- 29. Polynomial Representations of Threshold Functions and Algorithmic Applications - Banff International Research Station, September 2016.
- 30. *New applications of the polynomial method to algorithm design* - Highlights of Algorithms (HALG), Paris, June 2016.
- 31. Super-Linear Gate Lower Bounds and Super-Quadratic Wire Lower Bounds for Depth-2 and Depth-3 Threshold Circuits
 - Theory Seminar, Caltech, January 2016.
 - Theory Seminar, Harvard, March 2016.
 - Combinatorics Seminar, Stanford, April 2016.
- Recent Work in Fine-Grained Complexity

 Invited Lecture at Computational Complexity Workshop, Mathematisches Forschungsinstitut Oberwolfach (Germany), November 2015.
- 33. Deterministic APSP, Orthogonal Vectors, and More
 - Invited Talk at Simons Institute, UC Berkeley, October 2015.
- 34. Thinking Algorithmically About Impossibility
 - EECS Colloquium, MIT, January 2016.
 - Invited Lecture at the 24th Annual Conference on Computer Science Logic, Berlin (Germany), September 2015.
 - Simons Institute Open Lecture, UC Berkeley, October 2015. https://youtu.be/7uplycLvraw
- 35. "Boot Camp" on Algorithms and Lower Bounds: Some Basic Connections

- Simons Institute, UC Berkeley, August 2015.

https://youtu.be/adJvi7tL-qM?list=PLgKuh-lKre10C3b4qfGF5cdgYzbHqoRBA

- 36. Four Lectures on Algorithms as Lower Bounds (and Vice-Versa)
- Summer School on Lower Bounds, Prague (Czech Republic), June 28–July 1, 2015.
- 37. SAT Solving and Complexity Theory
 - Invited Tutorial at Schloss Dagstuhl workshop (Germany), April 2015.
 - Invited Lecture at the 1st Annual SAT/SMT Summer School, MIT, Cambridge, MA, June 2011.
- 38. *The Polynomial Method in Circuit Complexity, Applied to Algorithm Design* Princeton Theory Seminar, February 2015.
 - Invited Lecture at 35th Annual Conference on Foundations of Software Technology and Theoretical Computer Science, New Delhi (India), December 2014.
- 39. On the Strong Exponential Time Hypothesis
 - Exact Algorithms and Lower Bounds Workshop, IIT Delhi, December 2014.
- 40. Algorithms for Circuits and Circuits for Algorithms
 - Rajeev Motwani Memorial Workshop, IIT Kanpur, December 2014.
 - Southern California Theory Day, San Diego, October 2014.

- Invited Lecture at International Congress of Mathematicians, Seoul (Korea), August 2014.

- Invited Survey at 29th IEEE Conference on Computational Complexity, June 2014.

- Clay Mathematics Research Conference, Oxford (England), September 2013.
- 41. Faster All-Pairs Shortest Paths via Circuit Complexity
 - Microsoft Research (Silicon Valley), July 2014.
 - TCS+ Online Seminar, https://sites.google.com/site/plustcs/, March 2014.
- 42. On Medium Uniformity and Circuit Lower Bounds
 Workshop on Computational Complexity, Banff International Research Station, July 2013.
- 43. Connections Between Algorithms and Lower Bounds

- Two lectures at CSEDays Summer School on Algorithms and Complexity, Ekaterinburg (Russia), June 2013.

44. Non-Uniform ACC Circuit Lower Bounds

- Invited Lecture at the Conference on Computer Science in Russia, Ekaterinburg (Russia), June 2013

- Israel CS Theory Day, March 2012 https://youtu.be/MIqsRsZacws
- Univ. of Michigan, August 2011
- UPC Barcelona, July 2011
- CS Department Colloquium, Dartmouth, May 2011
- Mathematics Department Colloquium, UC San Diego, March 2011
- EECS Distinguished Lecture, UC Berkeley, February 2011
- Theory Seminar, Univ. of Washington, February 2011
- Microsoft Research (Silicon Valley), December 2010
- Princeton, December 2010
- Microsoft Research (New England), December 2010
- MIT, November 2010
- UC Berkeley, November 2010
- IBM Almaden, November 2010
- 45. Recent Progress in Non-Uniform Circuit Complexity

- 85th Mathematical Colloquium, Computer Science Institute of Charles University, Prague (Czech Republic), June 2013.

- 46. Algorithm Design and Circuit Complexity
- 6th Bertinoro Workshop on Algorithms and Data Structures (ADS), June 2013.
- 47. Duality between Circuit Analysis and Circuit Lower Bounds
 Stanford CSLI Workshop on Logic, Rationality and Intelligent Interaction, June 2013.
- 48. Substructure in SAT

- Symposium on Structure in Combinatorial Problems, Vienna (Austria), May 2013.

- 49. New Lower Bounds in Complexity Theory via Diagonalization
 - Stanford Logic Colloquium, April 2013.
 - UCSD Math Department, April 2012.
 - UCLA Logic Colloquium, April 2012.
 - Plenary Lecture, North Amer. Annual Meeting of the Association for Symbolic Logic, Berkeley, CA, March 2011.
- 50. Parameterized Algorithms and Circuit Lower Bounds
 - Special Session at Joint Mathematics Meetings, San Diego, CA, January 2013.
- 51. Lower Bounds Against ACC

- Invited Lecture at Mathematisches Forschungsinstitut Oberwolfach (Germany), November 2012.

- 52. Algorithms for Circuits and Circuits for Algorithms
 - Kyoto University (Japan), January 2012.
 - Georgia Tech ARC Theory Day, Atlanta, GA, November 2011.
 - Keynote Lecture at China Theory Week, Aarhus (Denmark), October 2011.
- 53. Backdoors to Typical Case Complexity
 - Beyond Worst-Case Analysis Workshop, Stanford, August 2011.
- 54. Diagonalization Strikes Back
 Keynote Lecture at the International Computing and Combinatorics Conference (CO-COON), Dallas, TX, August 2011.
- Connecting SAT Algorithms and Complexity Lower Bounds

 Plenary Lecture at the International Conference on Theory and Applications of Satisfiability Testing (SAT), Ann Arbor, MI, June 2011.
- 56. Algorithms, Obstructions, and Beating Exhaustive Search Univ. of Michigan, January 2011; Univ. of Chicago, February 2011; Harvard, February 2011; Stanford, February 2011; UC San Diego, March 2011; IBM Almaden, March 2011; Cornell, March 2011; Microsoft Research (Silicon Valley), March 2011; Caltech, April 2011.
- 57. *What's all this about P not equaling NP?* (with Ken Clarkson and Ron Fagin) IBM Almaden, August 2010.
- 58. Communication Complexity With Clocks
 - Theory Seminar, UC Berkeley, March 2010.
- 59. Improving Exhaustive Search Implies Superpolynomial Lower Bounds
 - Schloss Dagstuhl (Germany), November 2010.
 - Georgia Tech, May 2010
 - Microsoft Research (Silicon Valley), April 2010
 - IBM Almaden, February 2010
- 60. Time-Space Lower Bounds for NP-Hard Problems
 - North Amer. Ann. Meeting of the Association for Symbolic Logic, D.C., March 2010
 - UC San Diego, May 2009
- 61. Applying Practice to Theory: Time Lower Bounds for Fundamental Problems
 - Univ. of Toronto, February 2009
 - DIMACS, November 2008
 - TTI Chicago, March 2008
- 62. Graph Algorithms From Group Algebra
 - IBM T.J. Watson (Yorktown), February 2009
 - Schloss Dagstuhl (Germany), October 2009.
- 63. Finding a k-Path in $O^*(2^k)$ Time
 - Schloss Dagstuhl (Germany), October 2008.
- 64. A Survey of Time Lower Bounds by Algorithmic Arguments - Institute for Advanced Study, September 2008.
- 65. Clique Problems and Applications
 - Computer Science Colloquium, Univ. of Rochester, February 2008.

- 66. Automated Proofs of Time Lower BoundsChina Theory Week, Tsinghua Univ. (China), September 2007.
- 67. A Hybrid Approach to Coping With Hard Problems
 - Georgia Tech, April 2007
 - Schloss Dagstuhl (Germany), July 2005.
- 68. *Exact 2-CSP Optimization Using Matrix Multiplication* Microsoft Research (Redmond), June 2005.
- 69. *On the Complexity of Optimal K-Anonymity* Privacy in D.A.T.A. Workshop, Carnegie Mellon, March 2003.

BOOK CHAPTERS	 J. Wang and R. Williams. Exact Algorithms and Strong Exponential Time Hypothesis. <i>Encyclopedia of Algorithms 2nd edition</i>, MY. Kao (ed.), 657–661, 2016. C. Gomes and R. Williams. Approximations and Randomization. In <i>Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques</i>, E. Burke and G. Kendall (eds.), 2nd edition, Springer, 2014. R. Williams. Maximum 2-Satisfiability. In <i>Encyclopedia of Algorithms</i>, MY. Kao (ed.), Springer, 2008. Updated for 2nd Edition, 2016. C. Gomes and R. Williams. Approximation Algorithms. In <i>Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques</i>, E. Burke and G. Kendall (eds.), Springer, 2005.
INVITED ARTICLES	 R. R. Williams. The Power of Constructing Bad Inputs. In the <i>EATCS Bulletin</i>, 2023. R. R. Williams. Complexity Lower Bounds from Algorithm Design. <i>IEEE Logic in Computer Science</i>, 1–3, 2021. R. R. Williams. Some Estimated Likelihoods for Computational Complexity. Lecture Notes in Computer Science 10000, Springer 2019. R. R. Williams. Some Ways of Thinking Algorithmically About Impossibility. <i>SIGLOG News</i> 4(3):28–40, 2017. R. R. Williams. Some Open Problems Regarding Lower Bounds For NP. <i>SIGACT News</i> 47(4), 2016. R. R. Williams. Thinking Algorithmically About Impossibility (Invited Talk). In <i>Proceedings of 24th Annual Conference on Computer Science Logic</i> (CSL), 14–23, 2015. R. Williams. The Polynomial Method in Circuit Complexity Applied to Algorithm Design. <i>Proceedings of 34th Foundations of Software Technology and Theoretical Computer Science</i>, 47–60, 2014. R. Williams. Algorithms for circuits and circuits for algorithms: connecting the tractable and intractable. <i>Proceedings of the International Congress of Mathematicians</i>, 2014. R. Williams. Towards NEXP versus BPP? Invited article in <i>Proceedings of Computer Science in Russia (CSR)</i>, 174–182, 2013. L. Hemaspaandra and R. Williams. An Atypical Survey of Typical-Case Complexity. <i>SIGACT News</i> 42(3):54–76, September 2011. R. Williams. A Casual Tour Around a Circuit Complexity Bound. <i>SIGACT News</i> 42(3):54–76, September 2011. R. Williams. Connecting Strikes Back: Some Recent Lower Bounds In Complexity Theory. Invited in <i>Proceedings of the 17th International Conference on Computing and Combinatorics (COCON)</i>, Springer LNCS 6842, 237–239, 2011. R. Williams. Connecting SAT Algorithms and Complexity Lower Bounds. Invited in <i>Theory of Applications of Satisfiability Testing</i> (SAT), Springer LNCS 6695, 1–2, 2011.
JOURNAL PUBLICATIONS	 R. Williams. Applying Practice to Theory. <i>SIGACT News</i> 39(4):37–52, 2008. L. Chen, C. Jin, R. Santhanam, R. Williams. Constructive Separations and Their Consequences. <i>TheoretiCS</i> 3, 2024. S. Akmal, L. Chen, C. Jin, M. Raj, and R. R. Williams. Improved Merlin-Arthur Protocols for Central Problems in Fine-Grained Complexity. <i>Algorithmica</i> 85(8):2395–2426, 2023. N. Vyas and R. R. Williams. Lower Bounds Against Sparse Symmetric Functions of ACC Circuits: Expanding the Reach of #SAT Algorithms. <i>Theory Comput. Syst.</i> 67(1):149–177, 2023. N. Vyas and R. R. Williams. On Super Strong ETH. <i>J. Artif. Intell. Res.</i> 70: 473–495.

2021.

- R. R. Williams. From Circuit Complexity to Faster All-Pairs Shortest Paths. SIAM Review 63(3):559–582, 2021.
- T. M. Chan and R. R. Williams. Deterministic APSP, Orthogonal Vectors, and More: Quickly Derandomizing Razborov-Smolensky. *ACM Transactions on Algorithms* 17(1): 2:1–2:14, 2021.
- C. D. Murray and R. R. Williams. Circuit Lower Bounds for Nondeterministic Quasi-Polytime From a New Easy Witness Lemma. *SIAM Journal on Computing* 49(5) (special issue for STOC 2018), 2020.
- A. Björklund, P. Kaski, and R. R. Williams. Generalized Kakeya sets for polynomial evaluation and faster computation of fermionants. *Algorithmica* 81(10): 4010–4028, 2019.
- 9. J. Gao, R. Impagliazzo, A. Kolokolova, and R. R. Williams. Completeness for firstorder properties on sparse structures with algorithmic applications. *ACM Transactions on Algorithms*, 15(2), Article 23, 2018.
- 10. V. Vassilevska Williams and R. R. Williams. Subcubic Equivalences Between Path, Matrix, and Triangle Problems. *Journal of the ACM* 65(5):27:1–27:38, 2018.
- R. R. Williams. Faster All-Pairs Shortest Paths via Circuit Complexity. SIAM Journal on Computing 47(5):1965–1985, 2018.
- R. R. Williams. New Algorithms and Lower Bounds for Circuits With Linear Threshold Gates. *Theory of Computing* 14(1):1–25, 2018.
- 13. C. D. Murray and R. R. Williams. On the (Non) NP-Hardness of Computing Circuit Complexity. *Theory of Computing* 13(1):1–22, 2017.
- 14. I. Koutis and R. Williams. Algebraic Fingerprints for Faster Algorithms. *Communications of the ACM* 59(1):98–105, 2016.
- 15. I. Koutis and R. Williams. Limits and Applications of Group Algebras for Parameterized Problems. *ACM Transactions on Algorithms* 12(3):31, 2016.
- 16. R. Williams. Natural Proofs Versus Derandomization. *SIAM Journal on Computing* 45(2):497–529, 2016.
- 17. S. Buss and R. Williams. Limits on Alternation-Trading Proofs for Time-Space Lower Bounds. *Computational Complexity* 24(3):533–600, 2015.
- 18. R. Santhanam and R. Williams. On Uniformity and Circuit Lower Bounds. *Computational Complexity*, 23(2):177–205, 2014.
- 19. R. Williams. Non-Uniform ACC Circuit Lower Bounds. *Journal of the ACM* 61(1), article 2, January 2014.
- 20. R. Williams. Improving Exhaustive Search Implies Superpolynomial Lower Bounds. *SIAM Journal on Computing* 42(3):1218–1244, 2013.
- V. Vassilevska Williams and R. Williams. Finding, Minimizing, and Counting Weighted Subgraphs. SIAM Journal on Computing 42(3):831–854, 2013.
- 22. R. Williams. Alternation-Trading Proofs, Linear Programming, and Lower Bounds. *ACM Transactions on Computation Theory*, 5(2), 2013.
- 23. R. J. Lipton and R. Williams. Amplifying Lower Bounds Against Polynomial Time With Applications. *Computational Complexity* 22(2):311–343, 2013.
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