

# Aaron L. Roth

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RESEARCH INTERESTS      Machine learning with guarantees of privacy, fairness, and other social constraints. Learning theory, algorithms, and game theory.

EMPLOYMENT      **University of Pennsylvania**, Philadelphia, Pennsylvania USA  
Henry Salvatori Professor of Computer and Cognitive Science, January 2022 –  
Professor of Statistics and Data Science, The Wharton School, July 2021 –  
Professor of Computer and Information Science, July 2020 –  
Class of 1940 Bicentennial Term Associate Professor, 2017 – June 2020.  
Associate Professor (with tenure), July 2016 – June 2020.  
Raj and Neera Singh Assistant Professor of Computer Science, August 2011 – June 2016.

**Amazon**, Seattle, Washington USA

Amazon Scholar, July 2020 –

**Consulting and Advisory Positions**, Philadelphia, Pennsylvania USA

Consulting for various clients including Apple, Facebook, and Keystone Strategy 2016 – 2020  
Scientific Advisor for Spectrum Labs 2019 – 2020  
Scientific Advisor for Leapyear Technologies 2016 – 2020

**Microsoft Research New England**, Cambridge, Massachusetts USA

Postdoctoral Researcher, July 2010 – July 2011

EDUCATION      **Carnegie Mellon University**, Pittsburgh, Pennsylvania USA

Ph.D., Department of Computer Science. May 2010  
Advisor: Avrim Blum

**Columbia University**, New York, New York USA

B.A., Computer Science, Mathematics, May, 2006  
*Summa Cum Laude*

AWARDS      CMU CyLab Distinguished Alumni Award, 2023. <https://www.cylab.cmu.edu/news/2023/08/24-distinguished-alumni-award.html>

American Association of American Publishers 2021 PROSE Award in the Computer and Information Sciences Category, for “The Ethical Algorithm”

Top 20 instructor in the Penn Engineering School, 2018-2019 academic year.  
2015 Pat Goldberg Memorial Best Paper Award (Awarded in 2017).  
Class of 1940 Bicentennial Endowed Term Chair, January 2017-July 2020.  
Presidential Early Career Award for Scientists and Engineers (PECASE), 2016.  
Google Faculty Research Award, 2015-2016.  
Alfred P. Sloan Research Fellow, 2015.  
NSF CAREER Award, 2012-2017.  
Yahoo! Academic Career Enhancement (ACE) Award, 2012.  
NSF Graduate Research Fellowship, 2008-2010  
Columbia Computer Science Departmental Award, 2006

PUBLICATIONS  
(ALPHABETICAL  
AUTHORSHIP)

BOOKS AND BOOK CHAPTERS

*Fairness in Prediction and Allocation.* Jamie Morgenstern, Aaron Roth. Appears as a chapter in *Online and Matching-Based Market Design.* Federico Echenique, Nicole Immorlica and Vijay V. Vazirani, Editors. Cambridge University Press. 2021.

*The Ethical Algorithm.* Michael Kearns, Aaron Roth. Oxford University Press, November 2019.

*The Algorithmic Foundations of Differential Privacy.* Cynthia Dwork, Aaron Roth. Foundations and Trends in Theoretical Computer Science, Vol 9. Issue 3-4, 2014.

JOURNALS

*Confidence-Ranked Reconstruction of Census Microdata from Published Statistics.* Travis Dick, Cynthia Dwork, Michael Kearns, Terrance Liu, Aaron Roth, Giuseppe Vietri, and Zhiwei Steven Wu. Proceedings of the National Academy of Sciences (PNAS), 120(8) February 17, 2023.

*Pipeline Interventions.* Eshwar Ram Arunachaleswaran, Sampath Kannan, Aaron Roth, Juba Ziani. Mathematics of Operations Research, 2022.

*Gaussian Differential Privacy.* Jinshuo Dong, Aaron Roth, Weijie Su. Journal of the Royal Statistical Society, 2021. **Selected as a discussion paper.**

*Exponential Separations in Local Differential Privacy Through Communication Complexity.* Matthew Joseph, Jieming Mao, Aaron Roth. ACM Transactions on Algorithms (TALG), 2021. (Special issue devoted to papers invited from SODA 2020).

*A Snapshot of the Frontiers of Fairness in Machine Learning: A Report from Philadelphia.* Alexandra Chouldechova, Aaron Roth. Communications of the ACM (CACM), May 2020. **Cover Article.**

*Accuracy First: Selecting a Differential Privacy Level for Accuracy Constrained ERM.* Katrina Ligett, Seth Neel, Aaron Roth, Bo Waggoner, Steven Zhiwei Wu. Journal of Privacy and Confidentiality, July 2019.

*Private Pareto Optimal Exchange.* Sampath Kannan, Jamie Morgenstern, Ryan Rogers, Aaron Roth. Transactions on Economics and Computation (TEAC), October 2018. (Special issue devoted to papers invited from EC 2015).

*Fairness in Criminal Justice Risk Assessments: The State of the Art.* Richard Berk, Hoda Heidari, Shahin Jabbari, Michael Kearns, Aaron Roth. Sociological Methods and Research, July 2018.

*Dual Query: Practical Private Query Release for High Dimensional Data.* Marco Gaboardi, Emilio Jesus Gallego-Arias, Justin Hsu, Aaron Roth, Zhiwei Steven Wu. Journal of Privacy and Confidentiality, January 2017.

*Private Matchings and Allocations.* Justin Hsu, Zhiyi Huang, Aaron Roth, Tim Roughgarden, Steven Wu. SIAM Journal on Computing (SICOMP), 2016.

*An Anti-Folk Theorem for Large Repeated Games.* Malleesh Pai, Aaron Roth, Jonathan Ullman. ACM Transactions on Economics and Computation, March 2017.

*Bounds for the Query Complexity of Approximate Equilibria.* Paul Goldberg, Aaron Roth. ACM Transactions on Economics and Computation, August 2016. (Special issue devoted to papers invited from EC 2014.)

*Private Algorithms for the Protected in Social Network Search.* Michael Kearns, Aaron Roth, Steven Wu, and Grigory Yaroslavtsev. Proceedings of the National Academy of Sciences (PNAS). 113(4), Pages 913-918 (Supplementary material online). January 29, 2016. (Penn Front Page Feature: <http://www.upenn.edu/spotlights/balancing-privacy-and-security-network-analysis>).

*The Reusable Holdout: Preserving Validity in Adaptive Data Analysis.* Cynthia Dwork, Vitaly Feldman, Moritz Hardt, Toniann Pitassi, Omer Reingold, and Aaron Roth. *Science*. 349 (6248), Pages 636-638 (Supplementary material online). August 7, 2015. (Penn News Feature: <https://news.upenn.edu/news/penn-research-helps-develop-algorithm-aimed-combating-science-s-reproducibility-problem>).

**Winner of the 2015 Pat Goldberg Memorial Best Paper Award.**

*Auctions with Online Supply.* Moshe Babaioff, Liad Blumrosen, Aaron Roth. Games and Economic Behavior. Volume 90, Pages 227-246. March 2015.

*Selling Privacy at Auction.* Arpita Ghosh, Aaron Roth. Games and Economic Behavior, Volume 91, Pages 334-346. May 2015.

*Mechanism Design in Large Games: Incentives and Privacy.* Michael Kearns, Malleesh Pai, Aaron Roth, Jon Ullman. American Economic Review (Papers and Proceedings) 104(5), Pages 431-35. May 2014.

*A Learning Theory Approach to Noninteractive Database Privacy.* Avrim Blum, Katrina Ligett, Aaron Roth. Journal of the ACM (JACM), Volume 60(2), Pages 12.1-12.25. May 2013.

*Privately Releasing Conjunctions and the Statistical Query Barrier.* Anupam Gupta, Moritz Hardt, Aaron Roth, Jon Ullman. SIAM Journal on Computing (SICOMP), Volume 42(4), Pages 1494-1520. July 2013.

*The Power of Fair Pricing Mechanisms.* Christine Chung, Katrina Ligett, Kirk Pruhs, Aaron Roth. Algorithmica, Volume 63(3). Pages 634-644. July 2012.

## REFEREED CONFERENCES

*Multicalibrated Regression for Downstream Fairness.* Ira Globus-Harris, Varun Gupta, Christopher Jung, Michael Kearns, Jamie Morgenstern, Aaron Roth. AIES 2023: The Sixth AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society, 2023.

*The Scope of Multicalibration: Characterizing Multicalibration via Property Elicitation.* Georgy Noarov, Aaron Roth. ICML 2023: The 40th International Conference on Machine Learning, 2023.

*Multicalibration as Boosting for Regression.* Ira Globus-Harris, Declan Harrison, Michael Kearns, Aaron Roth, Jessica Sorrell. ICML 2023: The 40th International Conference on Machine Learning, 2023. **Oral Presentation**

*Individually Fair Learning with One Sided Feedback.* Yahav Bechavod, Aaron Roth. ICML 2023: The 40th International Conference on Machine Learning, 2023.

*Reconciling Individual Probability Forecasts.* Aaron Roth, Alexander Tolbert, Scott Weinstein. FAccT 2023: The Sixth Annual ACM Conference on Fairness, Accountability, and Transparency, 2023.

*Batch Multivald Conformal Prediction.* Christopher Jung, Georgy Noarov, Ramya Ramalingam, Aaron Roth. ICLR 2023: The Eleventh International Conference on Learning Representations, 2023.

*Wealth Dynamics Over Generations: Analysis and Interventions.* Krishna Acharya, Eshwar Ram Arunachaleswaran, Sampath Kannan, Aaron Roth, Juba Ziani. SaTML 2023: The IEEE Conference on Secure and Trustworthy Machine Learning, 2023.

*Practical Adversarial Multivald Conformal Prediction .* Osbert Bastani, Varun Gupta, Christopher Jung, Georgy Noarov, Ramya Ramalingam, Aaron Roth. NeurIPS 2022: The 36th Annual Conference on Neural Information Processing Systems, 2022. **Oral Presentation**

*Private Synthetic Data for Multitask Learning and Marginal Queries.* Giuseppe Vietri, Cedric Archambeau, Sergul Aydore, William Brown, Michael Kearns, Aaron Roth, Ankit Siva, Shuai Tang, Steven Wu. NeurIPS 2022: The 36th Annual Conference on Neural Information Processing Systems, 2022.

*Online Multiobjective Minimax Optimization and Applications.* Georgy Noarov, Mallesh Pai, Aaron Roth. NeurIPS 2022: The 36th Annual Conference on Neural Information Processing Systems, 2022. **Oral Presentation**

*An Algorithmic Framework for Bias Bounties.* Ira Globus-Harris, Michael Kearns, Aaron Roth. In FAccT 2022: The ACM Conference on Fairness, Accountability, and Transparency 2022.

*Multiaccurate Proxies for Downstream Fairness.* Emily Diana, Wesley Gill, Michael Kearns, Krishnamurthy Kenthapadi, Aaron Roth, Saeed Sharifi-Lalvajerdi. In FAccT 2022: The ACM Conference on Fairness, Accountability, and Transparency 2022.

*Best vs. All: Equity and Accuracy of Standardized Test Score Reporting.* Sampath Kannan, Mingzi Niu, Aaron Roth, Rakesh Vohra. In FAccT 2022: The ACM Conference on Fairness, Accountability, and Transparency 2022.

*Mixed Differential Privacy for Computer Vision.* Aditya Golatkar, Alessandro Achille, Yu-Xiang

Wang, Aaron Roth, Michael Kearns, Stefano Soatto. In CVPR 2022: The 33rd IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2022. **Oral Presentation**.

*Online Multivald Learning: Means, Moments, and Prediction Intervals*. Varun Gupta, Christopher Jung, Georgy Naorov, Mallesh M. Pai, Aaron Roth. ITCS 2022: The 13th Innovations in Theoretical Computer Science Conference, 2022.

*Adaptive Machine Unlearning*. Varun Gupta, Christopher Jung, Seth Neel, Aaron Roth, Saeed Sharifi-Malvajerdi, Chris Waites. NeurIPS 2021: The 35th Annual Conference on Neural Information Processing Systems, 2021.

*Moment Multicalibration for Uncertainty Estimation*. Christopher Jung, Changwa Lee, Mallesh M. Pai, Aaron Roth, Rakesh Vohra. COLT 2021: The 34th Annual Conference on Learning Theory, 2021.

*Differentially Private Query Release Through Adaptive Projection*. Sergul Aydore, William Brown, Michael Kearns, Krishnaram Kenthapadi, Luca Melis, Aaron Roth, Ankit Siva. ICML 2021: The 38th International Conference on Machine Learning, 2021. **Long Presentation**

*Algorithms and Learning for Fair Portfolio Design*. Emily Diana, Ttravis Dick, Hadi Elzayn, Michael Kearns, Aaron Roth, Zachary Schutzman, Saeed Sharifi-Malvajerdi, Juba Ziani. EC 2021: 22nd ACM Conference on Economics and Computation, 2021.

*Minimax Group Fairness: Algorithms and Experiments*. Emily Diana, Wesley Gill, Michael Kearns, Krishnaram Kenthapadi, Aaron Roth. AIES 2021: The Fourth AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society, 2021.

*Eliciting and Enforcing Subjective Individual Fairness*. Christopher Jung, Michael Kearns, Seth Neel, Aaron Roth, Logan Stapleton, Steven Wu. FORC 2021: The Second Annual Symposium on the Foundations of Responsible Computing, 2021.

*Lexicographically Fair Learning: Algorithms and Generalization*. Emily Diana, Wesley Gill, Ira Globus-Harris, Michael Kearns, Aaron Roth, Saeed Sharifi-Malvajerdi. FORC 2021: The Second Annual Symposium on the Foundations of Responsible Computing, 2021.

*Descent-to-Delete: Gradient-Based Methods for Machine Unlearning*. Seth Neel, Aaron Roth, Saeed Sharifi-Malvajerdi. ALT 2021: The 32nd International Conference on Algorithmic Learning Theory, 2021.

*Pipeline Interventions*. Eshwar Ram Arunachaleswaran, Sampath Kannan, Aaron Roth, Juba Ziani. ITCS 2021: The 12th Innovations in Theoretical Computer Science Conference, 2021.

*Testing Differential Privacy with Dual Interpreters*. Hengchu Zhang, Edo Roth, Benjamin Pierce, Aaron Roth, Andreas Haeberlen. OOPSLA 2020: ACM Conference on Object-Oriented Programming, Systems, Languages & Applications, 2020.

*Differentially Private Objective Perturbation: Beyond Smoothness and Convexity*. Seth Neel, Aaron Roth, Giuseppe Vietri, Steven Wu. ICML 2020: The 37th International Conference on Machine Learning, 2020.

*Fair Prediction with Endogenous Behavior*. Christopher Jung, Sampath Kannan, Changwa Lee, Mallesh M. Pai, Aaron Roth, Rakesh Vohra. EC 2020: 21st ACM Conference on Economics and Computation, 2020.

*Differentially Private Call Auctions and Market Impact.* Emily Diana, Hadi Elzayn, Michael Kearns, Aaron Roth, Saeed Sharifi-Malvajerdi, Juba Ziani. EC 2020: 21st ACM Conference on Economics and Computation, 2020.

*Optimal, Truthful, and Private Securities Lending.* Michael Kearns, Seth Neel, Aaron Roth, Emily Ruth. ICAIF 2020: 1st ACM International Conference on AI in Finance, 2020.

*Guaranteed Validity for Empirical Approaches to Adaptive Data Analysis* Ryan Rogers, Aaron Roth, Adam Smith, Nathan Srebro, Om Thakkar, Blake Woodworth. AISTATS 2020: The 23rd International Conference on Artificial Intelligence and Statistics.

*A New Analysis of Differential Privacy's Generalization Guarantees.* Christopher Jung, Katrina Ligett, Seth Neel, Aaron Roth, Saeed Sharifi-Malvajerdi, Moshe Shenfeld. ITCS 2020: The 11th Innovations in Theoretical Computer Science, 2020.

*Exponential Separations in Local Differential Privacy Through Communication Complexity.* Matthew Joseph, Jieming Mao, Aaron Roth. SODA 2020: The ACM-SIAM Symposium on Discrete Algorithms, 2020. **Invited to ACM Transactions on Algorithms Special Issue.**

*Average Individual Fairness: Algorithms, Generalization and Experiments.* Michael Kearns, Aaron Roth, Saeed Sharifi-Malvajerdi. NeurIPS 2019: The 33rd Annual Conference on Neural Information Processing Systems, 2019. **Oral Presentation**

*Equal Opportunity in Online Classification with Partial Feedback.* Yahav Bechavod, Katrina Ligett, Aaron Roth, Bo Waggoner, Steven Wu. NeurIPS 2019: The 33rd Annual Conference on Neural Information Processing Systems, 2019.

*The Role of Interactivity in Local Differential Privacy.* Matthew Joseph, Jieming Mao, Seth Neel, Aaron Roth. FOCS 2019: The 60th Annual IEEE Symposium on Foundations of Computer Science, 2019.

*How to Use Heuristics for Differential Privacy.* Seth Neel, Aaron Roth, Steven Wu. FOCS 2019: The 60th Annual IEEE Symposium on Foundations of Computer Science, 2019.

*Fuzzi: A Three-Level Logic for Differential Privacy.* Hengchu Zhang, Edo Roth, Andreas Haeberlen, Benjamin C. Pierce, Aaron Roth. ICFP 2019: The 24th ACM SIGPLAN International Conference on Functional Programming, 2019.

*Differentially Private Fair Learning.* Matthew Jagielski, Michael Kearns, Jieming Mao, Alina Oprea, Aaron Roth, Saeed Sharifi-Malvajerdi, Jonathan Ullman. ICML 2019: The 36th International Conference on Machine Learning, 2019. **Long Presentation**

*Fair Algorithms for Learning in Allocation Problems.* Hadi Elzayn, Shahin Jabbari, Christopher Jung, Michael Kearns, Seth Neel, Aaron Roth, Zachary Schutzman. FAT\* 2019: The 2nd Annual ACM Conference on Fairness, Transparency, and Accountability, 2019.

*Downstream Effects of Affirmative Action.* Sampath Kannan, Aaron Roth, Juba Ziani. FAT\* 2019: The 2nd Annual ACM Conference on Fairness, Transparency, and Accountability, 2019.

*An Empirical Study of Rich Subgroup Fairness for Machine Learning.* Michael Kearns, Seth Neel, Aaron Roth, Steven Wu. FAT\* 2019: The 2nd Annual ACM Conference on Fairness, Transparency, and Accountability, 2019.

*Online Learning with an Unknown Fairness Metric.* Stephen Gillen, Christopher Jung, Michael

Kearns, Aaron Roth. NeurIPS 2018: The 32nd Annual Conference on Neural Information Processing Systems, 2018.

*Local Differential Privacy for Evolving Data.* Matthew Joseph, Aaron Roth, Jon Ullman, Bo Waggoner. NeurIPS 2018: The 32nd Annual Conference on Neural Information Processing Systems, 2018. **Spotlight Presentation.**

*A Smoothed Analysis of the Greedy Algorithm for the Linear Contextual Bandit Problem.* Sampath Kannan, Jamie Morgenstern, Aaron Roth, Bo Waggoner, Steven Wu. NeurIPS 2018: The 32nd Annual Conference on Neural Information Processing Systems, 2018. **Spotlight Presentation.**

*Mitigating Bias in Adaptive Data Gathering.* Seth Neel, Aaron Roth. ICML 2018: The 35th International Conference on Machine Learning, 2018.

*Preventing Fairness Gerrymandering: Auditing and Learning for Subgroup Fairness.* Michael Kearns, Seth Neel, Aaron Roth, Steven Wu. ICML 2018: The 35th International Conference on Machine Learning, 2018. (Also appeared in the FAT/ML 2018 workshop.)

*Strategic Classification from Revealed Preferences.* Jinshuo Dong, Aaron Roth, Zachary Schutzman, Bo Waggoner, Steven Wu. EC 2018: 19th ACM Conference on Economics and Computation, 2018. (Also appeared as a long oral presentation in the NIPS 2017 workshop on Learning in the Presence of Strategic Behavior.)

*Fair Algorithms for Infinite and Contextual Bandits.* Matthew Joseph, Michael Kearns, Jamie Morgenstern, Seth Neel, Aaron Roth. AIES 2018: The 1st Annual AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society, 2018.

*Accuracy First: Selecting a Differential Privacy Level for Accuracy Constrained ERM.* Katrina Ligett, Seth Neel, Aaron Roth, Bo Waggoner, Steven Zhiwei Wu. NIPS 2017: The 31st Annual Conference on Neural Information Processing Systems, 2017. **Invited to Journal of Privacy and Confidentiality Special Issue.**

*Meritocratic Fairness for Cross Population Selection.* Michael Kearns, Aaron Roth, Steven Wu. ICML 2017: The 34th International Conference on Machine Learning, 2017.

*Fairness in Reinforcement Learning.* Shahin Jabbari, Matthew Joseph, Michael Kearns, Jamie Morgenstern, Aaron Roth. ICML 2017: The 34th International Conference on Machine Learning, 2017.

*A Framework for Adaptive Differential Privacy.* Daniel Winograd-Cort, Andreas Haeberlen, Benjamin Pierce, Aaron Roth. ICFP 2017: The 22nd ACM SIGPLAN International Conference on Functional Programming, 2017.

*Fairness Incentives for Myopic Agents.* Sampath Kannan, Michael Kearns, Jamie Morgenstern, Mallesh Pai, Aaron Roth, Rakesh Vohra, Steven Wu. EC 2017: 18th ACM Conference on Economics and Computation, 2017.

*Multidimensional Dynamic Pricing for Welfare Maximization.* Aaron Roth, Aleksandrs Slivkins, Jonathan Ullman, Steven Wu. EC 2017: 18th ACM Conference on Economics and Computation, 2017.

*Computer Aided Verification in Mechanism Design.* Gilles Barthe, Marco Gaboardi, Emilio Jesus Gallego Arias, Justin Hsu, Aaron Roth, and Pierre-Yves Strub. WINE 2016: The 12th Conference on Web and Internet Economics, 2016.

*Privacy Odometers and Filters: Pay-as-you-Go Composition.* Ryan Rogers, Aaron Roth, Jonathan Ullman, Salil Vadhan. NIPS 2016: 30th Annual Conference on Neural Information Processing Systems, 2016.

*Fairness in Learning: Classic and Contextual Bandits.* Matthew Joseph, Michael Kearns, Jamie Morgenstern, Aaron Roth. NIPS 2016: 30th Annual Conference on Neural Information Processing Systems, 2016.

*Learning from Rational Behavior: Predicting Solutions to Unknown Linear Programs.* Shahin Jabbari, Ryan Rogers, Aaron Roth, Steven Wu. NIPS 2016: 30th Annual Conference on Neural Information Processing Systems, 2016.

*Max-Information, Differential Privacy, and Post-Selection Hypothesis Testing.* Ryan Rogers, Aaron Roth, Adam Smith, Om Thakkar. FOCS 2016: 57th Annual IEEE Symposium on Foundations of Computer Science, 2016.

*The Strange Case of Privacy in Equilibrium Models.* Rachel Cummings, Katrina Ligett, Mallesh M. Pai, Aaron Roth. EC 2016: 17th ACM Conference on Economics and Computation, 2016. **Invited to Transactions on Economics and Computation Special Issue** (declined).

*Adaptive Learning with Robust Generalization Guarantees.* Rachel Cummings, Katrina Ligett, Kobbi Nissim, Aaron Roth, Steven Wu. COLT 2016: The 29th Annual Conference on Learning Theory, 2016.

*Tight Regret Bounds for Improving and Decaying Bandits.* Hoda Heidari, Michael Kearns, Aaron Roth. IJCAI 2016: 25th International Joint Conference on Artificial Intelligence, 2016.

*Do Prices Coordinate Markets?* Justin Hsu, Jamie Morgenstern, Aaron Roth, Ryan Rogers, Rakesh Vohra. STOC 2016: 48th ACM Symposium on the Theory of Computing, 2016.

*Watch and Learn: Optimizing from Revealed Preferences Feedback.* Aaron Roth, Jonathan Ullman, Steven Wu. STOC 2016: 48th ACM Symposium on the Theory of Computing, 2016.

*Coordination Complexity: Small Information Coordinating Large Populations.* Rachel Cummings, Katrina Ligett, Jaikumar Radhakrishnan, Aaron Roth, Steven Wu. ITCS 2016: The 7th Innovations in Theoretical Computer Science (ITCS) Conference, 2016.

*Jointly Private Convex Programming.* Justin Hsu, Zhiyi Huang, Aaron Roth, Zhiwei Steven Wu. SODA 2016: The ACM-SIAM Symposium on Discrete Algorithms, 2016.

*Privacy and Truthful Equilibrium Selection for Aggregative Games.* Rachel Cummings, Michael Kearns, Aaron Roth, Zhiwei Steven Wu. WINE 2015: The 11th Conference on Web and Internet Economics, 2015.

*Generalization in Adaptive Data Analysis and Holdout Reuse.* Cynthia Dwork, Vitaly Feldman, Moritz Hardt, Toniann Pitassi, Omer Reingold, Aaron Roth. NIPS 2015: 29th Annual Conference on Neural Information Processing Systems, 2015.

*Inducing Approximately Optimal Flow Using Truthful Mediators.* Ryan Rogers, Aaron Roth, Jonathan Ullman, Steven Wu. EC 2015: 16th ACM Conference on Economics and Computation, 2015.

*Private Pareto Optimal Exchange.* Sampath Kannan, Jamie Morgenstern, Ryan Rogers, Aaron Roth. EC 2015: 16th ACM Conference on Economics and Computation, 2015. **Invited to Transactions on Economics and Computation Special Issue.**



*Preserving Statistical Validity in Adaptive Data Analysis.* Cynthia Dwork, Moritz Hardt, Toniann Pitassi, Omer Reingold, Aaron Roth. STOC 2015: 47th ACM Symposium on the Theory of Computing, 2015. **Invited to SICOMP Special Issue.**

*Online Learning and Profit Maximization from Revealed Preferences.* Kareem Amin, Rachel Cummings, Lili Dworkin, Michael Kearns, Aaron Roth. AAAI 2015: 29th AAAI Conference on Artificial Intelligence, 2015.

*Accuracy for Sale: Aggregating Data with a Variance Constraint.* Rachel Cummings, Katrina Ligett, Aaron Roth, Steven Zhiwei Wu, Juba Ziani. ITCS 2015: 6th ACM SIGACT Innovations in Theoretical Computer Science, 2015.

*Higher-Order Approximate Relational Refinement Types for Mechanism Design and Differential Privacy.* Gilles Barthe, Marco Gaboardi, Emilio Jesus Gallego Arias, Justin Hsu, Aaron Roth, Pierre-Yves Strub. POPL 2015: The 42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, 2015.

*Approximately Stable, School Optimal, and Student-Truthful Many-to-One Matchings (via Differential Privacy).* Sampath Kannan, Jamie Morgenstern, Aaron Roth, Zhiwei Steven Wu. SODA 2015: The ACM-SIAM Symposium on Discrete Algorithms, 2015.

*Dual Query: Practical Private Query Release for High Dimensional Data.* Marco Gaboardi, Emilio Jesus Gallego-Arias, Justin Hsu, Aaron Roth, Zhiwei Steven Wu. ICML 2014: The 31st International Conference on Machine Learning, 2014. **Invited to Journal of Privacy and Confidentiality Special Issue.**

*Privately Solving Linear Programs.* Justin Hsu, Aaron Roth, Tim Roughgarden, Jonathan Ullman.ICALP 2014: 41st International Colloquium on Automata, Languages and Programming, 2014.

*Differential Privacy: An Economic Method for Choosing Epsilon.* Justin Hsu, Marco Gaboardi, Andreas Haeberlen, Sanjeev Khanna, Arjun Narayan, Benjamin C. Pierce, Aaron Roth. CSF 2014: IEEE Computer Security Foundations Symposium, 2014.

*Buying Private Data without Verification.* Arpita Ghosh, Katrina Ligett, Aaron Roth, Grant Schoenebeck. EC 2014: 15th ACM Conference on Economics and Computation, 2014.

*Asymptotically Truthful Equilibrium Selection in Large Congestion Games.* Ryan Rogers, Aaron Roth. EC 2014: 15th ACM Conference on Economics and Computation, 2014.

*Bounds for the Query Complexity of Approximate Equilibria.* Paul Goldberg, Aaron Roth. EC 2014: 15th ACM Conference on Economics and Computation, 2014. **Invited to Transactions on Economics and Computation Special Issue.**

*Private Matchings and Allocations.* Justin Hsu, Zhiyi Huang, Aaron Roth, Tim Roughgarden, Steven Wu. STOC 2014: 46th ACM Symposium on the Theory of Computing, 2014.

*Mechanism Design in Large Games: Incentives and Privacy.* Michael Kearns, Malleesh Pai, Aaron Roth, Jon Ullman. ITCS 2014: 5th ACM SIGACT Innovations in Theoretical Computer Science, 2014.

*Constrained Signaling for Welfare and Revenue Maximization.* Shaddin Dughmi, Nicole Immorlica, Aaron Roth. SODA 2014: The ACM-SIAM Symposium on Discrete Algorithms, 2014.

*Exploiting Metric Structure for Efficient Private Query Release.* Zhiyi Huang, Aaron Roth. SODA

2014: The ACM-SIAM Symposium on Discrete Algorithms, 2014.

*Fast Private Data Release Algorithms for Sparse Queries.* Avrim Blum, Aaron Roth. RANDOM 2013: the 17th International Workshop on Randomization and Computation, 2013.

*Differential Privacy for the Analyst via Private Equilibrium Computation.* Justin Hsu, Aaron Roth, Jon Ullman. STOC 2013: 45th ACM Symposium on the Theory of Computing, 2013.

*Beyond Worst-Case Analysis in Private Singular Vector Computation.* Moritz Hardt, Aaron Roth. STOC 2013: 45th ACM Symposium on the Theory of Computing, 2013.

*Distributed Private Heavy Hitters.* Justin Hsu, Sanjeev Khanna, Aaron Roth. ICALP 2012: The 39th International Colloquium on Automata, Languages and Programming, 2012.

*Efficiently Learning Revealed Preference.* Morteza Zadimoghaddam, Aaron Roth. WINE 2012: The 8th Workshop on Internet and Network Economics, 2012.

*Take it or Leave it: Running a Survey when Privacy Comes at a Cost.* Katrina Ligett, Aaron Roth. WINE 2012: The 8th Workshop on Internet and Network Economics, 2012.

*Conducting Truthful Surveys, Cheaply.* Aaron Roth, Grant Schoenebeck. EC 2012: The 13th ACM Conference on Electronic Commerce, 2012.

*Beating Randomized Response on Incoherent Matrices.* Moritz Hardt, Aaron Roth. STOC 2012, 44th ACM Symposium on the Theory of Computing, 2012.

*Iterative Constructions and Private Data Release.* Anupam Gupta, Aaron Roth, Jon Ullman. TCC 2012: The 9th IACR Theory of Cryptography Conference, 2012

*Selling Privacy at Auction.* Arpita Ghosh, Aaron Roth. In the Proceedings of EC 2011: The 12th ACM Conference on Electronic Commerce, 2011. **Invited to Games and Economic Behavior special issue.**

*Privately Releasing Conjunctions and the Statistical Query Barrier.* Anupam Gupta, Moritz Hardt, Aaron Roth, Jon Ullman. In the Proceedings of STOC 2011: The 43rd ACM Symposium on the Theory of Computing, 2011.

*Differential Privacy and the Fat Shattering Dimension of Linear Queries.* Aaron Roth. In the Proceedings of RANDOM 2010: The 14th International Workshop on Randomization and Computation, 2010

*Constrained Non-Monotone Submodular Maximization: Offline and Secretary Algorithms.* Anupam Gupta, Aaron Roth, Grant Schoenebeck, Kunal Talwar. In the Proceedings of WINE 2010.

*Interactive Privacy via the Median Mechanism.* Aaron Roth, Tim Roughgarden. In the Proceedings of STOC 2010: The 42nd ACM Symposium on the Theory of Computing, 2010.

*On the Equilibria of Alternating Move Games.* Aaron Roth, Maria-Florina Balcan, Adam Kalai, Yishay Mansour. In the Proceedings of SODA 2010: The ACM-SIAM Symposium on Discrete Algorithms, 2010. Pages 805-816.

*The Power of Fair Pricing Mechanisms.* Christine Chung, Katrina Ligett, Kirk Pruhs, Aaron Roth. In the Proceedings of LATIN 2010: The 9th Annual Latin American Theoretical Informatics Symposium, 2010. Pages 554-564. **Invited to Algorithmica special issue.**

*Differentially Private Combinatorial Optimization.* Anupam Gupta, Katrina Ligett, Frank McSherry, Aaron Roth, Kunal Talwar. In the Proceedings of SODA 2010: The ACM-SIAM Symposium on Discrete Algorithms, 2010. Pages 1106-1125.

*Auctions with Online Supply.* Moshe Babaioff, Liad Blumrosen, Aaron Roth. In the Proceedings of EC 2010: The 11th ACM Conference on Electronic Commerce, 2010. Also Presented at the 5th Workshop on Ad Auctions, 2009.

*The Price of Malice in Linear Congestion Games.* Aaron Roth. In the Proceedings of WINE 08: The 4th Workshop on Internet and Network Economics, 2008. Pages 118-125

*A Learning Theory Approach to Noninteractive Database Privacy.* Avrim Blum, Katrina Ligett, Aaron Roth. In the Proceedings of STOC 08: The 40th ACM Symposium on the Theory of Computing, 2008. Pages 609-618.

*The Price of Stochastic Anarchy.* Christine Chung, Katrina Ligett, Kirk Pruhs, Aaron Roth. In the Proceedings of SAGT 08: The 1st Annual International Symposium on Algorithmic Game Theory, 2008. Pages 303-314.

*Regret Minimization and the Price of Total Anarchy.* Avrim Blum, MohammadTaghi Hajiaghayi, Katrina Ligett, Aaron Roth. In the Proceedings of STOC 08: The 40th ACM Symposium on the Theory of Computing, 2008. Pages 373-382.

## MANUSCRIPTS IN SUBMISSION

*Oracle Efficient Online Multicalibration and Omniprediction.* Sumegha Garg, Christopher Jung, Omer Reingold, Aaron Roth. Manuscript, 2023.

*Balanced Filtering via Non-Disclosive Proxies.* Siqi Deng, Emily Diana, Michael Kearns, Aaron Roth. Manuscript, 2023.

*Scalable Membership Inference Attacks via Quantile Regression.* Martin Bertran, Michael Kearns, Jamie Morgenstern, Aaron Roth, Shuai Tang, Zhiwei Steven Wu. Manuscript, 2023.

*Oracle Efficient Online Multicalibration and Omniprediction.* Sumegha Garg, Christopher Jung, Omer Reingold, Aaron Roth. Manuscript, 2023.

*Improved Differentially Private Regression via Gradient Boosting .* Shuai Tang, Sergul Aydore, Michael Kearns, Saeyoung Rho, Aaron Roth, Yichen Wang, Yu-Xiang Wang, Zhiwei Steven Wu. Manuscript, 2023.

## INVITED SURVEYS, COMMENTS, BRIEFS, WHITEPAPERS, AND EDITORIALS

*Ethical Algorithm Design Should Guide Technology Regulation* Michael Kearns, Aaron Roth. Brookings Institute Policy Brief. January, 2020. <https://www.brookings.edu/research/ethical-algorithm-design-should-guide-technology-regulation/>

*Socially Aware Algorithms are Ready to Help.* Michael Kearns, Aaron Roth. Scientific American. November 17, 2019. <https://blogs.scientificamerican.com/observations/socially-aware-algorithms-are-ready-to-help/>

*Guidelines for Implementing and Auditing Differentially Private Systems.* Daniel Kifer, Solomon Messing, Aaron Roth, Abhradeep Thakurta, Danfeng Zhang. Whitepaper, 2019.

*Comment on Duchi, Wainwright, and Jordan.* Aaron Roth. Journal of the American Statistical Association (JASA). Vol. 113, No. 521, Pages 208-211, May 2018. (Invited Contribution).

*Pricing Information (And its Implications).* Aaron Roth. Technical Perspectives: Communications of the ACM, Vol. 60, No. 12, Page 78, December 2017. (Invited Contribution)

*Guilt Free Data Reuse.* Cynthia Dwork, Vitaly Feldman, Moritz Hardt, Toniann Pitassi, Omer Reingold, and Aaron Roth. Research Highlights: Communications of the ACM, Vol. 60, No. 4 Pages 86-93, April 2017. (Invited contribution)

*Do Prices Coordinate Markets?* Justin Hsu, Jamie Morgenstern, Aaron Roth, Ryan Rogers, Rakesh Vohra. SIGecom Exchanges, 2016. (Invited contribution)

*Watch and Learn: Optimizing from Revealed Preferences Feedback.* Aaron Roth, Jonathan Ullman, Steven Wu. SIGecom Exchanges, 2015. (Invited contribution)

*Coordination when Information is Scarce: How Privacy can Help.* Aaron Roth. ACM Crossroads, 2013. (Invited contribution)

*Privacy and Mechanism Design.* Mallesh Pai, Aaron Roth. SIGecom Exchanges, 2013. (Invited contribution)

*The Sensitive Surveyors Problem.* Aaron Roth. SIGecom Exchanges, 2012. (Invited contribution)

## Lightly Refereed Workshops

*A Convex Framework for Fair Regression.* Richard Berk, Hoda Heidari, Shahin Jabbari, Matthew Joseph, Michael Kearns, Jamie Morgenstern, Seth Neel, Aaron Roth. 4th Workshop on Fairness, Accountability, and Transparency in Machine Learning. (FATML) 2017.

## PATENTS

*Generating Relaxed Synthetic Data Using Adaptive Projection.* Sergul Aydore, William Brown, Michael Kearns, Krishnaram Kenthapadi, Luca Melis, Aaron Roth, Amaresh Ankit Siva. US Patent No. 11,487,765. November 1, 2022 (Filed June 28, 2021).

## RESEARCH FUNDING

### GRANTS

NSF Collaborative Research: EnCORE: Institute for Emerging CORE Methods in Data Science. Hamed Hassani (PI), Eric Tchetgen Tchetgen, Rajiv Gandhi, Aaron Roth (co-PI), George Pappas.

NSF: FAI: Breaking the Tradeoff Barrier in Algorithmic Fairness. Michael Kearns, Aaron Roth (PI). (2022-2025).

Simons Foundation: The Theory of Algorithmic Fairness. Aaron Roth (Penn PI). (2020-2024).

NSF: HDR TRIPODS: Penn Institute for Foundations of Data Science. Shivani Agarwal (PI),

Hamed Hassani, Sanjeev Khanna, Aaron Roth, Weijie Su. (2020-2022).  
Amazon Research Award: Practical, Meaningful Fairness Guarantees in Machine Learning. Aaron Roth (PI) (2019-2020).  
NSF: AF: MEDIUM: Collaborative Research: Foundations of Fair Data Analysis. Sampath Kannan, Mallesh Pai, Aaron Roth (PI), Rakesh Vohra (2018-2021).  
NSF AF: MEDIUM: Collaborative Research: Foundations of Adaptive Data Analysis. Cynthia Dwork, Aaron Roth (PI), Weijie Su, James Zou (2018-2020)  
Quattrone Center Faculty Research Grant: Algorithmic Fairness in Criminal Sentencing. Sampath Kannan, Aaron Roth (PI) (2017-2019)  
Google Faculty Research Award: Practical and Private Adaptive Data Analysis. Aaron Roth (PI) (2015-2016).  
DARPA TAMBA: Testing and Modeling of Brandies Artifacts. Galois lead. Aaron Roth (co-PI). (2015-2020).  
Sloan Foundation: Practical Algorithms for Interactive Private Data Analysis, with Applications to False Discovery Control. Aaron Roth (PI), Adam Smith. (2015-2018)  
NSF SATC Medium Grant: Distributed Differential Privacy. Andreas Haeberlen, Benjamin Pierce, Aaron Roth (PI) (2015-2019).  
Alfred P. Sloan Research Fellowship: New Frontiers for Differential Privacy. Aaron Roth (PI) (2015-2019)  
Google Focused Research Grant: Economic and Algorithmic Foundations for Data Privacy. Aaron Roth (PI). (2013-2015)  
NSF CAREER: The Algorithmic Foundations of Data Privacy. Aaron Roth (PI). (2012-2018)  
Google Focused Research Grant: Enabling the Next Generation of Highly Dynamic Inter-Domain Data-Centric Markets and Systems. Zach Ives, Sudipto Guha, Andreas Haeberlen, Michael Kearns, Aaron Roth (co-PI). (2011)  
NSF ICES Large Grant: Economic Foundations of Digital Privacy. Sham Kakade, Michael Kearns, Mallesh Pai, Aaron Roth (PI). (2011-2015)  
NSF TC Medium Grant: Putting Differential Privacy to Work. Andreas Haeberlen, Benjamin Pierce, Aaron Roth (co-PI). (2011-2015)

TEACHING

**Instructor for Uncertain: Modern Topics in Uncertainty Estimation (CIS-7000),**  
University of Pennsylvania **Fall 2022**

**Instructor for Introduction to Algorithms (CIS-320),**  
University of Pennsylvania **Fall 2021**

**Instructor for Algorithmic Foundations of Adaptive Data Analysis (CIS-700),**  
University of Pennsylvania **Fall 2017**

**Instructor for Differential Privacy in Game Theory and Mechanism Design (CIS-700),**  
University of Pennsylvania **Spring 2014**

**Instructor for No Regrets in Game Theory and Machine Learning (CIS-700),**  
University of Pennsylvania **Spring 2013**

**Instructor for Markets and Social Systems on the Internet (MKSE-150),**  
University of Pennsylvania **Spring 2013**

**Instructor for Automata, Computability, and Complexity (CIS-262),**  
University of Pennsylvania **Fall 2012, Fall 2014, Fall 2016, Spring 2019**

**Instructor for Algorithmic Game Theory (CIS-399, NETS-412),**  
University of Pennsylvania **Spring 2012, Fall 2013,**  
**Spring 2015, Spring 2017, Fall 2018, Spring 2020, Spring 2021, Spring 2022, Spring 2023**

**Instructor for Algorithmic Foundations of Data Privacy (CIS-800),**  
University of Pennsylvania **Fall 2011**

## ADVISING

### Postdocs

1. Yahav Bechavod. 2022-
2. Jessica Sorrell. 2022-
3. Juba Ziani (co-hosted with Sampath Kannan, Michael Kearns, and Rakesh Vohra.) 2019-2021. Now a professor at Georgia Tech ISYE.
4. Travis Dick (Warren Postdoc, co-hosted with Michael Kearns.) 2019-2021. Now a researcher at Google AI.
5. Jieming Mao (Warren Postdoc, co-hosted with Michael Kearns.) 2018-2019. Now a researcher at Google AI.
6. Bo Waggoner (Warren Postdoc, co-hosted with Michael Kearns.) 2016-2018. Now a professor at University of Colorado Computer Science.
7. Jamie Morgenstern (Warren Postdoc, co-hosted with Michael Kearns and Rakesh Vohra). 2015-2017. Now a professor at University of Washington Computer Science.
8. Mariann Ollar (Warren Postdoc, co-hosted with Malleesh Pai and Rakesh Vohra). 2014-2016. Now a professor at University of Groningen.
9. Krishnamurthy Iyer (co-supervised by Michael Kearns and Malleesh Pai). 2012-2013. Now a professor at Cornell ORIE

### PhD Students

1. Ramya Ramalingam (co-advised by Osbert Bastani). 2022 –
2. Natalie Collina (co-advised by Michael Kearns). 2022 –
3. Ira Globus-Harris (co-advised by Michael Kearns). 2021 –
4. Georgy Noarov (co-advised by Michael Kearns). 2021 –
5. Varun Gupta (co-advised by Michael Kearns). 2020 –
6. Saeed Sharifi (co-advised by Michael Kearns). 2019 – 2022. Postdoc: TTI Chicago (Research Assistant Professor)

7. Christopher Jung (co-advised by Michael Kearns). 2017 – 2022. Postdoc: Stanford (Hosted by Omer Reingold)
8. Zachary Schutzmann 2016 – 2021. Postdoc: MID IDSS.
9. Jinshuo Dong 2016 – 2020. Postdoc: Northwestern University/TTI Chicago
10. Seth Neel (co-advised by Michael Kearns). 2016 – 2020. Faculty: Harvard Business School (Technology and Operations Management).
11. Matthew Joseph 2015 – 2020. Now a Researcher at Google. **Winner of the Morris and Dorothy Rubinoff award for best thesis.**
12. Ryan Rogers (co-advised by Michael Kearns). 2013 – 2017 Now a Differential Privacy Engineer at LinkedIn.
13. Steven Wu (co-advised by Michael Kearns). 2012 – 2017 Postdoc: Microsoft Research, New York. Faculty: Carnegie Mellon University. **Winner of the Morris and Dorothy Rubinoff award for best thesis.**
14. Justin Hsu (co-advised by Benjamin Pierce). 2011 – 2017 Postdoc: Cornell. Faculty: Cornell. **Winner of the John C. Reynolds Doctoral Dissertation Award.**
15. Zhiyi Huang (co-advised by Sampath Kannan). 2012 – 2013 Postdoc: Stanford. Faculty: University of Hong Kong. Thesis: “New Techniques for Computations over Private Data”. **Winner of the Morris and Dorothy Rubinoff award for best thesis.**

## Visiting PhD Students

1. Jamie Morgenstern (Visiting from CMU) October 2013. Then a postdoc with me – see above.
2. Rachel Cummings (Visiting from Caltech) January - May 2014, and intermittently following. Now a professor at Georgia Tech ISYE.
3. Yahav Bechavod (Visiting from Hebrew University) July - October 2017.
4. Juba Ziani (Visiting from Caltech) July 2018. Then a postdoc with me – see above.

## Undergraduate Students

1. Daniel Lee. Masters Thesis. “Online Algorithms For Multi-Calibrating.” 2021-2022. Now a PhD Student at MIT.
2. Wesley Gill. Masters Thesis. “Multi-Accurate Proxies for Downstream Fairness” (co-advised with Michael Kearns). 2021-2022.
3. William Brown. Masters Thesis. “Mechanisms for Algorithmic Fairness” 2018-2019. Now a PhD student at Columbia University.
4. Drew Stone. Masters Thesis. “Theoretical Foundations of Blockchain Consensus Protocols” 2017-2018. Now a PhD student at Hebrew University.
5. Yang Jiao. Masters Thesis. “Approximation Algorithms Using Linear Programming”. 2012-2013. Now a PhD student at CMU.

## Thesis Committee member

Cory Boatright, Kook-Jin Ahn, Michael Brautbar, Anand Bhalgat, Kareem Amin, Arjun Narayan, Kevin Tian, Juba Ziani (Caltech CS), Yang Li, Antonis Papadimitriou, Hoda Heidari, Rachel Cummings (Caltech CS), Sepehr Assadi, Shahin Jabbari (chair), Xueru Zhang (University of Michigan CS), Yichen Wang (Wharton Statistics), Hengchu Zhang, Edo Roth, Yu Chen, Zeyu Tang (CMU Philosophy)

### TALKS, PRESENTATIONS, AND INTERVIEWS

Individual Probabilities, The Reference Class Problem, Model Multiplicity, and Reconciling Beliefs

- Who Counts? Sex and Gender Bias in Data (IPAM workshop). July, 2022. (Video available here.)

- Amazon AWS Responsible AI Seminar. September, 2022.

- Penn CIS Theory Seminar. September, 2022.

Iteratively Updating Models for Accuracy (An Algorithmic Framework for Bias Bounties)

- Updatable Machine Learning (ICML Workshop Invited Talk). July 2022. (Video available here.)

Robust Multivald Conformal Prediction

- 2022 StatML Oxford Imperial ML Workshop Keynote. April, 2022.

- Meta Lunch And Learn. April, 2022.

- Simons Foundation Presidential Lecture. May, 2022. (Video available here.)

- Responsible Decision Making in Dynamic Environments (ICML Workshop Invited Talk). (Video available here.) July 2022.

- Penn ASSET Seminar. (Video available here.) September 2022.

- NSF TRIPODS PI Meeting. September 2022.

- National Academies “AI and Justified Confidence” Workshop. September 2022.

- UCSD/TILOS (The Institute for Learning-Enabled Optimization at Scale) Seminar. October 2022.

- Open Data Science Conference (ODSC) West. November 2022.

- Emory University Humanity.AI Seminar. November 2022.

- University of Virginia Computer Science Department Colloquium. November 2022.

- Northeastern University Special Seminar. December 2022.

- Goldman Sachs SQAA Research Colloquium. January 2023.

- Berkeley CLIMB Evergreen Colloquium. February 2023. (Video available here.)

- Princeton CS Theory Seminar. March 2023.

- Yale CS/Econ Colloquium. April 2023.

- Cowles 2023 Econometrics Workshop. June 2023.

Differential Privacy and Machine Unlearning

- Privacy in Machine Learning (PriML) Workshop at Neurips 2021, Keynote Talk. December 2021.

- Boston Area Data Privacy Seminar. December 2021. (Video available here.)

- SystemX Trustworthy AI Day. July 2022.

A User Friendly Power Tool for Deriving Online Learning Algorithms



- ESA (European Symposium on Algorithms) 2021 Keynote Talk. September 2021.
- Simons Workshop on Adversarial Approaches in Machine Learning. February 2022. (Video available here.)
- Harvard Economics Opportunity Insights Seminar. March 2022.

#### A New Analysis of Differential Privacy's Generalization Guarantees

- STOC (Symposium on the Theory of Computation) 2021 Plenary Talk. June 2021.

#### Differentially Private Synthetic Data via Relaxed Adaptive Projection

- Google Differential Privacy Workshop. February 2021.
- Google's 3rd annual Ads Future of Technology Conference (FACT) Expert Talk. June 2021.
- IBM Joint Security and Privacy Seminar. September 2021.

#### Online Multivald Learning

- Simons Collaboration TOC4Fairness Seminar (Stanford). January 2021.
- Games, Decisions, and Networks Seminar (MIT). February 2021 (Video available here.)
- Foundations of Algorithmic Fairness Workshop. March 2021.
- "Fairness in Statistics and Machine Learning for Equitable Decision-making" Session at ENAR 2021 Spring Meeting. March 2021.
- Ben Taskar Memorial Distinguished Lecture, University of Washington. May 2021.
- Israel Algorithmic Game Theory Seminar. June 2021.
- ICML Workshop on Socially Responsible Machine Learning. July 2021.
- CCC Artificial Intelligence/Operations Research Workshop. September 2021.
- Rutgers CS Theory Seminar. October 2021.
- Texas A&M University Institute of Data Science. October 2021.
- Cornell CS Department Colloquium. November 2021.
- Fairness and Transparency in Human Robot Interaction (Workshop as part of HRI 2022). March 2022.

#### Moment Multicalibration and Uncertainty Estimation

- Wharton Statistics Seminar. September 2020. (Video available here.)
- Google Brain Research Seminar. October 2020. (Video available here.)
- Amazon Scholars Conference. October 2020.
- Columbia Economics Theory Seminar. October 2020.
- Duke Computer Science Theory Seminar. October 2020.
- Berkeley Statistics Neyman Seminar. October 2020.
- Amazon Scholars Tech Talk. November 2020.

#### The Frontiers of Fairness in Machine Learning

- Amazon AWS Machine Learning Tech Talk. May 2020.

#### Eliciting and Enforcing Subjective Individual Fairness

- Simons Institute Workshop on Recent Developments in Research on Fairness. July 2019. (Video available here.)
- NeurIPS Workshop on "Human Centered Machine Learning" Keynote. December 2019.

#### Towards Actionable Notions of Individual Fairness.

- 10th Annual Workshop in Decisions, Games, and Logic. Keynote Talk. June 2019.
- IMA Workshop: "Recent Themes in Resource Tradeoffs: Privacy, Fairness and Robustness". June 2019.

#### Individual Statistical Fairness in Machine Learning.

- Columbia University CS Theory Seminar. May 2019.
- Simons Institute Workshop: "Beyond Differential Privacy". May 2019. (Video available here.)
- Keynote Talk at TTIC Workshop "Recent Trends in Clustering and Classification". September 2019.
- Johns Hopkins Behavioral Science Forum on Artificial Intelligence . September 2019.
- NeurIPS Oral Presentation. December 2019. (Video available here.)
- NeurIPS Workshop on "Machine Learning with Guarantees" Keynote. December 2019. (Video available here.)
- International Symposium on Artificial Intelligence and Mathematics (ISAIM) Keynote Address. January 2020.

#### The Role of Interactivity in Local Differential Privacy.

- Simons Institute Workshop on Privacy and the Science of Data Analysis. April 2019. (Video available here.)

#### The Ethical Algorithm

- The New York Academy of Sciences 13th Annual Machine Learning Day. Keynote Address. March 2019. (Video available here.)
- MIT Statistics and Data Science Conference. April 2019. (Video available here.)
- AI Nextcon NYC 2019 Plenary Talk. July 2019.
- Harvard CMSA Big Data Conference. August 2019. (Video available here.)
- Special Seminar at Carnegie Mellon University. October 2019.
- Special Seminar at IBM TJ Watson. October 2019.
- Rotman School of Business, "Machine Learning: The Market for Intelligence". October 2019. (Video available here.)
- Philadelphia Federal Reserve. October 2019.
- Columbia Data Science Institute "Trustworthy AI Symposium" Keynote. October 2019.
- Harvard Book Store Author Series. November, 2019.
- National Association of Business Economics TEC2019 Conference Keynote. November 2019.
- Machine Learning and Public Policy Workshop Keynote. November 2019.
- Zillow Special Seminar. November 2019.
- Town Hall, Seattle (with Moderator Eric Horvitz). November, 2019. (Audio available here.)
- AI and Faith Special Seminar. November, 2019.
- Facebook Author Series. November, 2019.
- LinkedIn Author Series. November, 2019.
- Philadelphia Association for Critical Thinking (PhACT). November, 2019.
- Google, NY Author Series. November, 2019. (Video available here.)
- Keystone Strategy and CSPAN Book TV. December, 2019. (Video available here.)
- The Brookings Institution. January, 2020. (Video available here.)
- AI And Algorithms Lecture Series, University of Edinburgh. January, 2020.

- The Center for Technology, Innovation and Competition and the Penn Program on Regulation, Penn Law School. January, 2020.
- In-Q-Tel (Special Seminar). February, 2020.
- Facebook New York City (Special Seminar). February, 2020.
- Penn Society for Healthcare Innovation Edge of Innovation Series. August, 2020.
- Yale Computation and Society Colloquium. September, 2020.
- Phorum Philly. September, 2020.
- SBE Federal Interagency Conference on Big Data and Social Science. September 2020.
- Mellon Digital Humanities Seminar, at the Price Lab for Digital Humanities. October 2020.
- Fairness and Bias in AI Keynote, Amazon Machine Learning Conference. October 2020.
- DE Shaw Tech Talk Series. November 2020.
- AARP Staff Seminar. November 2020.
- Johns Hopkins Institute for Assured Autonomy Speaker Series. December 2020.
- Indian Institute of Management, Ahmedabad “Privacy Paradox” Seminar. February 2021.
- Oak Ridge National Laboratory Mathematics in Computation Seminar. March 2021.
- Netflix Machine Learning Seminar. October 2021.
- Emory University AI.Humanity Public Lecture. November 2022.

#### Ethical Algorithms

- “AI With the Best” developer conference. September 2018.
- Wharton Conference on Digitization of Human Resources. September 2018.
- Distinguished Guest Lecture at the 8th Annual FDIC Consumer Research Symposium. October 2018.
- Warren Center Symposium: The ”FATE” Of Technology. October 2018.
- Wharton Research Advisory Group. November 2018.

#### How to Use Heuristics in Differential Privacy

- Simons Institute Adaptive Data Analysis Workshop, July 2018.
- Google AI NYC Theory Seminar, October 2018.
- Harvard Theory of Computation Seminar, November 2018.
- Keller Colloquium in Computing and Mathematical Sciences, Caltech. November 2018.
- Wharton Statistics Student Seminar. December 2018.
- Princeton Computer Science Theory Seminar. March 2019. (Video available here.)
- PrivateNLP 2020 Keynote (Privacy workshop at EMNLP 2020). November 2020.

#### Algorithmic Approaches to Preventing Overfitting in Adaptive Data Analysis

- Simons Institute Adaptive Data Analysis Workshop. July 2018. (Video available here.)

#### (un)Fairness in Machine Learning (6 hour version)

- University of Zurich Mini-course on Fairness in Machine Learning (part of the week long 2018 summer school in machine learning), June 2018.

#### Preventing Fairness Gerrymandering in Machine Learning

- Penn Law School: 6th Annual Roundtable on Computer Science and Law. May 2018.
- Northwestern Quarterly Theory Workshop: Algorithmic Fairness. June 2018.

- Facebook Tech Talk (Menlo Park). September 2018.
- Google ML Fairness Workshop (Cambridge, MA). September 2018.
- Purdue CS Excellence Series Colloquium. November 2018.

Interview with “This week in Machine Learning (TWIML)”. April 2018. (Audio available [here](#).)

Computational Perspectives on Biology and the Scientific Method

- “Towards a New Theoretical Biology” Workshop, University of Pennsylvania. April 2018.

Privacy and Fairness: Explaining Problems and Technical Solutions.

- National Academy of Science Roundtable on Integrating Ethics and Privacy Concerns into Data Science Education. December 2017.

A Smoothed Analysis of the Greedy Algorithm for Linear Contextual Bandits.

- Microsoft Research, New York City. July 2017.

Weakly Meritocratic Fairness in Machine Learning

- Simons Institute Workshop on Differential Privacy. May 2017.
- GREAT: Greece Economic and Algorithmic Theory Week. July 2017.

Approximately Stable, School Optimal, Student Truthful Many-to-One Matchings (via Differential Privacy)

- MATCH-UP 2017, MSR-New England. April 2017.
- Simons Institute Workshop on Differential Privacy. May 2017.
- University of Wisconsin Economics Theory Seminar. November 2017.

Fairness in Learning: Classic and Contextual Bandits

- The Institute for Advanced Study Computer Science and Discrete Math Seminar. January 2017 (Video [here](#)).
- MIT EECS Theory of Computation Colloquium. February 2017.
- Stanford RAIN Seminar. April 2017.

Tradeoffs Between Fairness and Accuracy in Machine Learning

- Penn Law School: Optimizing Government Series. September 2016 (Video [here](#), Coverage [here](#)).
- Yale CS/Econ: “Designing The Digital Economy”.
- Harvard Law School: “Defining Fairness” Workshop.
- NIPS Symposium on Machine Learning and the Law 2016. December 2016.
- Department of Defense/Department of Veterans Affairs Predictive Analytics and Suicide Risk Research Roundtable. February 2018.
- Fulbright Seminar: “Big Data for the Public Good: Innovations in Civic Engagement”. May 2018.

Rigorous Data Dredging: Theory and Tools for Adaptive Data Analysis

- Invited Tutorial: ICML 2016, June 2016. (Video [here](#)).
- Data Linkage and Anonymization Kickoff Workshop, Isaac Newton Center, Cambridge UK. July 2016.
- PCMI Graduate Summer School: The Mathematics of Data. Park City, Utah. July 2016.
- Penn Statistics Department Seminar. September 2016.

- Big Data Colloquium, Universite Laval. October 2016.
- Institute for Advanced Study: Four Facets of Differential Privacy, November 2016. (Video here).
- NIPS 2016 Workshop on Adaptive Data Analysis. December, 2016.
- Goldman Sachs Engineering Insights Series. February, 2017.
- Joint Statistical Meetings Session on “The Stability Principle”. August, 2017.
- Philadelphia Symposium on Research Credibility. October, 2018.

#### A Whirlwind Tour of Differential Privacy (With Applications to Generalization and Game Theory)

- Google Research New York. January, 2016.

#### When do Prices Coordinate Markets?

- Penn State Computer Science Theory Seminar. October, 2015.
- Workshop on Simplicity and Complexity in Economics at the Simons Institute on the Theory of Computing. October, 2015 (Video here).
- Harvard CRCS (Center for Research on Computation and Society) Seminar. December, 2015 (Video here).

#### Dual Query: Practical Private Query Release for High Dimensional Data

- Workshop on the Theory and Practice of Differential Privacy. April, 2015.

#### Privacy as a Tool for Robust Mechanism Design in Large Markets

- Caltech workshop on The Theory of Bringing Privacy into Practice. April, 2015 (Video here.)
- PCMI Graduate Summer School: The Mathematics of Data. Park City, Utah. July 2016.

#### Private Convex Optimization (Yields Asymptotically Truthful Combinatorial Auctions)

- Cornell Joint Microeconomics and Computer Science Theory Seminar. October, 2014.
- Penn State Computer Science Department Colloquium. November, 2014.
- NIPS Workshop on Transactional Machine Learning and e-Commerce. December, 2015.

#### Preserving Statistical Validity in Adaptive Data Analysis

- MIT/MSR Theory Day. June, 2014.
- Yahoo Research NYC Theory Seminar. July, 2014.
- Johns Hopkins Theory Seminar. September, 2014.
- Warren Center Faculty Symposium. September, 2014.
- TCS+ Theory Seminar. June, 2015. (Video here.)
- BICOD 2015 Invited Lecture. July, 2015.
- Bloomberg Research (Princeton Campus). July, 2015.
- Clinical Epidemiology/Health Services Research Seminar, Penn Medical School. September, 2015.
- Penn Applied Mathematics and Computational Science (AMCS) Colloquium. September, 2015.

#### Private Matchings and Allocations

- Allerton October, 2013.
- Charles River Privacy Day. November, 2013.
- Princeton Theory Seminar. November, 2013.

- Rutgers Theory Seminar, April, 2014.

Tutorial on Privacy, Mechanism Design and Game Theory.

- DIMACS Workshop on Differential Privacy. October, 2012.
- EC Workshop on Differential Privacy and Mechanism Design. June, 2013.
- WPin+NetEcon 2014

Tutorial on Differential Privacy

- Security on the Schuylkill (Keynote speaker). April 2019.
- Annual Meeting of the American Association for the Advancement of Science (AAAS), February 2019.
- Comcast Security Guild. December 2018.
- MIT LIDS Smart Urban Infrastructures Workshop. May 2017.
- High Confidence Software and Systems Conference (HCSS 2017) Keynote Talk. May, 2017.
- Hot Topics on the Science of Security (HoTSoS 2017) Keynote Talk. April, 2017.
- MLConf NYC, March 2017. (Video here.)
- Annual Meeting of the American Association for the Advancement of Science (AAAS), February 2015. Press coverage here:  
<http://www.upenn.edu/pennnews/news/introduction-differential-privacy-penn-professor-aaron-roth>
- 2nd Annual Law and Computer Science Workshop, May 2014.
- Simons Workshop on the Science of Differential Privacy 2013.

Exploiting Metric Structure for Efficient Private Query Release

- IDASH Workshop on Differential Privacy. September, 2012.

Mechanism Design in Large Games: Incentives and Privacy.

- FOCS Committee Workshop, Stanford. June, 2012.
- University of Southern California (USC) Theory Seminar. October, 2012.
- IBM Research (TJ Watson) Research Seminar. October, 2012.
- DIMACS Workshop on Differential Privacy. October, 2012.
- Capital Area Theory Seminar (UMD). November, 2012.
- Stanford Market Design Seminar. December, 2012.
- DIMACS Workshop on Economic Aspects of Information Sharpening. February, 2013.
- Dagstuhl Workshop on the Frontiers of Mechanism Design. April, 2013.
- Caltech. May, 2013.

Invited Panel Discussion: Privacy amid the clamor for raw data access.

- iDash Privacy Workshop, UCSD. October, 2011. (Video: <http://bit.ly/IBdIEV>)

Selling Privacy at Auction

- Northwestern Theory Seminar. February 2011.
- Boston University Theory Seminar. May 2011.

Privately Releasing Conjunctions and the Statistical Query Barrier

- Penn State Theory Seminar. March 2011.
- MIT Theory Seminar. May 2011.

Interactive Privacy via the Median Mechanism

- Dartmouth Theory Seminar. May 2010.
- The 42nd ACM Symposium on the Theory of Computing. June 2010.

Efficient Computation Under the Constraints of Privacy And Incentives

- CMU Theory Seminar. February 2010.
- UPenn Market and Social Systems Engineering Lecture Series. February 2010

On the Equilibria of Alternating Move Games

- SODA 2010. January 2010.
- China Theory Week, Tsinghua University, Beijing. September 2009.
- CMU Theory Lunch. September 2009.
- Microsoft Research SVC. August 12 2009.

Differentially Private Approximation Algorithms

- SODA 2010. January 2010.
- Princeton Theory Lunch. February 13 2009.
- CMU Theory Lunch. February 11 2009.
- Microsoft Research New England. December 15 2008.

Auctions with Online Supply

- Microsoft Research SVC. August 18 2008.
- CMU Theory Lunch. September 17 2008.
- The 5th Workshop on Ad Auctions, Stanford CA. July 2009.
- The 11th ACM Conference on Electronic Commerce, June 2010.

A Learning Theory Approach to Noninteractive Database Privacy.

- Microsoft Research Live Labs SVC Tech Talk. June 20 2008.
- STOC 2008, May 20 2008.
- Capital Area Theory Seminar at the University of Maryland. April 4 2008.
- CMU/Microsoft Research Mindswap on Privacy. October 19 2007.

Regret Minimization and the Price of Total Anarchy.

- The 20th International Symposium on Mathematical Programming, Chicago Il. August 24, 2009.
- Harvard EconCS seminar. May 7, 2009.
- The 3rd World Conference of the Game Theory Society, Evanston Il. July 13 2008.
- CMU Theory Lunch. May 16 2007.

SERVICE AND  
OUTREACH

SEAS ASSET Advisory Committee 2022-present

CIS Faculty Search Committee Member 2021-2022.

Diversity Search Advisor on the Faculty Search Committee 2021-2022.

Penn Pinkel Lecture Committee Member 2020-

OpenDP Advisory Board Member 2020-

Keynotes and Tutorials Committee Member for the STOC 2020 TheoryFest.

SIGecom Doctoral Dissertation Award Committee 2017 - 2019 (Committee chair in 2019)

Co-Director of the Networked and Social Systems Engineering (NETS) Undergraduate Degree Program 2016 -

Director of PhD Admissions 2016-2020

Penn CIS Admitted PhD Student Visit Day Organizer 2015-2017

Organizer of the AMCS seminar series, 2015-2016.

Member of the Hearing Panels of the Student Disciplinary System (Penn), 2013-2015.

Organizer of the Penn CS Theory seminar, 2013-.

Judge for PennApps Hackathon, Fall 2013.

Department Committees: Machine Learning Hiring Search Committee, 2013. Machine Learning Hiring Search Committee, 2015. AMCS PhD Admissions committee, 2014-2015.

Invited Panelist: IDASH Privacy workshop: Privacy amid the clamor for raw data access, Simons Foundation Symposium Planning Meeting on the Science of Data Privacy, Penn State Workshop on Privacy and Confidentiality Issues in Financial Data Exchanges, 2015 National Privacy Research Strategy Workshop, 2018 Penn Teach In Panel: "The Future of Technology: Artificial Intelligence and Society" (Video: [here.](#)), 2018 Rosenbach Museum Flash Focus on Privacy, 2018 Fulbright Panel: "Big Data for the Public Good: Innovations in Civic Engagement.", 2018 CCC "Early Career Researcher Symposium" visioning panel on Privacy/Fairness, 2018. Amazon re:MARS Panel on "AI For Everyone: Promoting Fairness in Ethical AI." 2019, "Ethics and AI" Panel at REWORK "AI and Finance NYC" conference, 2019, "Ethics in AI" panel for AMLC (Amazon Machine Learning Conference) 2021, Differential Privacy: Experience so Far and What's Next, "Semantics of Privacy" panel, 2022. FinRegLab "What is Trustworthy AI", 2022.

Editorial Work: Editor for Data Privacy articles for the Springer Encyclopedia of Algorithms. Associate Editor for ACM Transactions on Economics and Computation (ACM TEAC) (2018-2021).

Program Committee/Track Chair: NETECON 2015: 10th annual Workshop on the Economics of Networks, Systems, and Computation PC chair, WWW 2018 "Economics and Markets" Track Chair, Conference on Fairness, Accountability, and Transparency (FAT\*) 2018 Theory/Security Track Chair. Conference on Fairness, Accountability, and Transparency (FAT\*) 2019 Theory/Privacy Track Chair. The Symposium on Foundations of Responsible Computing (FORC) 2020 PC Chair. 37th Annual Conference on Learning Theory (COLT) 2024 PC co-chair.

Program Committee Member: ECML/PKDD Workshop on Privacy and Security issues in Data Mining and Machine Learning 2010, EC 2011, EC 2012, FOCS 2012, GameSec 2012, SODA 2013, PODS 2013 (External Review Committee for Privacy), EC 2013, WINE 2013, FOCS 2014, 14th Haifa Workshop on Interdisciplinary Applications of Graph Theory, Combinatorics, and Algorithms, EC 2014, ICML Workshop on Learning, Security and Privacy 2014, WINE 2014, EC 2015, RANDOM 2015, ITCS 2016, EC 2016 (Senior PC), COLT 2016, NIPS Symposium on Machine Learning and the Law 2016, COLT 2017, EC 2017, FATML 2017 ICML 2018 (Area Chair), EC 2018, NIPS 2018 (Area Chair) AAAI 2019 (Senior PC), STOC 2019, EC 2019 (Senior PC), ACM Symposium on Computer Science and Law 2019, EC 2020 (Senior PC), SODA 2021, EC 2021 (Area Chair), NeurIPS 2021 (Area Chair), TPDP 2021, EC 2022 (Theory Track Chair), ITCS 2023, TPDP 2023.



Local Organizer: EC 2013

Workshop Organizer: 2012 DIMACS Workshop on Differential Privacy, New York Area CS and Econ (NYCE) Day V (2012), EC Workshop on Differential Privacy and Mechanism Design (2013). EC Tutorial on Privacy, Information Economics, and Mechanism Design (2014). First workshop on the Theory and Practice of Differential Privacy (TPDP) (2015). EC Workshop on Algorithmic Game Theory and Data Science (2015). NIPS 2015 Workshop on Adaptive Data Analysis (2015). IHP program "Nexus of Information and Computation Theories" (2016), TPDP 2016, Invited ICML 2016 Tutorial: "Rigorous Data Dredging: Theory and Tools for Adaptive Data Analysis," NIPS 2016 Workshop on Adaptive Data Analysis (2016), Fairness for Digital Infrastructure (2017). CCC Workshop on Fair Representations and Fair Interactive Learning (2018). Northwestern Quarterly Theory Workshop: Algorithmic Fairness (2018). Simons Institute Adaptive Data Analysis Workshop (2018). Simons Institute Workshop: "Beyond Differential Privacy" (2019). IMA (Institute for Mathematics and its Applications) Workshop on Resource Tradeoffs: Privacy, Fairness, and Robustness (2019), 2022 SIGEcom Winter Meeting (Theme: Algorithmic Fairness).

Member of the 2011 DARPA Study Group on Data Privacy

Computer Science Department Ombudsman, Carnegie Mellon University. 2009-2010.

Graduate Student Representative to the Computer Science Department Doctoral Review Committee, Carnegie Mellon University. 2009-2010

Computer Science Department Admissions Committee, Carnegie Mellon University. 2008 and 2009

Theory Lunch Organizer, Carnegie Mellon University. 2007-2008

## REFERENCES

References available upon request.