

Aaron L. Roth

CONTACT INFORMATION *Phone:* (917) 270-9542
E-mail: aaroth@cis.upenn.edu
Web: www.cis.upenn.edu/~aaroth

(Last updated: 09/04/2018)

RESEARCH INTERESTS Algorithmic Game Theory, Private Computation, Learning Theory, Algorithms, Complexity, and Computing under Social Constraints.

EMPLOYMENT **University of Pennsylvania**, Philadelphia, Pennsylvania USA
Class of 1940 Bicentennial Term Associate Professor, 2017-July 2019.
Associate Professor (with tenure), July 2016 – Present.
Raj and Neera Singh Assistant Professor of Computer Science, August 2011 – June 2016.
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 2015 Pat Goldberg Memorial Best Paper Award (Awarded in 2017).
Class of 1940 Bicentennial Endowed Term Chair, January 2017-July 2019.
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

The Ethical Algorithm. Michael Kearns, Aaron Roth. Forthcoming from Oxford University Press, 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

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.

Private Pareto Optimal Exchange. Sampath Kannan, Jamie Morgenstern, Ryan Rogers, Aaron Roth. Transactions on Economics and Computation (TEAC), 2017. (Special issue devoted to papers invited from EC 2015).

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

Online Learning with an Unknown Fairness Metric. Stephen Gillen, Christopher Jung, Michael Kearns, Aaron Roth. NIPS 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. NIPS 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. NIPS 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, Malleesh 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 Jess 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

Fair Algorithms for Learning in Allocation Problems. Hadi Elzayn, Shahin Jabbari, Christopher Jung, Michael Kearns, Seth Neel, Aaron Roth, Zachary Schutzman. Manuscript.

Downstream Effects of Affirmative Action. Sampath Kannan, Aaron Roth, Juba Ziani. Manuscript.

An Empirical Study of Rich Subgroup Fairness for Machine Learning. Michael Kearns, Seth Neel, Aaron Roth, Steven Wu. Manuscript.

Building Tools for Controlling Overfitting Adaptive Data Analysis. Ryan Rogers, Aaron Roth, Adam Smith, Om Thakkar. Manuscript.

A Convex Framework for Fair Regression. Richard Berk, Hoda Heidari, Shahin Jabbari, Matthew Joseph, Michael Kearns, Jamie Morgenstern, Seth Neel, Aaron Roth. Manuscript.

INVITED SURVEYS

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. Malleesh Pai, Aaron Roth. SIGecom Exchanges, 2013. (Invited contribution)

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

RESEARCH FUNDING

GRANTS

NSF: AF: MEDIUM: Collaborative Research: Foundations of Fair Data Analysis. Sampath Kannan, Malleesh Pai, Aaron Roth (PI), Rakesh Vohra (2018-2021).

NSF AF: MEDIUM: Collaborative Research: Foundations of Adaptive Data Analysis. Cynthia Dwork, Aaron Roth (PI), Weiji 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, Malleesh 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 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**

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

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

ADVISING

Postdocs

1. Jieming Mao (Warren Postdoc, co-hosted with Michael Kearns.) 2018-
2. Bo Waggoner (Warren Postdoc, co-hosted with Michael Kearns.) 2016-2018. Now a professor at University of Colorado Computer Science.
3. Jamie Morgenstern (Warren Postdoc, co-hosted with Michael Kearns and Rakesh Vohra). 2015-2017. Now a professor at Georgia Tech Computer Science.
4. Mariann Ollar (Warren Postdoc, co-hosted with Mallesh Pai and Rakesh Vohra). 2014-2016. Now a professor at University of Groningen.
5. Krishnamurthy Iyer (co-supervised by Michael Kearns and Mallesh Pai). 2012-2013. Now a professor at Cornell ORIE

PhD Students

1. Christopher Jung (co-advised by Michael Kearns). 2017 –
2. Zachary Schutzmann 2016 –
3. Jinshuo Dong 2016 –
4. Seth Neel (co-advised by Michael Kearns). 2016 –
5. Matthew Joseph 2015 –

6. Ryan Rogers (co-advised by Michael Kearns). 2013 – 2017 Now a Differential Privacy Engineer at Apple.
7. Steven Wu (co-advised by Michael Kearns). 2012 – 2017 Postdoc: Microsoft Research, New York. Faculty: University of Minnesota. **Winner of the Morris and Dorothy Rubinoff award for best thesis.**
8. Justin Hsu (co-advised by Benjamin Pierce). 2011 – 2017 Postdoc: Cornell. Faculty: University of Wisconsin. **Winner of the John C. Reynolds Doctoral Dissertation Award.**
9. 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.

Undergraduate Students

1. Yang Jiao. Masters Thesis. “Approximation Algorithms Using Linear Programming”. Spring 2013. Now a PhD student at CMU.

Thesis Committee member

1. Cory Boatright
2. Kook-Jin Ahn
3. Zhiyi Huang
4. Michael Brautbar
5. Anand Bhalgat
6. Kareem Amin
7. Arjun Narayan
8. Kevin Tian
9. Juba Ziani (Caltech)
10. Yang Li
11. Antonis Papadimitriou
12. Hoda Heidari
13. Rachel Cummings (Caltech)
14. Sepehr Assadi

TALKS,
PRESENTATIONS,
AND INTERVIEWS

Ethical Algorithms.

- “AI With the Best” developer conference. September 2018.
- Wharton Conference on Digitization of Human Resources. September 2018.

How to Use Heuristics in Differential Privacy

- Simons Institute Adaptive Data Analysis Workshop, July 2018.

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.

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.

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

- 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 Sharping. 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/IBdlEV>)

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 II. August 24, 2009.
- Harvard EconCS seminar. May 7, 2009.
- The 3rd World Conference of the Game Theory Society, Evanston II. July 13 2008.
- CMU Theory Lunch. May 16 2007.

SERVICE AND
OUTREACH

SIGecom Doctoral Dissertation Award Committee 2017 -

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

Director of PhD Admissions 2016-

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.

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

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.

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.

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).

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.