

Curriculum Vitae

ROBERT KLEINBERG

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Cornell University
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Research Interests

Algorithm design and analysis, economic aspects of algorithms, online learning and its applications, routing and information transmission in networks, random graphs and graph processes.

Education

- *Ph.D.*, Massachusetts Institute of Technology, Cambridge, MA, USA. 2005
Department of Mathematics
Thesis: *Online Decision Problems With Large Strategy Sets*
Advisor: Tom Leighton
- *A.B.*, Cornell University, Ithaca, NY, USA. 1997
Department of Mathematics, Summa Cum Laude.

Employment History

- *Associate Professor*, Computer Science, Cornell University *July 2013 – present*
- *Principal Researcher*, Microsoft Research *July 2015 – July 2016*
- *Assistant Professor*, Computer Science, Cornell University *July 2005 – June 2013*
- *NSF Postdoctoral Scholar*, Computer Science, U.C. Berkeley *Sep 2005 – Nov 2006*
Supervisor: Christos Papadimitriou
- *Senior Software Engineer and Asst. Architect*, Akamai Technologies *June 1999 – October 2004*

Awards and Honors

- Tau Beta Pi Professor of the Year Award, Cornell College of Engineering, 2012.
- Faculty of the Year Award, Cornell Association of CS Undergraduates (ACSU), 2008 and 2011.
- Best Paper Awards
 - ACM Conference on Electronic Commerce (EC), 2010. Awarded to M. Babaioff, R. Kleinberg, and A. Slivkins, *Truthful Mechanisms with Implicit Payment Computation*.
 - ACM Conference on Electronic Commerce (EC), 2014. Awarded to P. Frazier, D. Kempe, J. Kleinberg, and R. Kleinberg, *Incentivizing Exploration*.

- Kenneth A. Goldman '71 Excellence in Teaching Award, Cornell College of Engineering, 2009.
- Microsoft Research New Faculty Fellowship, 2008.
- Alfred P. Sloan Research Fellowship, 2008.
- Best Student Paper Award, Conference on Learning Theory (COLT), 2008. Awarded to R. Kleinberg, A. Niculescu-Mizil, and Y. Sharma, *Regret Bounds for Sleeping Experts and Bandits*.
- NSF CAREER Award, 2007.
- NSF Mathematical Sciences Postdoctoral Research Fellowship, 2005.
- Fannie and John Hertz Foundation Fellowship, 1997.
- Putnam Fellow (awarded to six annually), William Lowell Putnam Mathematics Competition, 1996.
- Gold medalist, International Mathematics Olympiad, 1992.
- Silver medalist, International Mathematics Olympiad, 1991.

Teaching and Advising

Teaching

All courses were taught at Cornell University. An asterisk (*) marks courses introduced.

- *CS 6820: Analysis of Algorithms* Fall 2008, 2010, 2012, 2013
- *CS 4820: Introduction to Analysis of Algorithms* Spring 2008–2012, 2014
- *CS 6822: Advanced Algorithms — Flows, Cuts, and Sparsifiers** Fall 2011
- *CS 783: Topics in Algorithms — Information-Theoretic Aspects of Algorithms** Fall 2007
- *CS 683: Advanced Algorithms — Learning, Games, and Electronic Markets** Spring 2007

Postdocs

- *Saeed Alaei* 8/2012–08/2014
Joined Google as a Research Scientist.
- *Patrick Briest* 9/2008–8/2009
Joined University of Paderborn CS Department as junior professor; now at McKinsey & Co.
- *Shahar Dobzinski* (co-supervised with É. Tardos) 8/2009–10/2012
Joined Weizmann Institute CS Department as tenure-track faculty.
- *Thomas Kesselheim* (co-supervised with É. Tardos) 2/2013–08/2014
Joined Max-Planck-Institute für Informatik as a postdoctoral scholar.
- *Katrina Ligett* (co-supervised with É. Tardos) 8/2009–7/2011
Joined Caltech CS and Economics Department as tenure-track faculty.

Graduated Ph.D. Students

- *Bruno Abrahao* August 2014
Postdoc at Stanford University.
- *Hyung-Chan An* (co-supervised with D. Shmoys) August 2012
Postdoc at EPFL.
- *Ashwinkumar Badanidiyuru* August 2014
Research scientist at Google.
- *Anna Blasiak* August 2013
Akamai Technologies.
- *Hu Fu* August 2013
Postdoc at Microsoft Research New England.
- *Yogeshwer Sharma* (co-supervised with D. Williamson) June 2010
Postdoc at University of Waterloo; now at Facebook.

Current Ph.D. Students

- *Rad Niazadeh* expected graduation May 2017
- *Yang Yuan* expected graduation May 2017

Undergraduate and Masters Student Research Supervision

- *Lisa Fawcett and Sam Park* 8/2012–12/2012
- *Christina Brandt and Gautam Kamath* 6/2011–11/2011
 - Published “An analysis of one-dimensional Schelling segregation” in STOC 2012.
- *Hooyeon Haden Lee* 6/2011–8/2011
 - Published “Approximating low-dimensional coverage problems” in SOCG 2012.
- *Andrew Hoelscher and David Kupiec* 2/2011–5/2011
- *Matthew Paff* 2/2010–5/2010
- *S. Matthew Weinberg* 8/2008–5/2010
 - Published “Pricing randomized allocations” in SODA 2010.
- *Di Wang* 6/2008–5/2010
 - Published “Analyzing quadratic unconstrained binary optimization problems via multicommodity flows” in *Discrete Applied Mathematics*, 2009.
 - **CRA Outstanding Undergraduate Research Award**, runner-up, 2010.
- *Rafael Frongillo* 1/2008–5/2008
- *Kareem Amin* 10/2007–12/2007

Service

Conferences

- **Program committee chair**

- *4th Innovations in Theoretical Computer Science Conference (ITCS)* 2013

- **Program committee**

- *ACM Symposium on Theory of Computing (STOC)* 2013, 2010, 2007
- *IEEE Symposium on Foundations of Computer Science (FOCS)* 2014, 2007
- *ACM-SIAM Symposium on Discrete Algorithms (SODA)* 2009
- *ACM Conference on Electronic Commerce (EC)* Senior PC 2016, 2013, 2012, 2011
PC 2014, 2010, 2008
Workshops Chair 2014
- *Conference on Learning Theory (COLT)* 2016, 2012, 2009
- *International Conference on Machine Learning (ICML)* 2012
- *Innovations in Theoretical Computer Science Conference (ITCS)* 2012
- *International Joint Conference on Artificial Intelligence (IJCAI)* 2011, 2009
- *Uncertainty in Artificial Intelligence (UAI)* 2010
- *Workshop on Internet and Network Economics (WINE)* 2010
- *International Colloquium on Automata, Languages, and Programming (ICALP)* 2014, 2009
- *Symposium on Parallelism in Algorithms and Architectures (SPAA)* 2006

Workshops

- **Co-founder and co-organizer**

- *Eastern Great Lakes Theory Workshop (EaGL)* 2008–present
- *Bay Algorithmic Game Theory Symposium (BAGT)* Feb. 2006, Sept. 2006

- **Co-organizer**

- *Cornell-MSR Workshop on Computation and the Social Sciences* June 2016
- *Reverse AGT Workshop on Applied Econometrics* February 2016
- *Workshop on Implementation Theory (WIT)* June 2011
- *New York Computational Economics Day (NYCE)* Nov. 2009

- **Steering committee**

- *New York Computational Economics Day (NYCE)* 2010–present

- **Program committee**

- *Workshop on Economics of Networks, Systems, and Computation (NetEcon)* 2013, 2012, 2010, 2009
- *Workshop on Ad Auctions (AdAuctions)* 2010, 2009

Journals

- Board of Editors, *SIAM Journal on Computing*
- Board of Editors, *Theory of Computing*
- Guest Editor, *Journal of Economic Theory*, special issue on the interface between economics and computer science. (Co-editors: Larry Blume, David Easley, Jon Kleinberg, Éva Tardos.)
- Guest Editor, *SIAM Journal on Computing*, special issue on selected papers from STOC 2010. (Co-editors: A. Frieze, C. Peikert, A. Russell, L. Schulman, A. Srinivasan.)
- Guest Editor, *Theory of Computing Systems*, special issue on selected papers from SPAA 2006. (Co-editor: Christian Scheideler.)

Cornell CS Department

- Faculty recruiting committee 2009, 2007
- Graduate admissions committee 2012, 2010, 2008
- CS colloquium committee 2012, 2013
- Curriculum committee 2008
- Organizer, Brazil-Cornell Computer Science Workshop May, 2012
(Co-organizers: John Hopcroft, Nivio Ziviani)
- Organizer, CS Theory Seminar 2007–2014
(Co-organizers: Rafael Pass, 2007–2012; Éva Tardos, 2011–2012; David Steurer, 2012–2014.)

Publications

Journal Papers

- [J1] H. Fu, R. Kleinberg, R. Lavi, and R. Smorodinsky. Job security, stability and production efficiency. *Theoretical Economics*, 2015. In press, accepted manuscript.
- [J2] H.-C. An, R. Kleinberg, and D. B. Shmoys. Improving Christofides' algorithm for the s-t path TSP. *J. ACM*, 62(5):34:1–34:28, Nov. 2015.
- [J3] M. Babaioff, R. Kleinberg, and A. Slivkins. Truthful mechanisms with implicit payment computation. *J. ACM*, 62(2):10:1–10:37, May 2015.
- [J4] P. Briest, S. Chawla, R. Kleinberg, and S. M. Weinberg. Pricing lotteries. *Journal of Economic Theory*, 156:144–174, 2015.
- [J5] R. Kleinberg and S. M. Weinberg. Matroid prophet inequalities and applications to multi-dimensional mechanism design. *Games and Economic Behavior*, 2015. Special issue on selected algorithmic game theory papers from STOC, FOCS, and SODA 2012. In press, corrected proof.

- [J6] J. D. Hartline, R. Kleinberg, and A. Malekian. Bayesian incentive compatibility via matchings. *Games and Economic Behavior*, 92:401–429, July 2015. Special issue on selected algorithmic game theory papers from STOC, FOCS, and SODA 2011.
- [J7] S. Dobzinski, H. Fu, and R. D. Kleinberg. Approximately optimal auctions for correlated bidders. *Games and Economic Behavior*, 92:349–369, July 2015. Special issue on selected algorithmic game theory papers from STOC, FOCS, and SODA 2011.
- [J8] M. Babaioff, S. Dughmi, R. Kleinberg, and A. Slivkins. Dynamic pricing with limited supply. *ACM Trans. Econ. Comput.*, 3(1):4:1–4:26, Mar. 2015.
- [J9] K. Birman, M. Jelasity, R. Kleinberg, and E. Tremel. Building a secure and privacy-preserving smart grid. *Operating Systems Review*, 49(1):131–136, 2015.
- [J10] B. Abrahao, S. Soundarajan, J. Hopcroft, and R. Kleinberg. A separability framework for analyzing community structure. *ACM Transactions on Knowledge Discovery from Data*, 8(1), 2014. Special issue on Computational Aspects of Social and Information Networks.
- [J11] A. Archer and R. Kleinberg. Truthful germs are contagious: A local to global characterization of truthfulness. *Games and Economic Behavior*, 86:340–366, 2014. Special issue on selected papers from EC 2008 and EC 2009.
- [J12] A. Blasiak, R. Kleinberg, and E. Lubetzky. Broadcasting with side information: Bounding and approximating the broadcast rate. *IEEE Transactions on Information Theory*, 59(9):5811–5823, 2013.
- [J13] L. Blume, D. A. Easley, J. M. Kleinberg, R. D. Kleinberg, and É. Tardos. Network formation in the presence of contagious risk. *ACM Transactions on Economics and Computation*, 1(2), 2013.
- [J14] Y. Yue, J. Broder, R. Kleinberg, and T. Joachims. The K-armed dueling bandits problem. *J. Comput. Syst. Sci.*, 78(5):1538–1556, 2012. Special issue: Learning Theory 2009.
- [J15] S. A. Marvel, J. Kleinberg, R. D. Kleinberg, and S. H. Strogatz. Continuous-time model of structural balance. *Proceedings of the National Academy of Sciences (PNAS)*, 108(5):1771–1776, 2011.
- [J16] R. Kleinberg, G. Piliouras, and É. Tardos. Load balancing without regret in the bulletin board model. *Distributed Computing*, 24(1):21–29, 2011. Special issue on selected papers from PODC 2009.
- [J17] R. Kleinberg, A. Niculescu-Mizil, and Y. Sharma. Regret bounds for sleeping experts and bandits. *Machine Learning*, 80(2-3):245–272, 2010. Special issue on selected papers from COLT 2008.
- [J18] D. Wang and R. Kleinberg. Analyzing quadratic unconstrained binary optimization problems via multicommodity flows. *Discrete Applied Mathematics*, 157(18):3746–3753, 2009.
- [J19] M. Babaioff, R. Kleinberg, and C. H. Papadimitriou. Congestion games with malicious players. *Games and Economic Behavior*, 67(1):22–35, 2009. Special issue on selected papers from EC 2007.
- [J20] S. Butler, M. T. Hajiaghayi, R. D. Kleinberg, and T. Leighton. Hat guessing games. *SIAM J. Discrete Math.*, 22(2):592–605, 2008. Reprinted in *SIAM Review* 51 (2), 2009, pages 399–413, SIGEST section for featured articles.

- [J21] B. Awerbuch and R. Kleinberg. Competitive collaborative learning. *J. Comput. Syst. Sci.*, 74(8):1271–1288, 2008. Special issue: Learning Theory 2005.
- [J22] B. Awerbuch and R. Kleinberg. Online linear optimization and adaptive routing. *J. Comput. Syst. Sci.*, 74(1):97–114, 2008. Special issue: Learning Theory 2004.
- [J23] J. Chen, R. D. Kleinberg, L. Lovász, R. Rajaraman, R. Sundaram, and A. Vetta. (Almost) tight bounds and existence theorems for single-commodity confluent flows. *J. ACM*, 54(4), 2007.
- [J24] R. M. D’Souza, C. Borgs, J. T. Chayes, N. Berger, and R. Kleinberg. Emergence of tempered preferential attachment from optimization. *Proceedings of the National Academy of Sciences (PNAS)*, 104(15):6112–6117, 2007.
- [J25] J. Demmel, I. Dumitriu, O. Holtz, and R. Kleinberg. Fast matrix multiplication is stable. *Numerische Mathematik*, 106(2):199–224, 2007.
- [J26] B. Awerbuch, M. T. Hajiaghayi, R. Kleinberg, and T. Leighton. Localized client-server load balancing without global information. *SIAM J. Comput.*, 37(4):1259–1279, 2007.
- [J27] M. T. Hajiaghayi, R. D. Kleinberg, H. Räcke, and T. Leighton. Oblivious routing on node-capacitated and directed graphs. *ACM Transactions on Algorithms*, 3(4), 2007.
- [J28] N. J. A. Harvey, R. D. Kleinberg, and A. R. Lehman. On the capacity of information networks. *IEEE Transactions on Information Theory*, 52(6):2345–2364, 2006. Special issue on network coding.
- [J29] N. Berger, C. Borgs, J. T. Chayes, R. M. D’Souza, and R. D. Kleinberg. Degree distribution of competition-induced preferential attachment graphs. *Combinatorics, Probability, and Computing*, 14:697–721, 2005.
- [J30] L. Kontothanassis, R. Sitaraman, J. Wein, D. Hong, R. Kleinberg, B. Mancuso, D. Shaw, and D. Stodolsky. A transport layer for live streaming in a content delivery network. *Proceedings of the IEEE*, 92(9):1408–1419, 2004. Special issue on evolution of Internet technologies.

Refereed Conference Papers

- [C1] .
- [C2] P. Dütting and R. Kleinberg. Polymatroid prophet inequalities. In *Proceedings of the 23rd European Symposium on Algorithms*, 2015.
- [C3] T. Kesselheim, R. Kleinberg, and Éva Tardos. Smooth online mechanisms: A game-theoretic problem in renewable energy markets. In *Proceedings of the 16th ACM Conference on Electronic Commerce (EC)*, 2015.
- [C4] T. Kesselheim, R. Kleinberg, and R. Niazadeh. Secretary problems with non-uniform arrival order. In *Proceedings of the 47th ACM Symposium on Theory of Computing (STOC)*, 2015.
- [C5] S. Dobzinski, H. Fu, and R. Kleinberg. On the complexity of computing an equilibrium in combinatorial auctions. In *Proceedings of the 26th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 110–122, 2015.

- [C6] R. Niazadeh, Y. Yuan, and R. Kleinberg. Simple and near-optimal mechanisms for market intermediation. In *Proceedings of the 10th Workshop on Internet and Network Economics (WINE)*, pages 386–399, 2014.
- [C7] R. Soulé, S. Basu, P. J. Marandi, F. Pedone, R. Kleinberg, E. G. Sirer, and N. Foster. Merlin: A language for provisioning network resources. In *Proceedings of the 10th Conference on Emerging Networking Experiments and Technologies (CoNEXT)*, pages 213–226, 2014. Preliminary version in *Proceedings of the 12th ACM Workshop on Hot Topics in Networks (HotNets-XII)*, 2013.
- [C8] H. Fu and R. Kleinberg. Improved lower bounds for testing triangle-freeness in boolean functions via fast matrix multiplication. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques, 17th International Workshop, APPROX 2014, and 18th International Workshop, RANDOM 2014*, pages 669–676, 2014.
- [C9] P. Frazier, D. Kempe, J. Kleinberg, and R. Kleinberg. Incentivizing exploration. In *Proceedings of the 15th ACM Conference on Electronic Commerce (EC)*, pages 5–22, 2014.
- [C10] A. Ghosh and R. Kleinberg. Optimal contest design for simple agents. In *Proceedings of the 15th ACM Conference on Electronic Commerce (EC)*, pages 913–930, 2014.
- [C11] H. Fu, N. Haghpanah, J. Hartline, and R. Kleinberg. Optimal auctions for correlated bidders with sampling. In *Proceedings of the 15th ACM Conference on Electronic Commerce (EC)*, pages 23–36, 2014.
- [C12] T. Lin, B. Abrahao, R. Kleinberg, J. C. S. Lui, and W. Chen. Combinatorial partial monitoring game with linear feedback and its applications. In *Proceedings of the 31st International Conference on Machine Learning (ICML)*, pages 901–909, 2014.
- [C13] P. Azar, R. Kleinberg, and S. M. Weinberg. Prophet inequalities with limited information. In *Proceedings of the 25th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 1358–1377, 2014.
- [C14] A. Badanidiyuru, R. Kleinberg, and A. Slivkins. Bandits with knapsacks. In *Proceedings of the 54th IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 207–216, 2013.
- [C15] B. Abrahao, F. Chierichetti, R. Kleinberg, and A. Panconesi. Trace complexity of network inference. In *Proceedings of the 19th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, pages 491–499, 2013.
- [C16] M. Babaioff, R. Kleinberg, and A. Slivkins. Multi-parameter mechanisms with implicit payment computation. In *Proceedings of the 14th ACM Conference on Electronic Commerce (EC)*, pages 35–52, 2013.
- [C17] R. Kleinberg and Y. Yuan. On the ratio of revenue to welfare in single-parameter mechanism design. In *Proceedings of the 14th ACM Conference on Electronic Commerce (EC)*, pages 589–602, 2013.
- [C18] P. H. C. Guerra, W. M. Jr., C. Cardie, and R. Kleinberg. A measure of polarization on social media networks based on community boundaries. In *Proceedings of the 7th AAAI Conference on Weblogs and Social Media (ICWSM)*, 2013.

- [C19] N. R. Devanur, K. Jain, and R. D. Kleinberg. Randomized primal-dual analysis of RANKING for online bipartite matching. In *Proceedings of the 24th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 101–107, 2013.
- [C20] H.-C. An, R. Kleinberg, and D. B. Shmoys. Improving Christofides’ algorithm for the s-t path TSP. In *Proceedings of the 44th ACM Symposium on Theory of Computing (STOC)*, pages 875–886, 2012.
- [C21] R. Kleinberg and S. M. Weinberg. Matroid prophet inequalities. In *Proceedings of the 44th ACM Symposium on Theory of Computing (STOC)*, pages 123–136, 2012.
- [C22] C. Brandt, N. Immorlica, G. Kamath, and R. Kleinberg. An analysis of one-dimensional Schelling segregation. In *Proceedings of the 44th ACM Symposium on Theory of Computing (STOC)*, pages 789–804, 2012.
- [C23] M. Babaioff, R. Kleinberg, and R. P. Leme. Optimal mechanisms for selling information. In *Proceedings of the 13th ACM Conference on Electronic Commerce (EC)*, pages 92–109, 2012.
- [C24] H. Fu, R. Kleinberg, and R. Lavi. Conditional equilibrium outcomes via ascending price processes with applications to combinatorial auctions with item bidding. In *Proceedings of the 13th ACM Conference on Electronic Commerce (EC)*, page 586, 2012.
- [C25] A. Badanidiyuru, R. Kleinberg, and Y. Singer. Learning on a budget: Posted price mechanisms for online procurement. In *Proceedings of the 13th ACM Conference on Electronic Commerce (EC)*, pages 128–145, 2012.
- [C26] M. Babaioff, S. Dughmi, R. Kleinberg, and A. Slivkins. Dynamic pricing with limited supply. In *Proceedings of the 13th ACM Conference on Electronic Commerce (EC)*, pages 74–91, 2012.
- [C27] B. Abrahao, S. Soundarajan, J. Hopcroft, and R. Kleinberg. On the separability of structural classes of communities. In *Proceedings of the 18th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, pages 624–632, 2012.
- [C28] A. Badanidiyuru, R. Kleinberg, and H. Lee. Approximating low-dimensional coverage problems. In *Proceedings of the 28th Symposium on Computational Geometry (SOCG)*, pages 161–170, 2012.
- [C29] A. Badanidiyuru, S. Dobzinski, H. Fu, R. Kleinberg, N. Nisan, and T. Roughgarden. Sketching valuation functions. In *Proceedings of the 23rd ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 1025–1035, 2012.
- [C30] L. E. Blume, D. A. Easley, J. M. Kleinberg, R. Kleinberg, and É. Tardos. Which networks are least susceptible to cascading failures? In *Proceedings of the 52nd IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 393–402, 2011.
- [C31] A. Blasiak, R. Kleinberg, and E. Lubetzky. Lexicographic products and the power of non-linear network coding. In *Proceedings of the 52nd IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 609–618, 2011.
- [C32] S. Dobzinski, H. Fu, and R. D. Kleinberg. Optimal auctions with correlated bidders are easy. In *Proceedings of the 43rd ACM Symposium on Theory of Computing (STOC)*, pages 129–138, 2011.

- [C33] L. Blume, D. A. Easley, J. M. Kleinberg, R. D. Kleinberg, and É. Tardos. Network formation in the presence of contagious risk. In *Proceedings of the 12th ACM Conference on Electronic Commerce (EC)*, pages 1–10, 2011.
- [C34] J. D. Hartline, R. Kleinberg, and A. Malekian. Bayesian incentive compatibility via matchings. In *Proceedings of the 22nd ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 734–747, 2011.
- [C35] R. D. Kleinberg, K. Ligett, G. Piliouras, and É. Tardos. Beyond the Nash equilibrium barrier. In *Proceedings of the 2nd Symposium on Innovations in Computer Science (ICS)*, pages 125–140, 2011.
- [C36] A. Blasiak and R. D. Kleinberg. The serializability of network codes. In *Proceedings of the 37th International Colloquium on Automata, Languages, and Programming (ICALP)*, pages 100–114, 2010.
- [C37] A. Altman and R. Kleinberg. Nonmanipulable randomized tournament selections. In *Proceedings of the 24th AAAI Conference on Artificial Intelligence (AAAI)*, 2010.
- [C38] M. Babaioff, R. D. Kleinberg, and A. Slivkins. Truthful mechanisms with implicit payment computation. In *Proceedings of the 11th ACM Conference on Electronic Commerce (EC)*, pages 43–52, 2010.
- [C39] H.-C. An, R. D. Kleinberg, and D. B. Shmoys. Approximation algorithms for the bottleneck asymmetric traveling salesman problem. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques, 13th International Workshop, APPROX 2010, and 14th International Workshop, RANDOM 2010*, volume 6302 of *Lecture Notes in Computer Science*, pages 1–11. Springer, 2010.
- [C40] I. Gorodezky, R. D. Kleinberg, D. B. Shmoys, and G. Spencer. Improved lower bounds for the universal and *a priori* TSP. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques, 13th International Workshop, APPROX 2010, and 14th International Workshop, RANDOM 2010, Barcelona, Spain, September 1-3, 2010. Proceedings*, volume 6302 of *Lecture Notes in Computer Science*, pages 178–191. Springer, 2010.
- [C41] P. Briest, S. Chawla, R. Kleinberg, and S. M. Weinberg. Pricing randomized allocations. In *Proceedings of the 21st ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 585–597, 2010.
- [C42] D. Buchfuhrer, S. Dughmi, H. Fu, R. Kleinberg, E. Mossel, C. H. Papadimitriou, M. Schapira, Y. Singer, and C. Umans. Inapproximability for VCG-based combinatorial auctions. In *Proceedings of the 21st ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 518–536, 2010.
- [C43] R. Kleinberg and A. Slivkins. Sharp dichotomies for regret minimization in metric spaces. In *Proceedings of the 21st ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 827–846, 2010.
- [C44] R. Kleinberg, G. Piliouras, and É. Tardos. Multiplicative updates outperform generic no-regret learning in congestion games. In *Proceedings of the 41st ACM Symposium on Theory of Computing (STOC)*, pages 533–542, 2009.
- [C45] M. Babaioff, J. D. Hartline, and R. D. Kleinberg. Selling ad campaigns: Online algorithms with cancellations. In *Proceedings of the 10th ACM Conference on Electronic Commerce (EC)*, pages 61–70, 2009.

- [C46] R. D. Kleinberg, G. Piliouras, and É. Tardos. Load balancing without regret in the bulletin board model. In *Proceedings of the 28th ACM Symposium on Principles of Distributed Computing (PODC)*, pages 56–62, 2009.
- [C47] E. Even-Dar, R. Kleinberg, S. Mannor, and Y. Mansour. Online learning for global cost functions. In *Proceedings of the 22nd Conference on Learning Theory (COLT)*, 2009.
- [C48] Y. Yue, J. Broder, R. Kleinberg, and T. Joachims. The K-armed dueling bandits problem. In *Proceedings of the 22nd Conference on Learning Theory (COLT)*, 2009.
- [C49] K. Chaudhuri, C. Daskalakis, R. D. Kleinberg, and H. Lin. Online bipartite perfect matching with augmentations. In *Proceedings of the 28th IEEE International Conference on Computer Communications (INFOCOM)*, pages 1044–1052, 2009.
- [C50] A. Badanidiyuru and R. Kleinberg. Randomized online algorithms for the buyback problem. In *Proceedings of the 5th Workshop on Internet and Network Economics (WINE)*, pages 529–536, 2009.
- [C51] R. Kleinberg, A. Slivkins, and E. Upfal. Multi-armed bandits in metric spaces. In *Proceedings of the 40th ACM Symposium on Theory of Computing (STOC)*, pages 681–690, 2008.
- [C52] A. Archer and R. Kleinberg. Truthful germs are contagious: A local to global characterization of truthfulness. In *Proceedings of the 9th ACM Conference on Electronic Commerce (EC)*, pages 21–30, 2008.
- [C53] F. Radlinski, R. Kleinberg, and T. Joachims. Learning diverse rankings with multi-armed bandits. In *Proceedings of the 25th International Conference on Machine Learning (ICML)*, pages 784–791, 2008.
- [C54] R. D. Kleinberg, A. Niculescu-Mizil, and Y. Sharma. Regret bounds for sleeping experts and bandits. In *Proceedings of the 21st Conference on Learning Theory (COLT)*, pages 425–436, 2008.
- [C55] B. D. Abrahamo and R. D. Kleinberg. On the Internet delay space dimensionality. In *Proceedings of the 8th ACM SIGCOMM Conference on Internet Measurement (IMC)*, pages 157–168, 2008. Brief announcement appeared in *Proceedings of the Twenty-Seventh Annual ACM Symposium on Principles of Distributed Computing, PODC 2008*.
- [C56] M. Babaioff, R. Kleinberg, and C. H. Papadimitriou. Congestion games with malicious players. In *Proceedings of the 8th ACM Conference on Electronic Commerce (EC)*, pages 103–112, 2007.
- [C57] S. Chawla, J. D. Hartline, and R. D. Kleinberg. Algorithmic pricing via virtual valuations. In *Proceedings of the 8th ACM Conference on Electronic Commerce (EC)*, pages 243–251, 2007.
- [C58] M. Babaioff, N. Immorlica, D. Kempe, and R. Kleinberg. A knapsack secretary problem with applications. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques, 10th International Workshop, APPROX 2007, and 11th International Workshop, RANDOM 2007*, volume 4627 of *Lecture Notes in Computer Science*, pages 16–28. Springer, 2007.
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Other Publications

- [O1] H.-C. An and R. Kleinberg. A diameter-revealing proof of the Bondy-Lovász lemma. *CoRR*, abs/1111.6561, 2011. Working paper.
- [O2] S. Dobzinski, H. Fu, and R. Kleinberg. Truthfulness via proxies. *CoRR*, abs/1011.3232, 2010. Working paper.
- [O3] R. Kleinberg and K. Ligett. Privacy-compatibility for general utility metrics. *CoRR*, abs/1010.2705, 2010. Working paper.

- [O4] P. Hersh and R. Kleinberg. A multiplicative deformation of the möbius function for the poset of partitions of a multiset. In *Communicating Mathematics (special volume in honor of Joe Gallian's 65th birthday)*, *Contemp. Math.*, 479, pages 113–118. Amer. Math. Soc., 2009.
- [O5] M. Babaioff, J. D. Hartline, and R. Kleinberg. Selling banner ads: Online algorithms with buyback. In *Proceedings of the 4th Workshop on Ad Auctions*, 2008.
- [O6] A. Archer and R. Kleinberg. Characterizing truthful mechanisms with convex type spaces. *SIGecom Exchanges*, 7(3), 2008.
- [O7] M. Babaioff, N. Immorlica, D. Kempe, and R. Kleinberg. Online auctions and generalized secretary problems. *SIGecom Exchanges*, 7(2), 2008.
- [O8] N. J. A. Harvey, R. Kleinberg, C. Nair, and Y. Wu. A “Chicken & Egg” network coding problem. In *Proceedings of the 2007 IEEE International Symposium on Information Theory (ISIT)*, pages 131–135, 2007.
- [O9] N. J. A. Harvey and R. Kleinberg. Tighter cut-based bounds for k-pairs communication problems. In *Proceedings of the 43rd Annual Allerton Conference on Communication, Control, and Computing*, 2005.
- [O10] R. Kleinberg and W. Menasco. Train tracks and zipping sequences for pseudo-Anosov braids. *Chaos, Solitons, and Fractals*, 9(4-5):793–809, 1998. Special issue on knot theory and its applications.

Invited Talks

- Inference-Based Privacy Guarantees for Differentially Private Mechanisms
 - *Caltech SISL Seminar*, Pasadena, CA, March 2016.
 - *MIT-Harvard-MSR Theory Reading Group*, Cambridge, MA, March 2016.
 - *Northeastern CS Colloquium and Theory Seminar*, Boston, MA, November 2015.
- Descending Prices Coordinate Approximately Efficient Search
 - *Harvard CRCS Seminar*, Cambridge, MA, April 2016.
- Secretary Problems with Non-Uniform Arrival Order
 - *Penn State CS Theory Seminar*, State College, PA, October 2015.
 - *Harvard Theory of Computation Seminar*, Cambridge, MA, March 2015.
 - *Simons Symposium on New Directions in Approximation Algorithms*, San Jose, Puerto Rico, February 2015.
 - *MIT Theory of Computation Colloquium*, Cambridge, MA, February 2015.
- Incentivizing Exploration
 - *MSR Theory Day*, Invited Keynote Lecture, Redmond, WA, March 2016.
 - *Penn State Microeconomic Theory Seminar*, State College, PA, October 2015.
 - *MSR Game Theory and Computation Seminar*, Cambridge, MA, November 2014.

- *NIPS Workshop on Transactional Machine Learning and E-Commerce*, Montréal, Canada, December 2014.
- *RAIN (Research on Algorithms and Incentives in Networks) Seminar*, Stanford, CA, April 2015.
- *International Symposium on Mathematical Programming*, Pittsburgh, PA, July 2015.
- Multi-Armed Bandits in Economics and Computation
 - *Winedale Workshop*, Winedale, TX, October 2014.
- Explore or Exploit? Reflections on an Ancient Dilemma in the Age of the Web
 - *Microsoft Research Colloquium*, Cambridge, MA, August 2014.
 - *Brown University CS Colloquium*, Providence, RI, November 2014.
 - *UCLA Electrical Engineering Distinguished Seminar Series*, Los Angeles, CA, December 2014.
- Multi-Armed Bandits and the Web.
 - *Santa Fe Institute Colloquium*, Santa Fe, NM, September 2013.
 - *IOMS Colloquium*, NYU Stern School of Business, New York, NY, October 2013.
 - *Cornell Information Science Colloquium*, Ithaca, NY, October 2013.
 - *USC Computer Science Colloquium*, Los Angeles, CA, December 2014.
- Optimal Stopping Meets Combinatorial Optimization.
 - Invited keynote talk, *COCOON 2013*, Hangzhou, China, June 2013.
- An Analysis of One-Dimensional Schelling Segregation.
 - *Duke CS-Econ Seminar*, Durham, NC, April 2013.
 - *ICERM Workshop on Stochastic Graph Models*, Brown University, Providence, RI, March 2014.
- Group-Theoretic Algorithms for Fast Matrix Multiplication
 - *Oliver Club (Cornell Mathematics Colloquium)*, Ithaca, NY, February 2013.
 - *URGE to Compute Seminar*, Buffalo, NY, November 2013.
- Generalized Prophet Inequalities and Their Applications.
 - *AGT Samos Summer School*, Samos, Greece, July 2012.
 - *MIT LIDS Seminar*, Cambridge, MA, May 2012.
- Learning on a Budget: Posted Price Mechanisms for Online Procurement
 - *Google Market Algorithms Workshop*, New York, NY, May 2012.
- Basics of Mechanism Design; Recent Developments in Bayesian Mechanism Design.
 - *Princeton University*, Center for Computational Intractability, Princeton, NJ, May 2012.
- Improving Christofides' Algorithm for the s-t Path TSP
 - *Theory Canal Seminar*, Rochester, NY, February 2012.
- Which Networks Are Least Susceptible to Cascading Failures?
 - *Georgia Tech ARC Colloquium*, Atlanta, GA, December 2011.
 - *Cornell CS Theory Seminar*, Ithaca, NY, November 2011.

- *Greek Algorithmic Game Theory Week*, Paros, Greece, July 2011.
- Algorithmic Mechanism Design: Fundamental Techniques and Future Challenges
 - One-week short course taught at *ADFOCS* (Advanced Course on the Foundations of Computer Science), Max Planck Institut für Informatik, Saarbrücken, Germany, August 2011.
- Strategic Network Formation in the Presence of Contagious Risk
 - *Microsoft Research*, Mountain View, CA, June 2011.
 - *Microsoft Research*, Redmond, WA, May 2011.
- Converting Any Algorithm into an Incentive-Compatible Mechanism
 - *RIT Computer Science Colloquium*, Rochester, NY, February 2012.
 - *Microsoft New England Theory Colloquium*, Cambridge, MA, December 2010.
 - *Capital Area Theory Seminar*, University of Maryland, College Park, MD, November 2010.
 - *New York Computational Economics Day*, New York, NY, October 2010.
 - *CWI Workshop: Advances in Algorithmic Game Theory*, Amsterdam, Netherlands, Sept. 2010.
 - *Cornell CS Theory Seminar*, August 2010.
- Pricing Lotteries
 - *MIT ORC Colloquium*, Cambridge, MA, April 2010.
 - *STIET Seminar*, University of Michigan, Ann Arbor, MI, April 2010.
 - *New York Area Theory Day*, New York, NY, December 2009.
 - *Cornell Applied Math Colloquium*, Ithaca, NY, November 2009.
 - *Microsoft Research*, Mountain View, CA, July 2009.
- Game Theory, Economic Modeling, and Economic Regulation from a Computational Perspective
 - *Kavli Frontiers of Science Symposium*, Irvine, CA, November 2009.
- Some Vignettes from Learning Theory
 - *Microsoft Faculty Summit*, Redmond, WA, July 2009.
- A Learning-Theoretic Refinement of the Price of Anarchy
 - *Northwestern University*, Evanston, IL, May 2009.
 - *MIT CS Theory Colloquium*, Cambridge, MA, February 2009.
 - *Google Market Algorithms Workshop*, New York, NY, January 2009.
 - *Microsoft Research*, Cambridge, MA, August 2008.
 - *Microsoft Research*, Mountain View, CA, May 2008.
 - *Stanford iCME Colloquium*, Stanford, CA, May 2008.
- Multi-Armed Bandit Problems in Metric Spaces
 - *Information Theory and Applications Workshop*, San Diego, CA, February 2009.
 - *CMU/Google Machine Learning Seminar*, Pittsburgh, PA, November 2008.
 - *New York Machine Learning Symposium*, New York, NY, October 2008.
 - *Cornell ORIE Colloquium*, Ithaca, NY, September 2008.
 - *University at Buffalo CS Theory Seminar*, Buffalo, NY, March 2008.

- Truthful Germs Are Contagious: A Local-to-Global Characterization of Truthfulness
 - *Symposium on Economic Design*, Ann Arbor, MI, June 2008.
- Online Learning Algorithms for Searching and Ranking
 - *MIT Applied Mathematics Colloquium*, Cambridge, MA, December 2007.
 - *University of Washington CS Theory Seminar*, Seattle, WA, November 2007.
- Online Mechanisms and Optimal Stopping
 - *Penn State CS Colloquium*, University Park, PA, March 2007.
 - *University of Rochester CS Colloquium*, Rochester, NY, January 2007.
- Algorithmic Pricing Via Virtual Valuations
 - *Bay Algorithmic Game Theory Symposium*, Berkeley, CA, September 2006.
- Competitive Collaborative Learning
 - *Yahoo! Research Seminar*, Sunnyvale, CA, November 2006.
 - *USC Computer Science Colloquium*, Los Angeles, CA, September 2006.
 - *Amazon.com Operations Seminar*, Seattle, WA, March 2006.
- Approximation Algorithms for Confluent Flow
 - *Caltech IST Seminar*, Pasadena, CA, December 2005.
 - *UCLA Algorithms Seminar*, Los Angeles, CA, December 2005.
 - *Stanford Algorithms Seminar*, Stanford, CA, November 2005.
- On the Capacity of Information Networks
 - *USC Computer Science Colloquium*, Los Angeles, CA, December 2005.
 - *Berkeley CS Theory Seminar*, Berkeley, CA, October 2005.
- Adaptive Algorithms for Pricing and Overlay Routing
 - *Cornell CS Colloquium*, Ithaca, NY, Apr. 2005.
 - *Carnegie Mellon Tepper School of Business, OR Seminar*, Pittsburgh, PA, Mar. 2005.
 - *Northeastern University CS Colloquium*, Boston, MA, March 2005.
 - *University of Washington CS Colloquium*, Seattle, WA, March 2005.
 - *Harvard CS Colloquium*, Cambridge, MA, March 2005.
 - *Caltech IST Seminar*, Pasadena, CA, February 2005.
 - *Stanford Management Science Colloquium*, Stanford, CA, February 2005.
 - *UCSD Computer Science Colloquium*, San Diego, CA, February 2005.
 - *Toyota Technological Institute Seminar Series*, Chicago, IL, February 2005.
 - *UMass Amherst CS Colloquium*, Amherst, MA, February 2005
 - *Microsoft Research*, Mountain View, CA, January 2005.

U.S. Patents

- *Network Performance Monitoring In A Content Delivery Service*.
U.S. Patent 7,717,367.

- *Global Load Balancing Across Mirrored Data Centers.*
U.S. Patent 7,111,061.
- *Method For Extending A Network Map.*
U.S. Patent 7,028,083.
- *Payment Determination in Auctions.*
Patent application submitted.