

## **Eric J. Friedman**

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### **Education**

**University of California at Berkeley:** Ph.D. in Operations Research, May 1993.

**University of California at Berkeley:** M.S. in Operations Research, May 1991.

**University of California at Berkeley:** M.A. in Physics, May 1987.

**Princeton University:** A.B. Cum Laude in Physics, June 1985.

### **Academic Positions**

**International Computer Science Institute (ICSI),** Senior Research Scientist (June 2011 to present)

**U.C. Berkeley,** Visiting Scholar, Department of Computer Science (September 2010 – April 2015)

**Cornell University,** Associate Professor of Operations Research and Industrial Engineering. (2001-2011) (Graduate faculty in Information Science, Applied Math and Computer Science.)

**U.C. Berkeley,** Visiting Scholar, Department of Computer Science (Sabbatical: September 2005-June 2006)

**Rutgers University,** Associate Professor of Economics. (September 2002 – July 2003)

**Rutgers University,** Assistant Professor of Economics. (September 1996 – July 2002)

**California Institute of Technology,** Visiting Associate. (Fall 1999)

**Duke University,** Assistant Professor of Decision Sciences. (January 1994 – August 1996)

**University of California Energy Institute:** Visiting Scholar. (July 1994 and June 1995)

**U.C.B. Industrial Engineering and Operations Research:** Postdoctoral Fellow. (Fall 1993)

### **Other Experience**

**IDT:** consultant (2008-2009)

**Ebay:** Expert witness on cost allocation (2007-2008)

**WeMeUs.com:** Scientific Advisory Board (reputation systems) (2006-10)

**The International Monetary Fund:** Outside consultant on financing in emerging markets (2004-2007)

**The Brattle Group:** Outside consultant on financing in emerging markets for Verizon (1999)

**Xerox Palo Alto Research Center:** Learning in Computer Networks, hosted by Dr. S. Shenker. (Summer 1992)

**BARRA** (Berkeley, CA), Consultant, developed models and algorithms for computing equity option values. (Summer 1990)

**SYBASE** (Emeryville, CA), Database programmer. (Summer 1989)

### **Teaching**

**Cornell:** Undergraduate: Game Theory, Applications of Operations Research and Game Theory to Information Technology, Information Technology; Graduate: Game Theory, Mathematical Cost Allocation.

**Rutgers:** Undergraduate: Intermediate Microeconomics, Operations Research, Honors Seminar on Cooperation and Self-Interest. Graduate: Microeconomic Theory, Advanced Topics in Microeconomic Theory

**Duke:** Probability and Statistics.

**Berkeley (TA):** Advanced Physics Laboratory, Physics for Scientists and Engineers, Physics for the Life Sciences, Physics for Poets.

## **Advising**

### **Postdocs**

Weiyu Xu 2009-11

Sid Suri 2007-8

### **PhD and MA**

Joel Nishimura: Ph.D. Cornell Applied Math, “Synchronization on Graphs” (2012)

Asif-ul Haque: Ph.D. Cornell CS, “Interactions between social and information systems” (2011)

Ian Kash: Ph.D. Cornell CS, “Reputation Systems for P2P.” (2009)

Gang Song (committee member): M.A. Cornell Architecture (2008)

Patrick Ng (committee member): Ph.D. Cornell CS (2011)

Alice Cheng: M.A. Cornell CAM, “Robust Ranking Systems” M.S. (2007)

Yun Shi: M.A. Cornell ORIE, “Algorithms for Sensornets” M.S. (2006)

Mark Sandler (committee member): Ph.D. Cornell CS (2005)

Kevin O’Neill (committee member): Ph.D. Cornell CS (2005)

Mikhael Shor (committee member): Ph.D. Rutgers Economics (2001)

### **M. Eng. Cornell**

E. Chiew, A. Sumethkul, J. Timura, and V. Wilson “Optimizing Emergency Services Response time for the Third Battalion in Rochester, NY” (2010)

Chen Chun-Hsien, Crystal Diaz and Tan Zhuohua, “Optimizing Emergency Services Staffing for the Third Battalion in Rochester, NY” (2009)

Ashish Gulati, Praneeth Vaddepalli, Taimoor Akhtar, Ernest Lumanpauw, “Optimizing Service Technician Scheduling for Xerox” (2008)

Aloysius Lim, Sae Yi Park, Xiao Yu Wang, “Community and Website Design for Earth System Science Informal Education Network” (2007)

Ilya Ryshov, Tracey Sun, Donald Ryu, Koh Shimizu, “Optimizing Google Adwords for Analog Devices Inc.” (2005)

Graig Diamond, Kevin Byrnes, “Voice over IP at Cornell.” (2004)

Jay Sorenson, Kevin Koo, Joshua Goldfarb, “Data Network Pricing at Cornell.” (2003)

Brian Garland, Horace Chen, Melanie Kirkwood, Michael Tetteh, “A message board for the college of engineering with anonymous reputational controls.” (2002)

### **Undergraduate**

UC Berkeley Interns:

Qi Zhong (2014)

Yifan Ding, Wenson Hsieh, Leo Kam (2013-14)

Danial Muhammad, Scott Wilson (2012-13)

Inderjit Jutla, Michael Liang, Jason Liang, Graham Tremper (2012)  
Wenson Hsieh, Moeka Tanagi (2011-12)

Cornell:

Thomas Byuen and German Gutierrez: “Perpetual Play in Monopoly” (2008-9)  
Alex Aidun, Thomas Byuen, and Dennis Li: “Optimal Play in Monopoly” (2008)  
Matthew Fontana: “4-Rowed Chomp” (2007)  
Patrik Ng: “Algorithms for Chomp” (2004)  
Patrik Ng and Zaman Rajan: “Improved Web Server Protocols” (2003)  
Viral Naik, Rutgers senior honors thesis, “The Microsoft Antitrust Case” (1999)

## Service

Co-director: Cornell ISST-MS major (2007-2010)

Cornell Committees: Graduate Admissions ORIE (2009-2010), Graduate Admissions Applied Math (2007-2009), College Ad-hoc (tenure) committees (2007,2008), College Teaching award committee (2007-2009), Applied Math Colloquium Committee (2008-2009), Chair ORIE computing (2002-2010), Faculty search (2001, 2002, 2003), Campus Safety (2001-4), Cornell co-op (2004- 2007), Engineering Library (2001-4), Design of the Information Science Major (2002-4).

Other: Cornell Contest on Mathematical Modeling and International Contest in Mathematical Modeling (Judge and Coach, 2002-2010). Math Olympiad coach for the Cayuga Heights Elementary School (2008-2010). Chess club coach for Albany Middle School (2010-2011), Judge Sonoma County science fair (2013,2014).

## Grants

National Science Foundation: “ICES: Evaluating Price Mechanisms for Clouds” PI (with S. Shenker), 2012-2015 (\$375,000.00.)

National Science Foundation: CSR: Medium: Limiting Manipulation in Data Centers and the Cloud” co-PI (with A. Ghodsi and I. Stoica), 2012-2014 (\$135,109.)

National Institutes of Health, “Robust Localized Measures for Brain Networks” 2011-2016 PI (\$800,000)

National Science Foundation: “CDI Type II: Complex Dynamics in the Internet: A Computational Analytic Approach,” PI (with S. Strogatz and A.Tang), 2008-2013 (\$1,499,000)

National Science Foundation: “ITR: Networks of Strategic Agents: Theory and Algorithms,” co-PI (with J. Halpern, D. Huttenlocher, J. Kleinberg and E. Tardos), 2003-2008 (\$2,468,677)

National Science Foundation: “ITR: Achieving Innovative and Reliable Services in Unlicensed Spectrum,” PI, 2002-2005 (Group \$1,230,860, Cornell \$175,000)

National Science Foundation: “Learning and the Design of the Internet,” co-PI (with S. Shenker), 1998-2003 (\$357,000.)

## Publications (\*undergraduates at time of research)

1. Friedman, Eric J., Adam S. Landsberg, Julia P. Owen, Wenson Hsieh, Leo Kam, and Pratik Mukherjee. "Edge Correlations in Spatial Networks", *Journal of Complex Networks* (2015) forthcoming.

2. Eric Friedman and Miklos Z. Racz, "Dynamic Budget-Constrained Pricing in the Cloud", Proceeding of the The 28<sup>th</sup> Canadian Conference on Artificial Intelligence (2015) forthcoming.
3. Eric Friedman, Christos-Alexandros Psomas, and Shai Vardi, "Pareto Optimal Dynamic Fair Division with Minimal Disruptions", In *Proceedings of the sixteenth ACM conference on Economics and Computation* (2015) forthcoming.
4. Friedman, Eric J., Karl Young, Graham Tremper\*, Jason Liang\*, Adam S. Landsberg, and Norbert Schuff. "Directed Network Motifs in Alzheimer's Disease and Mild Cognitive Impairment", *PLoS One* (2015) forthcoming.
5. Friedman, Eric J., Karl Young, Danial Asif\*, Inderjit Jutla\*, Michael Liang\*, Scott Wilson\*, Adam S. Landsberg, and Norbert Schuff. "Directed Progression Brain Networks in Alzheimer's Disease: Properties and Classification." *Brain connectivity* 4, no. 5 (2014): 384-393.
6. Friedman, Eric J., Adam S. Landsberg, Julia P. Owen, Yi-Ou Li, and Pratik Mukherjee. "Stochastic geometric network models for groups of functional and structural connectomes." *NeuroImage* 101 (2014): 473-484.
7. Friedman, Eric, Ali Ghodsi, and Christos-Alexandros Psomas. "Strategyproof allocation of discrete jobs on multiple machines." In *Proceedings of the fifteenth ACM conference on Economics and computation*, pp. 529-546. ACM, 2014.
8. Friedman, Eric J., and Adam S. Landsberg. "Hierarchical networks, power laws, and neuronal avalanches." *Chaos: An Interdisciplinary Journal of Nonlinear Science* 23, no. 1 (2013): 013135.
9. Bhattacharya, Arka A., David Culler, Eric Friedman, Ali Ghodsi, Scott Shenker, and Ion Stoica. "Hierarchical scheduling for diverse datacenter workloads." In *Proceedings of the 4th annual Symposium on Cloud Computing*, p. 4. ACM, 2013.
10. Owen, Julia P., Etay Ziv, Polina Bukshpun, Nicholas Pojman, Mari Wakahiro, Jeffrey I. Berman, Timothy PL Roberts, Eric J. Friedman, Elliott H. Sherr, and Pratik Mukherjee. "Test–retest reliability of computational network measurements derived from the structural connectome of the human brain." *Brain connectivity* 3, no. 2 (2013): 160-176.
11. Owen, Julia P., Yi-Ou Li, Etay Ziv, Zoe Strominger, Jacquelyn Gold, Polina Bukhpun, Mari Wakahiro, Eric J. Friedman, Elliott H. Sherr, and Pratik Mukherjee. "The structural connectome of the human brain in agenesis of the corpus callosum." *Neuroimage* 70 (2013): 340-355.
12. Cofinite Induced Subgraphs of Impartial Combinatorial Games: An Analysis of CIS-Nim, *Integers* v.13 #G2, 2013 (with Scott M. Garrabrant\* and Adam S. Landsberg)
13. Probabilistic convergence guarantees for type-II pulse-coupled oscillators. *Physical Review E* 86, no. 2 (2012): 025201 (with J. Nishimura)
14. Asymmetric Cost Sharing, *Games and Economic Behavior* (2012), pp. 139-151
15. Combinatorial Games with a Pass: A dynamical systems approach, *Chaos* 21:4 2011. (with A. Landsberg and R. Morrison\*)
16. Robust convergence in pulse-coupled oscillators with delays, *Physical Review Letters* 106:19, 2011. (with Joel Nishimura )
17. Understanding explosive percolation in random graphs, *Physical Review Letters* 103:25 2009. (with A.S. Landsberg)

18. Finding a Simple Polytope from its Graph in Polynomial Time, *Discrete & Computational Geometry*, Volume 41, Issue2, p.249, 2009.
19. Active Learning for Smooth Problems. *Proceedings of the Conference on Learning Theory (COLT)*, 2009.
20. Manipulating Scrip Systems: Sybils and Collusion. *Proceedings of the First Conference on Auctions, Market Mechanisms and Their Applications (AMMA'09)*, 2009. (with J.Y. Halpern, and I.A. Kash)
21. Multiagent Learning in Large Anonymous Games. *Proceedings of the Eighth International Conference on Autonomous Agents and Multiagent Systems (AAMAS'09)*, pages 765-772, 2009 and *Journal of AI Research* Volume 40, pages 571-598, 2011. (with J.Y. Halpern, and I.A. Kash)
22. Estimating the probability that the game of Monopoly never ends. *Proceedings of the 2009 Winter Simulation Conference*, 2009 (with S. G. Henderson, T. Byuen\*, and G. Gutierrez Gallardo\*) **(Cornell best poster award for computer-science related undergraduate research -- BOOM)**
23. Efficient Fair Algorithms for Message Communication, *Simulation Modelling, Practice and Theory* 17(3), pp.513-527, 2008. (with S. Gorinsky, S. Henderson, and C. Jechlitschek)
24. Brief Announcement: The Lotus-Eater Attack. *Proceedings of the Twenty Seventh Annual ACM Symposium on Principles of Distributed Computing (PODC'08)*, page 455, 2008. (with J.Y. Halpern, and I.A. Kash)
25. Fundamental Domains for Combinatorial Integer Programs with Symmetries. *Cocoa07: The First International Conference on Combinatorial Optimization and Applications*, 2007.
26. Nonlinear Dynamics in Combinatorial Games: Renormalizing Chomp, *Chaos* 17 023117, 2007. (with A.S. Landsberg)
27. Manipulation-Resistant Reputation Systems, in *Algorithmic Game Theory*, Edited by N. Nisan, T. Roughgarden, E. Tardos, and V. Vazirani, 2007. (with P. Resnick and R. Sami)
28. On the Geometry of Combinatorial Games: A renormalization approach, *Games of No Chance III*, edited by R. Nowakowski, 2009. (with A.S. Landsberg)
29. Optimizing Scrip Systems: Efficiency, Crashes, Hoarders, and Altruists. *Proceedings of Eighth ACM Conference on Electronic Commerce (EC'07)*, pages 305-315, 2007. (with J.Y. Halpern, and I.A. Kash) also in *Transactions on Economics and Computation* (Forthcoming 2014).
30. Algorithms for implementing fair wireless power allocations, *Proceedings of the the 9th Canadian Workshop on Information Theory*, 2006. (with Y. Shi)
31. Fair and Robust Power Allocation Rules for Multiple Access Channels, *Proceedings of the the 9th Canadian Workshop on Information Theory*, 2006.
32. Manipulability of PageRank under Sybil Strategies, *Proceedings of the First Workshop of Networked Systems (NetEcon06)*, 2006. (with A. Cheng)
33. Efficiency and Nash Equilibria in a Scrip System for P2P Networks. *Proceedings of Seventh ACM Conference on Electronic Commerce (EC'06)*, pages 140-149, 2006. (with J.Y. Halpern, and I.A. Kash)
34. Sybilproof Reputation Mechanisms, with A. Cheng. *Proceedings of Third Workshop on Economics of Peer-to-Peer Systems (EC'05)*, 2005.



35. A Generic Analysis of Selfish Routing, Proceedings of the 43<sup>rd</sup> IEEE Conference on Decision and Control, 2004.
36. Paths and Consistency in Additive Cost Sharing, *International Journal of Game Theory* Volume 32, Number 4, pp.501 – 518, 2004.
37. Behavior of Coupled Automata, *Physical Review E*. 69: 046116, 2004. (with R. Gann\*, J. Venable\*, and A.S. Landsberg)
38. Asynchronous Learning with Limited Information: An Experimental Analysis, *Games and Economic Behavior* Volume 47, Issue 2, pp.325-352, 2004. (with M. Shor, S. Shenker, B. Sopher)
39. Strong Monotonicity in Surplus Sharing, *Economic Theory* Volume 23, Number 3, pp.643 – 658, 2004.
40. Asynchronous Learning in Decentralized Environments: A Game Theoretic Approach, in *Collectives and the Design of Complex Systems*, edited by K. Tumer and D. Wolpert, Springer-Verlag, 2004.
41. Strategic Properties of Heterogeneous Serial Cost Sharing, *Mathematical Social Sciences* Volume 44, Issue 2, pp.145-154, 2004.
42. Fairness and Efficiency in Processor Sharing Protocols to Minimize Sojourn Times, *Proceedings of International Conference on Measurement and Modeling of Computer Systems (Sigmetrics)* pp.229 – 237, 2003. (with S. Henderson)
43. Pricing WiFi at Starbucks -- Issues in Online Mechanism Design, *Proceedings of the Fourth ACM Conf. on Electronic Commerce (EC'03)*, 2003. (with D. Parkes)
44. Large Scale Synchrony, Global Interdependence and Contagion, *Quantitative Finance* 3, No 4, pp.296-305, 2003. (with S. Johnson and A. Landsberg)
45. Propping and Tunneling, *Journal of Comparative Economics* Volume 31, Issue 4, pp.732-750, 2003. (with Simon Johnson and Todd Mitton)
46. Large-Scale Synchrony in Weakly Interacting Automata, *Physical Review E*, (63), 051303, 2001. (with A. Landsberg)
47. The Social Costs of Cheap Pseudonyms, *Journal of Economics and Management Strategy*, (10) 2, 2001. (with P. Resnick) (**Winner of the 2015 ACM SIGecom Test of Time Award.**)
48. Reputation Systems: Facilitating Trust on the Internet, *Communications of the ACM*, 43(12), 2000. (with K. Kuwabara, P. Resnick, and R. Zeckhauser)
49. Corporate governance and corporate debt in Asian crisis countries, in *Korean Crisis and Recovery*, edited by Coe and Kim, International monetary fund, 2002. (with S. Johnson and T. Minton)
50. Corporate Governance in the Asian Financial Crisis, 1997-98, *Journal of Financial Economics*, (58), Issue 1-2, 2000. Reprinted in *Economic Approaches to Law*. (with S. Johnson, P. Boone and A. Breach)
51. Dodging the Grabbing Hand: The determinants of unofficial activity in 69 countries, *Journal of Public Economics* 76: (3) 459-493, 2000. Reprinted in *Proceedings of the 1999 Nobel Symposium*, 2000. (with S. Johnson, D. Kaufmann and P. Zoido-Lobaton)
52. Three Methods to Share Joint Costs or Surplus, *Journal of Economic Theory*, 87(2) pp.275-312, 1999. (with H. Moulin)

53. Learning in Network Contexts: Experimental Results from Simulations, *Games and Economic Behavior*, (35), 1-2, April-May, 80-123, 2001. (with A. Greenwald and S. Shenker)
54. Dynamic Monotonicity and Comparative Statics for Real Options, with S. Johnson, *Journal of Economic Theory*, 75(1), 104-121, 1997.
55. Dynamics and Rationality in Ordered Externality Games, *Games and Economic Behavior*, 16, 65-76, 1996.
56. Dynamical Effects of Partial Orderings in Physical Systems, *Physical Review E*, 54(4), 3135-3141, 1996. (with A. Landsberg)
57. Complementarities in Economic Reform, *Economics of Transition* 4(2), 319-329, 1996. (with S. Johnson)
58. Communication Effort in Teams and in Games, *Understanding Strategic Interaction: Essays in Honor of Reinhard Selton*, edited by W. Albers, et al, Springer-Verlag, 1996. (with T. Marschak)
59. Long Run Dynamics of Queues: Stability and Chaos, *Operations Research Letters*, 18, 185-191, 1996. (with A. Landsberg)
60. The Complexity of Resource Allocation and Price Mechanisms under Bounded Rationality, *Economic Theory* 6, 225-250, 1995. (with S. Oren)
61. Short Run Dynamics of Multi-Class Queues, *Operations Research Letters*, 14, 221-229, (1993). (with A. Landsberg)
62. The Complexity of Allocating Resources in Parallel, in *Complexity in Numerical Optimization*, edited by P. Pardalos, World Scientific, 1993.
63. Structure and Uncomputability in One-Dimensional Maps, *Complex Systems* 5, 335-349, 1988.

## Technical Reports

1. Strategyproofness, Leontief Economies and the Kalai-Smorodinsky Solution, 2011. (with Ghodsi, A., Shenker, S. and Stoica, I.)
2. Nash Bargaining without Scale Invariance, 2011. (with Ghodsi, A., Shenker, S. and Stoica, I.)
3. Explosive Percolation in Social and Physical Networks, 2009. (with J. Nishimura)
4. Active Learning for Clustering Bundled Data, 2009.
5. Convex Optimization for Active Learning with Large Margins, 2009.
6. Winning Strategies: The Emergence of Base 2 in the Game of Nim, 2008. (with A.S. Landsberg)
7. On the Statistical Efficiency of Pagerank and other Ranking Procedures, 2007.
8. Selfishness, Learning, and Mechanism Design on the Internet, 2002. (with S. Shenker)
9. Robust Social Norms in Bargains and Markets, 2001.
10. Limits on Cooperation with Anonymity and Noise, 2000.
11. Optimization Based Characterizations of Cost Sharing Methods, 1999.
12. Asynchronous Learning by Responsive Learning Automata in Network Environments, 1998. (with S. Shenker)
13. Learnability in a class of Non-atomic Games arising on the Internet, 1997.
14. Search and Complementarities in Chinese Style Reform, with S. Johnson, 1996. (with S. Johnson)
15. Complementarities and Optimal Reform, 1995. (with S. Johnson)

16. A Strongly Polynomial Algorithm for Approximate Convex Optimization with Combinatorial Constraints and Resource Allocation, 1992.

### **Professional Activities:**

**National Science Foundation:** workshops, panel review (multiple times)

**Co-chair:** Workshop on Economics of P2P (2005)

**Co-organizer:** The Economics, Technology and Policy of Unlicensed Spectrum (2005)

**Co-organizer:** Workshop on Economics, Game Theory, and the Internet (1997)

**Scientific Committee:** Game theory (2009)

**Program Committee:** Workshop on Economics of P2P (2004), ACM conference on Electronic Commerce (2006, 2007, 2008, 2012)

**Referee:** ACM workshop on Electronic Commerce, American Economic Review, Blackwell Publishers, Brain, Communications of the ACM, Comparative Economic Systems, Econometrica, Economica, European Journal of Political Economy, Games and Economic Behavior, Informs Journal on Computing, IEEE Journal on Selected Areas in Communications, IEEE Transactions on Information Theory, IEEE Transactions on Networking, IEEE Transactions on Parallel and Distributed Systems, International Journal of Game Theory, International Workshop on Peer-to-Peer Systems, Journal of Comparative Economics, Journal of Economic Theory, Journal of Economic Education, Journal of Economics and Management Strategy, Journal of Environmental Informatics, Journal of Complex Networks, Journal of Political Economy, Management Science, Mathematical Social Sciences, Mathematics of Operations Research, National Science Foundation, Nature Physics, Rand Journal of Economics, Operations Research, PLOS One, Review of Development Economics, Review Economic Design, Science Foundation Ireland, Social Choice and Welfare, Telecommunications Systems, Transactions on Economics and Computation.

**Memberships:** SFN, OHBM, ACM, AMS, Econometric Society

### **Media Coverage**

More than just fun and games: Monopoly is subject of academic study. *San Diego Union-Tribune*, October 5, 2009.

Chaotic Chomp: The mathematics of crystal growth sheds light on a tantalizing game.

Featured article and cover, *Science News*, July 22, 2006; Vol. 170, No. 4, p. 58.

Like a Swerving Commuter, a Selfish Router Slows Traffic, *New York Times*, April 24, 2003.

### **Presentations**

*Directed Network Motifs from MRI Cortical Thickness as Markers In Alzheimer's Disease* 2015: ICSI. 2014: Claremont Colleges. 2013: Society for Neuroscience Annual Meeting, *Geometric Network Models of the Functional Connectome* 2013: SIAM Conference on Dynamical Systems, Santa Fe Institute

*Construction and Analysis of Empirical Brain Networks (Connectomes)* 2013: Session organized for the SIAM Conference on Dynamical Systems.



*Network Analysis of Brain Images* 2012: UCSF symposium on structure and functional connectivity in neurodegenerative diseases.

*Cost Sharing and Cloud Computing*. 2013: UC Berkeley EconCS, 2012: Decentralization conference (Caltech), 2011: UCLA, USC, Stanford, Claremont Colleges, UCB CS.

*Explosive Percolation*. 2012: SF VA medical center.

*Asymmetric Cost Allocation*. 2011: University of Oregon; 2010: UC Berkeley (IEOR),

*Active Learning for Smooth Problems*. 2009: COLT Montreal.

*Finding a Simple Polytope from its Graph in Polynomial Time*: 2007: IPCO Ithaca, IAS Jerusalem, Johns Hopkins, Cornell.

*Fundamental Domains for Combinatorial Integer Programs with Symmetries* 2007. Cocoa07 (Xi'an, China)

*Scaling, Renormalization, and Universality in Combinatorial Games*: 2006: UC Berkeley CS; 2005: Cornell ORIE, BIRS Combinatorial Game Theory Workshop.

*Sybilproof Reputation Mechanisms*: 2006: Microsoft research. 2005: P2PEcon, Rice, Stanford, Oregon.

*Fair and Robust Power Allocation Rules for Multiple Access Channels*: 2005: Canadian Workshop on Information theory.

*Algorithms for Implementing Fair Wireless Power Allocations*: 2005: Canadian Workshop on Information theory.

*Fairness and Stability in Allocating Wireless Bandwidth*: 2005: Michigan State; 2004: JPET Beijing, Caltech, Rochester; 2003: Rutgers WINLAB, Dagstuhl, Germany, U.C. Berkeley

*Cost Allocation*: 2008: Claremont Graduate University. 2003: CAM Cornell.

*A Generic Analysis of Selfish Routing*: 2004: IEEE Conference on Decision and Control; 2002: Cornell Economics; 2001: Rutgers DIMACS, SITE Stanford.

*Algorithms for Fair Webserving*: 2004: Oregon; 2003: Sigmetrics.

*Algorithmic Mechanism Design*: 2001: Brookings Institute; 2002: NASA.

*Strategic Properties of Generalized Serial Cost Sharing*: 2000: Stonybrook.

*The Social Costs of Cheap Pseudonyms*. 2000: Decentralization Conference (IBM); 1999: Oregon. 1998; Rutgers Newark, Lehigh University, SUNY Albany, University of Montreal, Stony Brook.

*Learning and Implementation on the Internet*. 2002: Cornell CS; 2001: Cornell ORIE; 1999: Claremont, USC (computer science), Northwestern University; DIMACS. 1998: University of Michigan, University of British Columbia; 1997: Workshop on Economics Game Theory and the Internet, Rutgers University, Columbia Workshop on Telecommunications, Princeton University.

*Robust Social Norms in Bargains and Markets*. 1999: Berkeley, Caltech, UCLA.

*Workshop on Cost allocation*. 1998: Pacific Institute of Mathematics.

*Complexity and Bounded Rationality*, (Chair and discussant for the session) 1998: Econometric Society Meetings, Chicago.

*Telecommunications pricing* (Panelist) Columbia University Workshop on Telecommunications, 1997.

*Three Methods to Share Joint Costs (or Surplus)*. CRDE conference on the Axiomatics of Resource Allocation. 1996: Northwestern University, Econometric Society (San Francisco); 1995: U.C. Berkeley.

*Synchronous and Asynchronous Learning by Responsive Learning Automata.* 1996: University of Rochester; 1995: NSF/NBER Decentralization Conference (Caltech).

*Complementarities and Optimal Reform.* Rutgers University. 1996; Harvard University; Duke University.

*Dynamic Monotonicity and Comparative Statics for Real Options.* 1996: M.I.T.

*Dynamics and Rationality in Externality Games.* 1995: VPI, International Conference on Game Theory (Stony Brook); 1994: Joint Duke/UNC Microeconomics Seminar..

*Non-Atomic Games with Multiple Externalities.* 1995:U.C. San Diego.

*Resource Allocation and Price Mechanisms under Bounded Rationality.* 1995: NSF/NBER Decentralization Conference (University of Illinois), Stanford University, Department of Engineering-Economic Systems; 1993: Coordination Theory Seminar (U.C. Berkeley); National Science Foundation Conference on Coordination Theory (U.C. Berkeley), Operations Research Society of America Conference, San Francisco.

*Using Linear Exchangeable Permits for the Decentralized Control of Externalities.* 1994: Southeast Economics Conference, University of Virginia, Institute for Management Science Conference, Anchorage.

*The Dynamics of Partially Ordered Mappings.* 1994: Duke University Nonlinear Science Seminar.

*Short Run Dynamics of Queues.* 1993: Operations Research Society of America Conference, Phoenix.

*A Strongly Polynomial Algorithm for Combinatorial Convex Optimization.* 1993: Operations Research Society of America Conference, San Francisco.