

# Maxim Raginsky

## Curriculum Vitæ

Department of Electrical and Computer Engineering  
Coordinated Science Laboratory  
University of Illinois at Urbana-Champaign  
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U.S. Citizen

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### Research Interests

Information processing and decision-making in uncertain environments under resource and complexity constraints  
◇ information theory ◇ statistical learning ◇ optimization ◇ stochastic control.

### Education

- 2000 - 2002 Northwestern University: Ph.D. in Electrical Engineering, June 2002  
Dissertation: *Dynamical Aspects of Information Storage in Quantum-Mechanical Systems*  
Advisor: Horace Yuen
- 1999 - 2000 Northwestern University: M.S. in Electrical Engineering, June 2000  
Thesis: *Quantum Noise Control in Fiber-Optic Lines*  
Advisor: Prem Kumar
- 1996 - 2000 Northwestern University: B.S. *magna cum laude* in Electrical Engineering, June 2000

### Academic Employment

- 2012 - present Assistant Professor  
Department of Electrical and Computer Engineering  
Coordinated Science Laboratory  
University of Illinois, Urbana IL
- 2010 - 2012 Assistant Research Professor  
Department of Electrical and Computer Engineering  
Duke University, Durham NC
- 2007 - 2010 Research Scientist, Network and Imaging Science Laboratory  
Department of Electrical and Computer Engineering  
Duke University, Durham NC
- 2004 - 2007 Beckman Foundation Postdoctoral Fellow  
Beckman Institute for Advanced Science and Technology  
University of Illinois, Urbana IL
- 2002 - 2004 Postdoctoral Researcher (advisor: Horace Yuen)  
Center for Photonic Communication and Computing  
Northwestern University, Evanston IL
- 2000 - 2002 Graduate Research Assistant  
Department of Electrical and Computer Engineering  
Northwestern University, Evanston IL

## Awards

### Research

- 2013            NSF CAREER Award
- 2004 - 2007    Beckman Foundation Postdoctoral Fellowship, University of Illinois
- 1999 - 2000    Walter P. Murphy Graduate Fellowship, Northwestern University

### Teaching

- Fall 2013, 2014    UIUC List of Teachers Ranked as Excellent

## Funding

### Current

- M. Raginsky (PI), “Towards a science of information processing in belief space,” Seed Grant from the Center for the Science of Information, an NSF Science and Technology Center, \$75,000 (2015–2016)
- M. Raginsky (PI), “Learning signal representations for multiple inference tasks” (co-PI: Pierre Moulin), National Science Foundation, \$500,000 (2015–2018); PI share: 50%
- M. Raginsky (PI), “Nonasymptotic analysis of feature-rich decision problems with applications to computer vision” (co-PI’s: Tara Javidi and Svetlana Lazebnik), National Science Foundation, \$800,000 (7/1/2013–6/30/2017); PI share: 30%
- M. Raginsky (PI), “CAREER: An information-theoretic approach to communication-constrained statistical learning,” National Science Foundation, \$518,434 (2/1/2013–1/31/2018)
- M. Raginsky (PI), “Information structures, signaling, and competitively optimal policies in decentralized online optimization” (co-PIs: Cedric Langbort and Angelia Nedich), Office of Naval Research, \$747,420 (10/1/2012–9/30/2017); PI share: 33%

### Past

- M. Raginsky (co-PI), “Learning codes for joint image reconstruction and classification” (PI: Pierre Moulin), DARPA, \$400,000 (10/1/2012-9/30/2014); co-PI share: 50%
- M. Raginsky (PI), “Distributed online decision-making in large-scale networks” (co-PI: Rebecca Willett), National Science Foundation, \$445,514 (9/1/2010–8/31/2014); PI share: 60%
- M. Raginsky (co-PI), “Sequential prediction for information fusion and control” (PI: Rebecca Willett), Air Force Office of Scientific Research, \$330,000 (7/1/2010–6/30/2013); PI share: 33%

## Teaching Experience

### At UIUC

- Spring 2016: ECE 498MR, Introduction to Stochastic Systems
- Fall 2013, Fall 2014, Fall 2015: ECE 598MR, Statistical Learning Theory
- Spring 2013, Spring 2014: ECE 486, Control Systems
- Fall 2012, Fall 2015: ECE 534, Random Processes

**At Duke University**

- Spring 2011: ECE 299 (Advanced Topics Seminar), Statistical Learning Theory
- Fall 2008: BME 171, Signals and Systems

**At Northwestern University**

- Fall 2001: ECE 590, Graduate Seminar (Quantum Detection and Estimation Theory) — instructor
- Winter 2001: ECE 407, Quantum Optics — teaching associate
- Winter 2000: ECE 302, Probabilistic Systems and Random Signals — teaching assistant
- Winter 2000: ECE 225, Fundamentals of Electronics — teaching assistant

**Student and Postdoc Advising****Postdocs**

- Naci Saldi (co-advised with Tamer Başar)
- Yanina Shkel (co-advised with Sergio Verdú)

**Ph.D. Advisees**

- Jaeho Lee
- Ehsan Shafieepoorfard
- Aolin Xu

**Alumni**

- Daphney-Stavroula Zois (postdoc, now Assistant Professor of Computer Engineering at SUNY Albany)
- Peng Guan (Ph.D., 2015, co-advised with Rebecca Willett; thesis title “Topics in online Markov decision processes”)
- Soomin Lee (postdoc, co-advised with Angelia Nedić, now at Georgia Tech)
- Xiaoyu Guang (M.S., 2014; thesis title “A channel emulation viewpoint of coding theorems”)
- Aray Kalieva (M.S., 2014; thesis title “Adaptive control of a linear system with quantized state observations”)

**Ph.D. Committees**

- James Davidson (advisor: Seth Hutchinson); Abhishek Gupta (advisors: Tamer Başar and Cedric Langbort); David Jun (advisor: Douglas Jones); Ali Khanafer (advisor: Tamer Başar); Juan Ochoa (advisor: Andreas Cangelaris); Po-Sen Huang (advisor: Mark Hasegawa-Johnson); Andrew Bean (advisor: Andrew Singer); Amin Emad (advisor: Olgica Milenkovic); Naci Saldi (Queen’s University, Canada; advisors: Tamás Linder and Serdar Yüksel); Onyeama Osuagwu (advisor: Stephen Levinson)

**Publications****Submitted**

- A. Xu and M. Raginsky, “Information-theoretic lower bounds on Bayes risk in decentralized estimation,” 2016
- A. Xu and M. Raginsky, “Information-theoretic lower bounds for distributed function computation,” 2015

- S. Lee, A. Nedić, and M. Raginsky, “Stochastic dual averaging for decentralized online optimization on time-varying communication graphs,” 2015

### Monographs

- M. Raginsky and I. Sason, “Concentration of measure inequalities in information theory, communications and coding,” *Foundations and Trends in Communications and Information Theory*, vol. 10, nos. 1 and 2, 2013; 2nd edition, 2014

### Journal papers

- S. Lee, A. Nedić, and M. Raginsky, “Coordinate dual averaging for decentralized online optimization with nonseparable global objectives,” to appear in *IEEE Transactions on Control of Networked Systems*, 2016
- M. Raginsky, “Strong data processing inequalities and  $\Phi$ -Sobolev inequalities for discrete channels,” *IEEE Transactions on Information Theory*, vol. 62, no. 6, pp. 3355–3389, 2016
- E. Shafieepoorfard, M. Raginsky, and S.P. Meyn, “Rationally inattentive control of Markov processes,” *SIAM Journal on Control and Optimization*, vol. 54, no. 2, pp. 987–1016, 2016
- M. Raginsky and A. Nedić, “Online discrete optimization in social networks in the presence of Knightian uncertainty,” *Operations Research*, vol. 64, no. 3, pp. 662–679, 2016 (special issue on *Information and Decisions in Social and Economic Networks*)
- M.A. Donmez, M. Raginsky, and A.C. Singer, “Online optimization under adversarial perturbations,” *IEEE Journal of Selected Topics in Signal Processing*, vol. 10, no. 2, pp. 256–269, 2016
- R.S. Laugesen, P.G. Mehta, S.P. Meyn, and M. Raginsky, “Poisson’s equation in nonlinear filtering,” *SIAM Journal on Control and Optimization*, vol. 53, no. 1, pp. 501–525, 2015
- P. Guan, M. Raginsky, and R. Willett, “Online Markov decision processes with Kullback–Leibler control cost,” *IEEE Transactions on Automatic Control*, vol. 59, no. 6, pp. 1423–1438, 2014
- M. Raginsky, J.G. Silva, S. Lazebnik, and R. Willett, “A recursive procedure for density estimation on the binary hypercube,” *Electronic Journal of Statistics*, vol. 7, pp. 820–858, 2013
- M. Raginsky, “Empirical processes, typical sequences and coordinated actions in standard Borel spaces,” *IEEE Transactions on Information Theory*, vol. 59, no. 3, pp. 1288–1301, 2013
- K. Krishnamurthy, R. Willett, and M. Raginsky, “Target detection performance bounds in compressive imaging,” *EURASIP Journal on Advances in Signal Processing*, art.no. 205, 2012
- M. Raginsky, R. Willett, C. Horn, J. Silva, and R. Marcia, “Sequential anomaly detection in the presence of noise and limited feedback,” *IEEE Transactions on Information Theory*, vol. 58, no. 8, pp. 5544–5562, 2012
- M. Raginsky and A. Rakhlin, “Information-based complexity, feedback and dynamics in convex programming,” *IEEE Transactions on Information Theory*, vol. 57, no. 10, pp. 7036–7056, 2011
- M. Raginsky, S. Jafarpour, Z. Harmany, R. Marcia, R. Willett, and R. Calderbank, “Performance bounds for expander-based compressed sensing in Poisson noise,” *IEEE Transactions on Signal Processing*, vol. 59, no. 9, pp. 4139–4153, 2011
- K. Krishnamurthy, M. Raginsky and R. Willett, “Multiscale photon-limited hyperspectral image reconstruction,” *SIAM Journal on Imaging Sciences*, vol. 3, no. 3, pp. 619–645, 2010
- M. Raginsky, Z. Harmany, R. Marcia, and R. Willett, “Compressed sensing performance bounds under Poisson noise,” *IEEE Transactions on Signal Processing*, vol. 58, no. 8, pp. 3990–4002, 2010
- S. Lazebnik and M. Raginsky, “Supervised learning of quantizer codebooks by information loss minimization,” *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 31, no. 7, pp. 1294–1309, 2009

- M. Raginsky, “Joint universal lossy coding and identification of stationary mixing sources with general alphabets,” *IEEE Transactions on Information Theory*, vol. 55, no. 5, pp. 1945–1960, 2009
- A.L. Fernandes, M. Raginsky and T.P. Coleman, “A low-complexity universal scheme for rate-constrained distributed regression using a wireless sensor network,” *IEEE Transactions on Signal Processing*, vol. 57, no. 5, pp. 1731–1744, 2009
- M. Raginsky, “Joint fixed-rate universal lossy coding and identification of continuous-alphabet memoryless sources,” *IEEE Transactions on Information Theory*, vol. 54, no. 7, pp. 3059–3077, 2008
- M. Raginsky and T.J. Anastasio, “Cooperation in self-organizing map networks enhances information transmission from input to output in the presence of input background activity,” *Biological Cybernetics*, vol. 98, pp. 195–211, 2008
- V.P. Belavkin, G.M. D’Ariano and M. Raginsky, “Operational distance and fidelity for quantum channels,” *Journal of Mathematical Physics*, vol. 46, art.no. 062106, 2005
- M. Raginsky, “Scaling and renormalization in fault-tolerant quantum computers,” *Quantum Information Processing*, vol. 2, pp. 249–258, 2003
- M. Raginsky, “Radon-Nikodym derivatives of quantum operations,” *Journal of Mathematical Physics*, vol. 44, pp. 5003–5020, 2003
- M. Raginsky, “Entropy production rates of bistochastic strictly contractive quantum channels on a matrix algebra,” *Journal of Physics A: Mathematical and General* vol. 35, pp. L585–L590, 2002
- M. Raginsky, “Almost any quantum spin system with short-range interactions can support toric codes,” *Physics Letters A*, vol. 294, pp. 153–157, 2002
- M. Raginsky, “Strictly contractive quantum channels and physically realizable quantum computers,” *Physical Review A*, vol. 65, art.no. 032306, 2002
- M. Raginsky, “A fidelity measure for quantum channels,” *Physics Letters A*, vol. 290, pp. 11–18, 2001
- M. Raginsky and P. Kumar, “Generation and manipulation of squeezed states of light in optical networks for quantum communication and computation,” *Journal of Optics B: Quantum and Semiclassical Optics*, vol. 3, pp. L1–L4, 2001

#### Chapters in refereed volumes

- A. Kontorovich and M. Raginsky, “Concentration of measure without independence: a unified approach via the martingale method,” to appear in *IMA Volume on Analysis of Discrete Structures*, Springer, 2016

#### Conference papers

- N. Saldi, T. Başar, and M. Raginsky, “Markov-Nash equilibria in mean-field games with discounted cost,” submitted to *American Control Conference*
- E. Shafieepoorfard and M. Raginsky, “Sequential empirical coordination under an output entropy constraint,” to appear in *Proceedings of the IEEE Conference on Decision and Control*, 2016
- P. Guan, M. Raginsky, R. Willett, and D.-S. Zois, “Regret minimization algorithms for single-controller zero-sum stochastic games,” to appear in *Proceedings of the IEEE Conference on Decision and Control*, 2016
- M. Donmez, M. Raginsky, A.C. Singer, and L.R. Varshney, “Cost-performance tradeoffs in unreliable computation architectures,” to appear in *Proceedings of the Asilomar Conference on Signals, Systems, and Computers*, November 2016
- D.-S. Zois and M. Raginsky, “Active object detection on graphs via locally informative trees,” in *Proceedings of the IEEE Workshop on Machine Learning for Signal Processing*, 2016

- M. Raginsky, A. Rakhlin, M. Tsao, Y. Wu, and A. Xu, “Information-theoretic analysis of stability and bias of learning algorithms,” in *Proceedings of IEEE Information Theory Workshop*, pp. 26–30, 2016 (invited paper)
- M. Raginsky, “Channel polarization and Blackwell measures,” in *Proceedings of the IEEE International Symposium on Information Theory*, pp. 56–60, 2016
- A. Xu and M. Raginsky, “Converses for distributed estimation via strong data processing inequalities,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 2376–2380, 2015
- J. Lee, M. Raginsky, and P. Moulin, “On MMSE estimation from quantized observations in the nonasymptotic regime,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 2924–2928, 2015
- A. Nedić, S. Lee, and M. Raginsky, “Decentralized online optimization with global objectives and local communication,” *Proceedings of the American Control Conference*, pp. 4497–4503, 2015
- R.S. Laugesen, P.G. Mehta, S.P. Meyn, and M. Raginsky, “Poisson’s equation in nonlinear filtering,” *Proceedings of the IEEE Conference on Decision and Control*, pp. 4185–4190, 2014 (invited paper)
- A. Xu and M. Raginsky, “A new information-theoretic lower bound for distributed function computation,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 2227–2231, 2014
- P. Guan, M. Raginsky, and R. Willett, “From minimax value to low-regret algorithms for online Markov decision processes,” *Proceedings of the American Control Conference*, pp. 471–476, 2014
- M. Raginsky and A. Nedić, “Online discrete optimization in social networks,” *Proceedings of the American Control Conference*, pp. 3796–3801, 2014
- E. Shafieepoorfard and M. Raginsky, “Rational inattention in scalar LQG control,” *IEEE Conference on Decision and Control*, pp. 5733–5739, 2013
- M. Raginsky, “Learning joint quantizers for reconstruction and prediction,” *Proceedings of the IEEE Information Theory Workshop*, 2013 (invited paper)
- M. Raginsky, “Logarithmic Sobolev inequalities and strong data processing theorems for discrete channels,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 419–423, 2013
- M. Raginsky and I. Sason, “Refined bounds on the empirical distribution of good channel codes via concentration inequalities,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 221–225, 2013
- E. Shafieepoorfard, M. Raginsky, and S.P. Meyn, “Rational inattention in controlled Markov processes,” *Proceedings of the American Control Conference*, pp. 6790–6797, 2013
- M. Raginsky and J. Bouvrie, “Continuous-time stochastic mirror descent on a network: variance reduction, consensus, convergence,” *Proceedings of the IEEE Conference on Decision and Control*, pp. 6793–6800, 2012
- P. Guan, M. Raginsky, and R. Willett, “Online Markov decision processes with Kullback–Leibler control cost,” *Proceedings of the American Control Conference*, pp. 1388–1393, 2012
- M. Raginsky and A. Rakhlin, “Lower bounds for passive and active learning,” in *Advances in Neural Information Processing Systems*, pp. 1026–1034, 2011
- M. Raginsky, “Directed information and Pearl’s causal calculus,” *Proceedings of the Annual Allerton Conference on Communication, Control, and Computing*, pp. 958–965, 2011 (invited paper)
- M. Raginsky, “Shannon meets Blackwell and Le Cam: codes, channels, and statistical experiments,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 1220–1224, 2011
- N. Kiarashi, M. Raginsky, and R. Willett, “Decentralized online convex programming with local information,” *Proceedings of the American Control Conference*, pp. 5363–5369, 2011

- M. Raginsky, A. Rakhlin, and S. Yüksel, “Online convex programming and regularization in adaptive control,” *IEEE Conference on Decision and Control*, pp. 1957–1962, 2010 (invited paper)
- M. Raginsky, “Divergence-based characterization of fundamental limitations of adaptive dynamical systems,” *Proceedings of the Annual Allerton Conference on Communication, Control and Computing*, pp. 107–114, 2010 (invited paper)
- K. Krishnamurthy, M. Raginsky, and R. Willett, “Hyperspectral target detection from incoherent projections: nonequiprobable targets and inhomogeneous SNR,” *Proceedings of the IEEE International Conference on Image Processing*, pp. 1357–1360, 2010
- T.P. Coleman and M. Raginsky, “Mutual information saddle points in channels of exponential family type,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 1355–1359, 2010
- M. Raginsky, “Empirical processes and typical sequences,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 1458–1462, 2010
- M. Raginsky, S. Jafarpour, R. Willett, and R. Calderbank, “Fishing in Poisson streams: focusing on the whales, ignoring the minnows,” *IEEE Conference on Information Systems and Sciences*, 2010 (invited paper)
- K. Krishnamurthy, M. Raginsky, and R. Willett, “Hyperspectral target detection from incoherent projections,” *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, pp. 3550–3553, 2010
- M. Raginsky and S. Lazebnik, “Locality-sensitive binary codes from shift-invariant kernels,” *Advances in Neural Information Processing Systems*, pp. 1509–1517, 2009
- S. Jafarpour, R. Willett, M. Raginsky and R. Calderbank, “Performance bounds for expander-based compressed sensing with Poisson noise,” *Proceedings of the Asilomar Conference on Signals, Systems, and Computers*, pp. 513–517, 2009
- M. Raginsky and A. Rakhlin, “Information complexity of black-box convex optimization: a new look via feedback information theory,” *Forty-Seventh Annual Allerton Conference on Communication, Control, and Computing*, pp. 803–810, 2009 (invited paper)
- M. Raginsky and T.P. Coleman, “Mutual information and posterior estimates in channels of exponential family type,” *Proceedings of the IEEE Workshop on Information Theory*, 2009
- M. Raginsky, “Achievability results for statistical learning under communication constraints,” *Proceedings of the IEEE International Symposium on Information Theory*, 2009
- R. Willett and M. Raginsky, “Performance bounds on compressed sensing with Poisson noise,” *Proceedings of the IEEE International Symposium on Information Theory*, 2009
- M. Raginsky, R. Marcia, J. Silva and R. Willett, “Sequential probability assignment via online convex programming using exponential families,” *Proceedings of the IEEE International Symposium on Information Theory*, 2009
- S. Lazebnik and M. Raginsky, “An empirical Bayes approach to contextual region classification,” *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 2009
- M. Raginsky, S. Lazebnik, R. Willett and J. Silva, “Near-minimax recursive density estimation on the binary hypercube,” *Advances Neural Information Processing Systems*, 2008
- M. Raginsky, “On the information capacity of Gaussian channels under small peak power constraints,” *Proceedings of the Annual Allerton Conference on Communication, Control, and Computing*, pp. 286–293, 2008
- M. Raginsky, “Universal Wyner–Ziv coding of discrete memoryless sources with known side information statistics,” *IEEE Proceedings of the International Symposium on Information Theory*, pp. 2167–2171, 2008 ,

- A.L. Fernandes, M. Raginsky and T.P. Coleman, “A low-complexity universal scheme for rate-constrained distributed regression using a wireless sensor network,” *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, pp. 2269–2272, 2008
- M. Raginsky, “Learning from compressed observations,” *Proceedings of the IEEE Workshop on Information Theory*, pp. 420–425, 2007
- M. Raginsky, “Joint universal lossy coding and identification of stationary mixing sources,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 1961–1965, 2007
- S. Lazebnik and M. Raginsky, “Learning nearest-neighbor quantizers from labeled data by information loss minimization,” *Proceedings of the International Conference on Artificial Intelligence and Statistics*, 2007
- M. Raginsky, “Joint universal lossy coding and identification of i.i.d. vector sources,” *Proceedings of the IEEE International Symposium on Information Theory*, pp. 577–581, 2006
- M. Raginsky and S. Lazebnik, “Estimation of intrinsic dimensionality using high-rate vector quantization,” *Advances in Neural Information Processing Systems*, pp. 1105–1112, 2005
- M. Raginsky, “A complexity-regularized quantization approach to nonlinear dimensionality reduction,” *IEEE International Symposium on Information Theory*, pp. 352–356, 2005
- M. Raginsky, “Quantum system identification,” *Proceedings of the International Conference on Physics and Control (PhysCon)*, A.L. Fradkov and A.N. Churilov, eds., St. Petersburg, Russia; vol. 3, pp. 792–796, 2003
- M. Raginsky, “Entropy-energy balance in noisy quantum computers,” *Proceedings of the Sixth International Conference on Quantum Communication, Measurement, and Computing*, J.H. Shapiro and O. Hirota, eds., pp. 445–448, 2003

### Theses and technical reports

- M. Raginsky and R. Willett, “Sequential anomaly detection in the presence of noise and limited feedback,” Duke University Technical Report ECE-2009-01, 2009
- M. Raginsky, “A phase transition and stochastic domination in Pippenger’s probabilistic failure model for Boolean networks with unreliable gates,” arXiv.org e-print math.PR/0311045, 2003
- *Dynamical Aspects of Information Storage in Quantum-Mechanical Systems*, Ph.D. dissertation, Northwestern University, 2002
- *Quantum Noise Control in Fiber-Optic Lines*, M.S. thesis, Northwestern University, 2000

### Presentations

#### Invited courses and tutorials

- *Concentration of Measure with Applications in Information Theory, Communications, and Coding* (jointly with Igal Sason, Technion): tutorial at the IEEE International Symposium on Information Theory, Hong Kong, July 2015

#### Research seminars

- *Information-theoretic lower bounds for distributed function computation*
  - Computing and Mathematical Sciences Colloquium, Caltech, April 2016
- *Logarithmic Sobolev inequalities and strong data processing theorems for discrete channels*
  - Georgia Tech, Algorithms and Randomness Center Colloquium, April 2013
- *Rational inattention, stochastic control, and rate-distortion theory*



- UPenn, Electrical and Systems Engineering Colloquium, November 2013
- MIT, LIDS Seminar, April 2013
- *Fundamental limits of passive and active learning: a new look via feedback information theory*
  - Boston University, ECE Seminar, April 2013
  - ENSAE: Paris Graduate School of Economics, Statistics and Finance, France, March 2013
  - University of Southern California, Los Angeles, February 2012
  - University of California, Los Angeles, February 2012
- *Active sequential decision-making in an uncertain world: fundamental limits and optimal strategies*
  - UNC Chapel Hill, September 2011
  - University of Illinois at Urbana–Champaign, April 2011
  - University of Minnesota, February 2011
- *Fundamental limitations of adaptive dynamical systems: an information-theoretic meta-framework*
  - McGill University, Center For Intelligent Machines Informal Systems Seminar, October 2010
  - Queen’s University, Communications and Control Group Seminar, October 2010
- *Empirical processes, typical sequences and coordinated actions in standard Borel spaces*
  - University of California San Diego, ECE and ITA Colloquium, November 2012
  - University of Maryland, Information and Coding Theory Seminar, September 2010
- *Information complexity of black-box convex optimization: a new look via feedback information theory*
  - École Normale Supérieure, Statistical Machine Learning Seminar, May 2010
  - University of Pennsylvania, Machine Learning Lunch, May 2010
  - UNC Chapel Hill, Statistics and Operations Research Colloquium, April 2010
  - Duke University, Algorithms Seminar, November 2009
  - Queen’s University, Mathematics Colloquium, October 2009
- *Information theory meets statistical learning: how to extract patterns from data using just a few bits*
  - Queen’s University, October 2009
  - University of Pennsylvania, Department of Statistics, August 2009
  - University of Illinois at Urbana–Champaign, CSL Seminar, May 2009
  - Northwestern University, Communications Group Seminar, May 2009
- *Shannon meets Vapnik–Chervonenkis: some interactions between information theory and statistical learning*
  - Princeton University, ISS Seminar, March 2008
- *Statistical learning under communication constraints*
  - UNC Chapel Hill, Statistics Colloquium, March 2008
  - University of Michigan Ann Arbor, CSPL Seminar, November 2007
- *A low-complexity universal scheme for rate-constrained distributed regression using a wireless sensor network*
  - Duke University, ECE Colloquium, October 2007
  - University of Illinois at Chicago, ECE Seminar, September 2007

- North Carolina State University, Distinguished Seminar Series, August 2007
- *Joint universal lossy coding and identification of stationary mixing sources*
  - University of Illinois at Urbana-Champaign, CSL Seminar, January 2007
  - Yale University, Statistics Seminar, November 2006
- *From quantum channels to neural networks: information processing in stochastic multicomponent systems*
  - University of Wisconsin-Madison, March 2006
- *Dimensionality estimation and reduction: a unified approach using vector quantization*
  - University of Chicago, Toyota Technological Institute, February 2006
- *Estimation of intrinsic dimensionality using high-rate vector quantization*
  - Microsoft Research, December 2005
- *Minimax fidelity for quantum channels: theory and some applications*
  - University of California at Berkeley, Berkeley Quantum Seminar, May 2005

#### **Invited conference and workshop talks**

- *Information-theoretic lower bounds for distributed function computation*
  - Workshop on the Nexus of Information and Computation Theories, Institut Henri Poincaré, Paris, France, February 2016
  - 4th Workshop on Cognition and Control, University of Florida, Gainesville, January 2016
- *Contraction estimates for Markov kernels via information-transportation inequalities*
  - Workshop on Information Theory and Concentration Phenomena, Institute for Mathematics and Applications, University of Minnesota, April 2015
- *Strong data processing inequalities: applications to MCMC and graphical models*
  - Workshop on Information Theory, Learning, and Big Data, Simons Institute for the Theory of Computing, Berkeley, CA, March 2015
- *$\varphi$ -Sobolev inequalities and strong data processing theorems*
  - Information Theory and Applications Workshop, UCSD, February 2014
- *Online discrete optimization in social networks with inertia*
  - 2nd Workshop on Cognition and Control, University of Florida, Gainesville, January 2014
- *Empirical processes and information theory*
  - Meeting on Mathematical Statistics with Applications in Mind, Centre International de Rencontres Mathématiques, Marseille, France, December 2013
- *Rational inattention, stochastic control, and rate-distortion theory*
  - Workshop on Sequential and Adaptive Information Theory, McGill University, Montreal, Canada, November 2013
- *Learning joint quantizers for reconstruction and prediction*
  - IEEE Information Theory Workshop, Seville, Spain, September 2013
- *The limits of control: an information-theoretic viewpoint*

- 1st Workshop on Cognition and Control, University of Florida, Gainesville, February 2013
- *Logarithmic Sobolev inequalities and strong data processing theorems for discrete channels*
  - Information Theory and Applications Workshop, UCSD, February 2013
- *Directed information, probabilistic graphical models, and Pearl's causal calculus*
  - 1st Munich Workshop on Bidirectional Communication and Directed Information, Technical University of Munich, May 2012
- *Concentration of measure and erasure divergence*
  - Information Theory and Applications Workshop, UCSD, February 2012
- *Shannon meets Blackwell (and Le Cam): coding theorems of information theory and comparison of statistical experiments*
  - Information Theory and Applications Workshop, UCSD, February 2011
- *Fishing in Poisson streams: focusing on the whales, ignoring the minnows*
  - Conference on Information Systems and Sciences, Princeton, March 2010
- *Information-based complexity in optimization and control: a new look via feedback information theory*
  - Information Theory and Applications Workshop, UCSD, February 2010
- *Achievability results for learning under communication constraints*
  - Information Theory and Applications Workshop, UCSD, February 2009
- *Operational distances between quantum channels, with applications to quantum information theory and cryptography*
  - Mini-Symposium on Quantum Communication, Computation and Information Theory, ETH, Zürich, September 2006
- *Quantum operations, Radon–Nikodym and all that*
  - A Meeting on  $C^*$ -Algebras and Quantum Information Theory, Los Angeles, CA, June 2004
- *Comparison Theorems for Quantum Operations*
  - Workshop on Quantum Information Processing and Quantum Communications, Università di Pavia, Italy, May 2004
- *Scaling and renormalization in fault-tolerant quantum computers*
  - Simons Conference on Quantum and Reversible Computation, SUNY Stony Brook, May 2003

## Professional Service and Memberships

- Technical program committees:
  - IEEE International Symposium on Information Theory, 2011, 2014–2017
  - IEEE Information Theory Workshop, 2013, 2015
  - IFAC Workshop on Estimation and Control of Networked Systems (NecSys), 2015
  - IEEE International Conference on Distributed Computing in Sensor Systems (Signal Processing and Information Theory Track), 2014, 2015
  - IEEE GlobalSIP Symposium on Controlled Sensing for Inference, 2013

- IEEE GlobalSIP Symposium on Emerging Challenges in Network Sensing, Inference, and Communication, 2013
- NIPS Workshop on Computational Trade-offs in Statistical Learning, 2011
- Conference on Artificial Intelligence and Statistics, 2017
- Conference on Neural Information Processing Systems, 2013
- Editorial board member:
  - Foundations and Trends in Communications and Information Theory (since 2012)
  - IEEE Transactions on Network Science and Engineering (since 2016)
- Conference session organizer:
  - “Active learning, search, and visual recognition,” invited session at the 2013 Allerton Conference on Communications, Control and Computing – co-organized with S. Lazebnik (UIUC) and T. Javidi (UCSD)
  - “Distributed optimization,” invited session at the 2012 IEEE Conference on Decision and Control — co-organized with A. Nedich (UIUC)
  - “Information, learning and adaptation in stochastic dynamical systems,” invited session at the 2012 Allerton Conference on Communication, Control and Computing — co-organized with A. Nedich (UIUC)
  - “Information theory in learning and control,” invited session at the 2012 Conference on Information Systems and Sciences
  - “David Blackwell’s legacy: new frontiers,” two invited sessions at the 2011 Information Theory and Applications Workshop, UCSD
  - “Information divergence and stochastic dynamical systems,” invited session at the 2010 Allerton Conference on Communications, Control and Computing – co-organized with T.P. Coleman (UIUC) and G. Como (MIT)
  - “New developments in the use of feedback in communications and decision-making environments,” invited session at the 2009 Allerton Conference on Communication, Control and Computing – co-organized with T.P. Coleman (UIUC) and O. Shayevitz (UCSD)
- Workshop organizer:
  - “Optimal cooperation, communication, and learning in decentralized systems,” a five-day workshop at Banff International Research Station, Canada, October 2014 – co-organized with A. Mahajan (McGill), D. Teneketzis (University of Michigan), and S. Yüksel (Queen’s University)
- Journal refereeing:

IEEE Transactions on Information Theory, IEEE Transactions on Automatic Control, IEEE Transactions on Control of Networked Systems, IEEE Transactions on Network Science and Engineering, IEEE Journal on Selected Areas in Communication, IEEE Transactions on Signal Processing, IEEE Journal on Selected Topics in Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Information Forensics and Security, IEEE Transactions on Aerospace and Electronic Systems, IMA Journal of Mathematical Control and Information, SIAM Journal on Control and Optimization, Systems and Control Letters, Operations Research, Annals of Statistics, Journal of Machine Learning Research, Journal of Computer and System Sciences, Communications on Mathematical Physics, Linear Algebra and Its Applications, Journal of Geometric Mechanics, Physical Review Letters, Physical Review A, Physics Letters, Entropy, Kybernetika
- Conference refereeing:

IEEE Symposium on Foundations of Computer Science (FOCS): 2016; IEEE International Symposium on Information Theory (ISIT): 2007, 2009, 2010–2016; IEEE Information Theory Workshop (ITW): 2008, 2010, 2011, 2013, 2015; International Symposium on Mathematical Theory of Networks and Systems (MTNS):

2010; IFAC Workshop on Estimation and Control of Networked Systems (NecSys): 2012; Conference on Learning Theory (COLT): 2009, 2011; Conference on Neural Information Processing Systems (NIPS): 2009, 2010, 2011, 2012; Conference on Artificial Intelligence and Statistics (AISTATS): 2007, 2013; IEEE Conference on Decision and Control: 2013; European Control Conference: 2013, 2014, 2015; Conference on Computer Vision and Pattern Recognition (CVPR): 2010; European Conference on Computer Vision (ECCV): 2008; Data Compression Conference (DCC): 2010

- Panels: NSF CISE, 2008; NSF CIF, 2013–2014
- Senior Member of IEEE (Information Theory Society, Control Systems Society)

### **University Service**

- Celebration of Excellence Committee: 2014–2016
- Colloquium Committee: 2012–2015
- Communications and Control Area Committee: 2015–2016
- Curriculum Committee: 2012–2016
- Fellowship Committee: 2012–2013
- Graduate Committee: 2015–2016
- Graduate Recruitment Committee: 2012–2015