Dror Baron

Web: people.engr.ncsu.edu/dzbaron

Research Interests: Signal Processing, Compressed Sensing, Data Science, Information Theory, Machine Learning, Fast Algorithms, Quantitative Finance, Distributed Systems

Education

- **Postdoctoral Research Associate**: 2003–2006, Rice University

    - Advisor: Prof. Richard Baraniuk
    - Specializations: Compressed Sensing, Finite Block-Lengths in Information Theory, Multi-Dimensional Signal Processing

- **Ph.D. in Electrical Engineering**: 2003, University of Illinois at Urbana-Champaign

    - Advisor: Prof. Yoram Bresler
    - Thesis: "Fast Parallel Algorithms for Universal Lossless Source Coding"
    - Specialization: Efficient Algorithms, Lossless Source Coding

- **M.Sc. in Electrical Engineering**: 1999, Technion — Israel Institute of Technology

    - Advisor: Prof. Yitzhak Birk
    - Thesis: "Multiple Working Points and Multislot-Message Coding in Multichannel ALOHA with Deadlines"
    - Specialization: Computer Networks, Communications

- **B.Sc. in Electrical Engineering** (*summa cum laude*): 1997, Technion

Positions

- **Associate Professor**: 2016–present, Electrical and Computer Engineering Department, North Carolina State Universty

- **Assistant Professor**: 2010–2016, Electrical and Computer Engineering Department, North Carolina State Universty

- **Visiting Scientist**: 2008–2010, Department of Electrical Engineering, Technion

- **Quantitative Research Analyst**: 2007–2008, Menta Capital LLC (San Francisco)

- **Postdoctoral Research Associate**: 2003–2006, Rice University

- **Visiting Assistant Professor**: 2003, University of Illinois

- **Research Assistant**: 1999–2003, University of Illinois

- **Modem Design Engineer**: 1997–1999, Witcom Ltd. (Yoqneam Ilit, Israel)

- **Teaching Assistant**: 1997, Technion

Awards and Honors

- *IEEE Senior Member*, 2010

- *M. E. VanValkenburg Graduate Research Award*, 2002, University of Illinois

- Honorable mention, *Robert Bohrer Memorial Student Workshop*, April 2002, Department of Statistics, University of Illinois

- Participant in *Program for Outstanding Students*, comprising approximately 45 undergraduate students (out of a student body of 9000), 1994–1997, Technion

- Included in "President's Roll" every semester (awarded to top 3% of undergraduate students), 1994–1997, Technion

Research Support

- National Science Foundation, "mm/Sub-mm Wave Compressive Sensing Imaging," $399,979, July 2016 – June 2019 (PI: David Ricketts)

- US Army Research Office, "Compressive Imaging via Approximate Message Passing," $50,000, August 2014 – April 2015

- US Army Research Office, "Minimax Compressed Sensing Reconstruction," $238,678, October 2012 – September 2015 (PI: Hamid Krim)

- National Science Foundation, "CIF: Small: Universal Signal Estimation from Noisy Measurements," $422,732, September 2012 – August 2016

Experience

- **Associate/Assistant Professor**: 2010–present, North Carolina State University

  - *Students*: advised and mentored multiple graduate and undergraduate students; 2 students completed their Ph.D., advised 2 more Ph.D. students, mentored another Ph.D. student (advisor was Prof. Wesley Snyder), 1 M.S. student, and several undergraduate students
  - *Funding*: submitted 4–5 proposals per year in order to support research program, leading to $1,111,389 in research funding
  - *Publication*: published 14 journal papers, 22 conference papers, 6 tutorial videos about research, 6 software platforms, and 2 patent applications
  - *Research*: performed and led Ph.D. students conducting research in signal estimation algorithms for compressed sensing, compressive imaging algorithms, signal denoisers, universal denoisers and reconstruction algorithms, derivation of performance limits for linear inverse problems, parallel data compression algorithms, and lossy compression algorithms
  - *Teaching*: Taught 2 courses per year; courses include ECE308 (undergraduate control), ECE421 (undergraduate signal processing), ECE514 (random processes), ECE 592 (data science), and ECE792 (universal algorithms); jointly designed WebWorK software platform for automating homework and quiz problems
  - *Mentored students applying for fellowships*: Mentored Ph.D. students applying for NSF, DOD, and DOE fellowships; 3 students in 2015 and 3 in 2016; applicant Ms. Kristen Garcia received NSF Graduate Research Fellowship

- **Visiting Scientist**: 2008–2010, Technion

  - *Compressed sensing*: jointly-developed developed information theoretic characterization of compressed sensing measurement systems using replica method, new belief propagation reconstruction algorithm, new algorithms for fault detection, and new framework for secrecy in compressed sensing systems
  - *Rate distortion theory*: developed universal lossy compression algorithms that asymptotically achieve rate distortion limits; submitted US provisional patent application

- **Quantitative research analyst**: 2007–2008, Menta Capital LLC, San Francisco

  - *Information theoretic approach to finance*: applied information theoretic and statistical signal processing tools to identify novel investment ideas in a quantitative market-neutral equity hedge fund
  - *Financial signals*: designed and implemented fundamental accounting based factor strategies, resulting in new financial signals
  - *Data cleansing*: cleansed noisy and erroneous data sources, enabling empirical evaluation of investment strategies

- **Postdoctoral research**: 2003–2006, Rice University

  - *Compressed sensing*: jointly-developed new distributed compression algorithms, new imaging devices, new A2Ds, and new reconstruction algorithms; co-inventor of US Patents 7,271,747, 7,511,643, 8,199,244, 8,687,689, and 8,848,091
  - *Non-asymptotic aspects of information theory*: derived bounds on performance of channel coding and distributed source coding systems in non-asymptotic regime; developed schemes for settings with unknown statistics
  - *Rate-distortion performance for multi-dimensional signal representations*: took part in development of bounds and performance analysis of algorithms
  - *Research proposals*: helped prepare of "Multiscale Geometric Analysis for Higher Dimensional Signal Processing," which was awarded NSF grant CCF-04-31150 and "Theory and Practice of Analog-to-Information Conversion," which was awarded DARPA grant

- **Ph.D. research**: 1999–2003, University of Illinois

  - *Parallel lossless data compression*: developed compression protocols and algorithms and analyzed their computational complexity
  - *Computation of the Burrows Wheeler transform*: developed fast algorithms, analyzed their computational complexities, and evaluated performance via simulation
  - *Low-complexity methods for lossless data compression*: developed algorithms and analyzed their computational complexity
  - *Worst-case redundancy of two-part codes*: provided lower bounds on the redundancy of two-part codes and developed schemes that come close to the bounds
  - *Research proposal*: helped prepare "Efficient Algorithms for Universal Lossless Data and Image Compression," which was awarded NSF grant CCR-01-22293

- **Modem design engineer**: 1997–1999, Witcom Ltd., Yoqneam Ilit, Israel

  - *Multiplexer*: designed 54 Mbps FPGA for multiplexing/demultiplexing asynchronous data lines
  - *Modem ASIC*: participated in design of 54 Mbps modem ASIC; responsible for debugging the design and developing communications algorithms in hardware

- **M.Sc. research**: 1998–1999, Technion

  - *Multichannel ALOHA schemes with delay constraints*: developed methods for judiciously exploiting redundancy to provide near-deterministic guarantees of high delay-constrained throughput in satellite-based transaction processing networks

Teaching

- **ECE592 Topics in Data Science** (lecturer): fall 2016, North Carolina State University

    - Designed new graduate course
    - Instructor completely responsible for course
    - Taught 16 graduate students
    - Course covered machine learning, scientific programming, sparse signal processing, optimization, and dimensionality reduction
    - Developed new teaching materials, new homeworks, new projects, and new online resources

- **ECE308 Elements of Control Systems** (lecturer): fall 2014 and fall 2015, North Carolina State University

    - Instructor completely responsible for course
    - Taught 130 and 80 undergraduate students in 2014 and 2015, respectively
    - Supervised multiple teaching assistants in grading homeworks, computer projects, and developing tests

- **ECE421 Introduction to Digital Signal Processing** (lecturer): spring 2013, spring 2014, spring 2015, and spring 2016, North Carolina State University

    - Instructor completely responsible for course
    - Enrollment ranged between 25 and 44
    - Developed new teaching materials, new homeworks, and new online resources
    - Jointly designed WebWork automated software platform for assigning each student individualized homework and quiz problems (software later expanded to other courses)

- **ECE792 Universal Algorithms in Signal Processing and Communications** (lecturer): spring 2012, North Carolina State University

    - Designed new advanced graduate course
    - Instructor completely responsible for course

- **ECE514 Random Processes** (lecturer): fall 2010, fall 2011, fall 2012, and fall 2013, North Carolina State University

    - Instructor completely responsible for course
    - Enrollment ranged between 28 and 39 students
    - Developed new teaching materials, new homeworks, and new online resources

- **EE044130 Signals and Systems** (lecturer): spring 2009, Technion

    - Taught one of two lecture groups (approximately 30 undergraduate students)

- **ECE318 Introduction to Image and Video Processing** (lecturer): spring 2003, University of Illinois

    - Instructor completely responsible for course
    - Taught 23 students - mostly undergraduates

- **Teaching assistant**: EE044198 Introduction to Digital Signal Processing (tutorial and computer exercises) and EE044130 Signals and Systems (computer exercises), spring 1997, Technion

Mentoring Students

- **Rafael Luiz da Silva**: 2016–present, North Carolina State University, Ph.D. (anticipated 2020)

- **Yanting Ma**: 2012–present, North Carolina State University, Ph.D. (anticipated 2017)

- **Junan Zhu**: 2011–2016, North Carolina State University, Ph.D.

- **Jin Tan**: 2010–2015, North Carolina State University, Ph.D.

- **Theju Jacob**: 2010–2014, North Carolina State University, Ph.D. (mentored and published together; advisor was Prof. Wesley Snyder)

- **Ryan Pilgrim**: 2015–present, North Carolina State University, M.S. (anticipated 2017)

- **Nicholas Casale**: 2016–present, North Carolina State University, B.Sc. (anticipated 2017; applied for NSF Graduate Research Fellowship)

- **Rami Fayez**: 2015, North Carolina State University, B.Sc. (anticipated 2016; exchange student from Brazil)

- **Joseph Young**: 2014–2015, North Carolina State University, B.Sc. (currently with **Ph.D. program at Rice University**)

- **Danielle Carmon**: 2010–2012, North Carolina State University, M.Sc. 2012 (currently with IBM)

- **Ilya Poltorak**: 2009–2010, Technion, B.Sc. 2011 (currently with Intel)

Academic Service

- **Technical Program Committees**

  - 2016 IEEE Global Communications Conference (Workshops: Signal Processing for Big Data in Wireless Networks)
  - 2015 IEEE International Symposium on Information Theory
  - 2013 IEEE International Conference on Communications
  - 2012 IEEE International Conference on Communications

- **Co-organizer**

  - Co-organized 2016 North American Summer School of Information Theory; June 2016 (main organizer Prof. Henry Pfister)

- **National Science Foundation (NSF) panels**

  - NSF panel in 2017
  - NSF panel in 2015
  - NSF panel in 2011

- **Conferences**

  - Chaired session on "Compressed Sensing," *53d Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2015
  - Chaired session on "Theory and Algorithms for Dynamic Sparse and/or Low Rank Recovery," *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, Atlanta, GA, December 2014
  - Chaired session on "Sparse Signal Recovery," *Information Theory and Applications Workshop*, San Diego, CA, February 2012
  - Chaired session on "Detection and Estimation I," *49th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2011

- Chaired session on "Compressed Sensing I," *Information Theory and Applications Workshop*, San Diego, CA, February 2011
- Chaired session on "Universal Algorithms," *Information Theory and Applications Workshop*, San Diego, CA, February 2010
- Co-organized and chaired session on "Compressed Sensing," *44th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2006
- Chaired session on "Source and Channel Coding" *39th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2005
- Co-organized and chaired sessions on "Distributed Source Coding" and "Source and Source/Channel Coding," *43rd Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2005
- Chaired sessions on "Source Coding I" and "Source Coding II," *39th Conference on Information Sciences and Systems* (CISS2005), Baltimore, MD, March 2005
- Co-organized and chaired sessions on "Distributed Source Coding" and "Source Coding," *42nd Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2004
- Chaired session on "Filter Banks," *2004 IEEE International Symposium on Information Theory*, Chicago, IL, June 2004
- Chaired session on "Source Coding," *38th Conference on Information Sciences and Systems* (CISS2004), Princeton, NJ, March 2004
- Co-organized and chaired sessions on "Shannon Theory and Source Coding" and "Source Coding and Information Theory," *40th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, October 2002
- Co-organized and co-chaired session on "Source Coding and Statistical Methods," *38th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, October 2000

- **Reviewer**
    - *Algorithms – Open Access Journal*
    - *European Research Council Advanced / Starting Grant 2010*
    - *Europhysics Letters*
    - *IEEE Communications Letters*
    - *IEEE Journal on Selected Areas in Communications*
    - *IEEE Signal Processing Letters*
    - *IEEE Transactions on Communications*
    - *IEEE Transactions on Computational Imaging*
    - *IEEE Transactions on Computers*
    - *IEEE Transactions on Image Processing*
    - *IEEE Transactions on Information Theory*
    - *IEEE Transactions on Pattern Analysis and Machine Intelligence*
    - *IEEE Transactions on Signal Processing*
    - *IEEE Transactions on Wireless Communications*
    - *Information and Inference*
    - *International Journal of Adaptive Control and Signal Processing* (Wiley)
    - *International Journal of Electronics and Communications* (Elsevier)
    - *Journal of Selected Topics in Signal Processing*
    - *Journal of Visual Communication and Image Representation*
    - *Machine Learning*
    - *Signal Processing*
    - *Theoretical Computer Science*

Publications

- **Patents**

  1. D. Baron, J. Tan, and Y. Ma, "Compressive Imaging Using Approximate Message Passing with Denoising," US Patent filed.
  2. R. G. Baraniuk, D. Baron, M. F. Duarte, K. F. Kelly, C. C. Lane, J. N. Laska, D. Takhar, and M. B. Wakin "Method and Apparatus for Compressive Imaging Device," US Patent 8,848,091, issued Sep. 30, 2014.
  3. R. G. Baraniuk, D. Baron, M. A. Davenport, M. F. Duarte, M. Elnozahi, J. N. Laska, Y. Massoud, S. Kirolos, T. Ragheb, J. A. Tropp, and M. B. Wakin, "Method and Apparatus for On-Line Compressed Sensing," US Patent 8,687,689, issued Apr. 1, 2014.
  4. R. G. Baraniuk, D. Baron, M. F. Duarte, I. N. Goodman, D. H. Johnson, K. F. Kelly, C. C. Lane, J. N. Laska, D. Takhar, and M. B. Wakin, "Method and Apparatus for Compressive Imaging Device," US Patent 8,199,244, issued June 12, 2012.
  5. R. G. Baraniuk, D. Baron, M. F. Duarte, S. Sarvotham, M. B. Wakin, and M. Davenport, "Method and Apparatus for Distributed Compressed Sensing," US Patent 7,511,643, issued 31 Mar. 2009.
  6. R. G. Baraniuk, D. Baron, M. F. Duarte, S. Sarvotham, M. B. Wakin, and M. Davenport, "Method and Apparatus for Distributed Compressed Sensing," US Patent 7,271,747, issued 18 Sep. 2007.

- **High Impact Papers** (December 2016; data from scholar.google.com)

  - **Career total:** 4,783 citations; h-index 26.
  - *487 citations*: D. Takhar, J. N. Laska, M. B. Wakin, M. F. Duarte, D. Baron, S. Sarvotham, K. F. Kelly, and R. G. Baraniuk, "A New Compressive Imaging Camera Architecture using Optical-Domain Compression," *SPIE Electronic Imaging*, San Jose, CA, pp. 43–52, January 2006.
  - *381 citations*: M. F. Duarte, S. Sarvotham, D. Baron, M. B. Wakin, and R. G. Baraniuk, "Distributed Compressed Sensing of Jointly Sparse Signals," *Proceedings of 39th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2005.
  - *353 citations*: D. Baron, S. Sarvotham, and R. G. Baraniuk, "Bayesian Compressive Sensing via Belief Propagation," *IEEE Transactions on Signal Processing*, vol. 58, no. 1, pp. 269–280, January 2010.
  - *350 citations*: S. Kirolos, J. N. Laska, M. B. Wakin, M. F. Duarte, D. Baron, T. Ragheb, Y. Massoud, and R. G. Baraniuk, "Analog-to-Information Conversion via Random Demodulation," *Proceedings of IEEE Dallas Circuits and Systems Workshop* (DCAS), Dallas, TX, October 2006.

- **Journal Papers**

  1. J. Zhu, D. Baron, and A. Beirami, "Optimal Trade-offs in Multi-Processor Approximate Message Passing," submitted.
  2. J. Zhu, D. Baron, and F. Krzakala, "Performance Limits for Noisy Multi-Measurement Vector Problems," to appear in *IEEE Transactions on Signal Processing*, 2017.
  3. Y. Ma, J. Zhu, and D. Baron, "Approximate Message Passing Algorithm with Universal Denoising and Gaussian Mixture Learning," *IEEE Transactions on Signal Processing*, vol. 64, no. 21, pp. 5611–5622, November 2016.
  4. J. Tan, Y. Ma, H. Rueda, D. Baron, and G. Arce, "Compressive Hyperspectral Imaging via Approximate Message Passing," *IEEE J. Sel. Topics Signal Process.*, vol. 10, no. 2, pp. 389–401, March 2016.
  5. H. J. Trussell and D. Baron, "Creating Analytic Online Homework for Digital Signal Processing," *IEEE Signal Proc. Mag.*, vol. 32, no. 5, pp. 112–118, September 2015.

6. N. Krishnan and D. Baron, "A Universal Parallel Two-Pass MDL Context Tree Compression Algorithm," *IEEE Journal on Selected Topics in Signal Processing*, vol. 9, no. 4, pp. 1–8, June 2015.

7. J. Tan, Y. Ma, and D. Baron, "Compressive Imaging via Approximate Message Passing with Image Denoising," *IEEE Transactions on Signal Processing*, vol. 63, no. 8, pp. 2085–2092, April 2015.

8. J. Zhu, D. Baron, and M. F. Duarte, "Recovery from Linear Measurements with Complexity-Matching Universal Signal Estimation," *IEEE Transactions on Signal Processing*, vol. 63, no. 6, pp. 1512–1527, March 2015.

9. Y. Ma, D. Baron, and D. Needell, "Two-Part Reconstruction with Noisy-Sudocodes," *IEEE Transactions on Signal Processing*, vol. 62, no. 23, pp. 6323–6334, December 2014.

10. J. Tan, D. Baron, and L. Dai, "Wiener Filters in Gaussian Mixture Signal Estimation with ℓ_∞-Norm Error," *IEEE Transactions on Information Theory*, vol. 60, no. 10, pp. 6626–6635, October 2014.

11. J. Tan, D. M. Carmon, and D. Baron, "Signal Estimation with Additive Error Metrics in Compressed Sensing," *IEEE Transactions on Information Theory*, vol. 60, no. 1, pp. 150–158, January 2014.

12. M. F. Duarte, M. B. Wakin, D. Baron, S. Sarvotham, and R. G. Baraniuk, "Measurement Bounds for Sparse Signal Ensembles via Graphical Models," *IEEE Transactions on Information Theory*, vol. 59, no. 7, pp. 4280–4289, July 2013.

13. D. Baron and T. Jacob, "Variable Length Compression of Codeword Indices for Lossy Compression," *IEEE Signal Processing Letters*, vol. 19, no. 12, pp. 849–852, December 2012.

14. D. Baron and T. Weissman, "An MCMC Approach to Universal Lossy Compression of Analog Sources," *IEEE Transactions on Signal Processing*, vol. 60, no. 10, pp. 5230–5240, October 2012.

15. D. Bickson, D. Baron, A. T. Ihler, H. Avissar, and D. Dolev, "Fault Identification via Non-parametric Belief Propagation," *IEEE Transactions on Signal Processing*, vol. 59, no. 6, pp. 2602–2613, June 2011.

16. D. Baron, S. Sarvotham, and R. G. Baraniuk, "Bayesian Compressive Sensing via Belief Propagation," *IEEE Transactions on Signal Processing*, vol. 58, no. 1, pp. 269–280, January 2010.

17. V. Chandrasekaran, M. B. Wakin, D. Baron, and R. G. Baraniuk, "Representation and Compression of Multi-Dimensional Piecewise Functions Using Surflets," *IEEE Transactions on Information Theory*, vol. 55, no. 1, pp. 374–400, January 2009.

18. D. Baron and R. G. Baraniuk, "Faster Sequential Universal Coding via Block Partitioning," *IEEE Transactions on Information Theory*, vol. 52, no. 4, pp. 1708–1710, April 2006.

19. D. Baron and Y. Bresler, "Anti-Sequential Suffix Sorting for BWT-Based Data Compression," *IEEE Transactions on Computers*, vol. 54, no. 4, pp. 385–397, April 2005.

20. D. Baron and Y. Bresler, "An $O(N)$ Semipredictive Universal Encoder via the BWT," *IEEE Transactions on Information Theory*, vol. 50, no. 5, pp. 928–937, May 2004.

21. D. Baron and Y. Birk, "Coding Schemes for Multislot Messages in Multichannel ALOHA with Deadlines," *IEEE Transactions on Wireless Communications*, vol. 1, no. 2, pp. 292–301, April 2002.

22. D. Baron and Y. Birk, "Multiple Working Points in Multichannel ALOHA with Deadlines," *Wireless Networks*, vol. 8, issue 1, pp. 5–11, January 2002.

23. D. Baron and A. C. Singer, "On the Cost of Worst-Case Coding Length Constraints," *IEEE Transactions on Information Theory*, vol. 47, no.7, pp. 3088–3090, November 2001.

- **Conference Papers**

1. J. Zhu, A. Beirami, and D. Baron, "Performance Trade-Offs in Multi-Processor Approximate Message Passing," *IEEE International Symposium on Information Theory*, Barcelona, Spain, June 2016.

2. P. Han, J. Zhu, R. Niu, and D. Baron, "Multi-Processor Approximate Message Passing Using Lossy Compression," *Proc. Int. Conf. Acoustics, Speech, and Signal Process.* (ICASSP2016), Shanghai, China, March 2016.

3. J. Tan, Y. Ma, H. Rueda, D. Baron, and G. Arce, "Approximate Message Passing in Coded Aperture Snapshot Spectral Imaging," *Proc. IEEE Global Conf. Signal Inf. Process.*, Orlando, FL, December 2015.

4. Y. Ma, D. Baron, and A. Beirami, "Mismatched Estimation in Large Linear Systems," *IEEE International Symposium on Information Theory*, Hong Kong, June 2015.

5. N. Krishnan and D. Baron, "Performance of Parallel Two-Pass MDL Context Tree Algorithm," *Proc. IEEE Global Conference on Signal and Information Processing*, Atlanta, GA, December 2014.

6. J. Tan, Y. Ma, and D. Baron, "Compressive Imaging via Approximate Message Passing with Wavelet-Based Image Denoising," *Proc. IEEE Global Conference on Signal and Information Processing*, Atlanta, GA, December 2014.

7. Y. Ma, J. Zhu, and D. Baron, "Compressed Sensing via Universal Denoising and Approximate Message Passing," *Proc. 52d Allerton Conference on Communication, Control, and Computing*, Monticello, IL, October 2014.

8. J. Zhu, D. Baron, and M. F. Duarte, "Complexity-Adaptive Universal Signal Estimation for Compressed Sensing," *IEEE Statistical Signal Processing Workshop*, Gold Coast, Australia, June 2014.

9. N. Krishnan, D. Baron, and M. K. Mihcak, "A Parallel Two-Pass MDL Context Tree Algorithm for Universal Source Coding," *IEEE International Symposium on Information Theory*, Honolulu, HI, June 2014.

10. J. Tan, D. Baron, and L. Dai, "Signal Estimation with Low Infinity-Norm Error by Minimizing the Mean p-Norm Error," *Proceedings 48th Annual Conference on Information Sciences and Systems*, Princeton, NJ, March 2014.

11. Y. Ma, D. Baron, and D. Needell, "Two-Part Reconstruction in Compressed Sensing," *IEEE Global Conf. Signal Inf. Process.*, Austin, TX, December 2013.

12. J. Zhu and D. Baron, "Performance Regions in Compressed Sensing from Noisy Measurements," *Proceedings 47th Annual Conference on Information Sciences and Systems*, Baltimore, MD, March 2013.

13. J. Tan and D. Baron, "Signal Reconstruction in Linear Mixing Systems with Different Error Metrics," *Information Theory and Applications workshop*, San Diego, February 2014.

14. J. Tan, D. M. Carmon, and D. Baron, "Optimal Estimation with Arbitrary Error Metrics in Compressed Sensing," *IEEE Statistical Signal Processing workshop*, Ann Arbor, MI, August 2012.

15. D. Baron and M. Duarte, "Universal MAP Estimation in Compressed Sensing," *49th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2011.

16. D. Baron, "Information complexity and estimation," *Fourth Workshop Inf. Theoretic Methods Science Eng.* (WITMSE 2011), Helsinki, Finland, August 2011.

17. D. Baron and T. Weissman, "An MCMC Approach to Lossy Compression of Continuous Sources," *Data Compression Conference (DCC)*, Snowbird, UT, March 2010.

18. D. Guo, D. Baron, and S. Shamai, "A Single-letter Characterization of Optimal Noisy Compressed Sensing," *47th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2009.

19. Y. Rachlin and D. Baron, "The Secrecy of Compressive Sensing Measurements," *46th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2008.

20. M. F. Duarte, S. Sarvotham, D. Baron, M. B. Wakin, and R. G. Baraniuk, "Performance Limits for Jointly Sparse Signals via Graphical Models," *Proceedings of Sensor, Signal, and Information Processing Workshop* (SenSIP), Sedona, AZ, May 2008.

21. S. Kirolos, J. N. Laska, M. B. Wakin, M. F. Duarte, D. Baron, T. Ragheb, Y. Massoud, and R. G. Baraniuk, "Analog-to-Information Conversion via Random Demodulation," *Proceedings of IEEE Dallas Circuits and Systems Workshop* (DCAS), Dallas, TX, October 2006.

22. M. B. Wakin, J. N. Laska, M. F. Duarte, D. Baron, S. Sarvotham, D. Takhar, K. F. Kelly, and R. G. Baraniuk, "An Architecture for Compressive Imaging," *Proceedings of International Conference on Image Processing* (ICIP), Atlanta, GA, October 2006.

23. S. Sarvotham, D. Baron, and R. G. Baraniuk, "Measurements vs. Bits: Compressed Sensing meets Information Theory," *Proceedings of 44th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2006.

24. S. Sarvotham, D. Baron, and R. G. Baraniuk, "Sudocodes – Fast Measurement and Reconstruction of Sparse Signals," *2006 IEEE International Symposium on Information Theory* (ISIT2006), Seattle, WA, July 2006.

25. M. B. Wakin, J. N. Laska, M. F. Duarte, D. Baron, S. Sarvotham, D. Takhar, K. F. Kelly, and R. G. Baraniuk, "Compressive Imaging for Video Representation and Coding," *Proceedings of Picture Coding Symposium* (PCS), Beijing, China, May 2006.

26. J. A. Tropp, M. B. Wakin, M. F. Duarte, D. Baron and R. G. Baranuik, "Random Filters for Compressive Sampling and Reconstruction," *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), Tolouse, France, May 2006.

27. M. F. Duarte, M. B. Wakin, D. Baron and R. G. Baraniuk, "Universal Distributed Sensing via Random Projections," *Proceedings of the Symposium on Information Processing in Sensor Networks* (IPSN), Nashville, TN, April 2006.

28. D. Baron, S. Sarvotham, and R. G. Baraniuk, "Coding vs. Packet Retransmission over Noisy Channels," *Proceedings of 40th Annual Conference on Information Sciences and Systems* (CISS2006), Princeton, NJ, March 2006.

29. D. Takhar, J. N. Laska, M. B. Wakin, M. F. Duarte, D. Baron, S. Sarvotham, K. F. Kelly, and R. G. Baraniuk, "A New Compressive Imaging Camera Architecture using Optical-Domain Compression," *SPIE Electronic Imaging*, San Jose, CA, pp. 43–52, January 2006.

30. M. B. Wakin, S. Sarvotham, M. F. Duarte, D. Baron, and R. G. Baraniuk, "Recovery of Jointly Sparse Signals from Few Random Projections," *Proceedings of Workshop on Neural Information Processing Systems*, Vancouver, Canada, December 2005.

31. M. F. Duarte, S. Sarvotham, M. B. Wakin, D. Baron, and R. G. Baraniuk, "Joint Sparsity Models for Distributed Compressed Sensing," *Online Proceedings of the Workshop on Signal Processing with Adaptive Sparse Structured Representations* (SPARS), Rennes, France, November 2005.

32. M. F. Duarte, S. Sarvotham, D. Baron, M. B. Wakin, and R. G. Baraniuk, "Distributed Compressed Sensing of Jointly Sparse Signals," *Proceedings of 39th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2005.

33. S. Sarvotham, D. Baron, and R. G. Baraniuk, "Variable-Rate Universal Slepian-Wolf Coding with Feedback," *Proceedings of 39th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2005.

34. D. Baron, M. F. Duarte, S. Sarvotham, M. B. Wakin, and R. G. Baraniuk, "An Information-Theoretic Approach to Distributed Compressed Sensing," *Proceedings of 43d Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2005.

35. S. Sarvotham, D. Baron, and R. G. Baraniuk, "Variable-Rate Coding with Feedback for Universal Communication Systems," *Proceedings of 43d Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2005.

36. S. Sarvotham, D. Baron, and R. G. Baraniuk, "Non-Asymptotic Performance of Symmetric Slepian-Wolf Coding," *Proceedings of 39th Annual Conference on Information Sciences and Systems* (CISS2005), Baltimore, MD, March 2005.

37. D. Baron, M. A. Khojastepour, and R. G. Baraniuk, "How Quickly Can We Approach Channel Capacity?," *Proceedings of 38th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, November 2004.

38. D. Baron, M. A. Khojastepour, and R. G. Baraniuk, "Redundancy Rates of Slepian-Wolf Coding," *Proceedings of 42d Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2004.

39. V. Chandrasekaran, M. Wakin, D. Baron, and R. G. Baraniuk, "Surflets: A Sparse Representation for Multidimensional Functions Containing Smooth Discontinuities," *2004 IEEE International Symposium on Information Theory* (ISIT2004), Chicago, IL, June 2004.

40. D. Baron, A. Singer, and R. G. Baraniuk, "Probability Assignments with Worst-Case Coding Length Constraints," *Proceedings of 38th Annual Conference on Information Sciences and Systems* (CISS2004), Princeton, NJ, March 2004.

41. V. Chandrasekaran, M. Wakin, D. Baron, and R. G. Baraniuk, "Compression of Higher Dimensional Functions Containing Smooth Discontinuities," *Proceedings of 38th Annual Conference on Information Sciences and Systems* (CISS2004), Princeton, NJ, March 2004.

42. D. Baron, Y. Bresler, and M. K. Mihcak, "Two-Part Codes with Low Worst-Case Redundancies for Distributed Compression of Bernoulli Sequences," *Proceedings of 37th Annual Conference on Information Sciences and Systems* (CISS2003), Baltimore, MD, March 2003.

43. D. Baron and Y. Bresler, "Linear Complexity MDL Universal Coding with the BWT," Recent Results Session, *IEEE International Symposium on Information Theory* (ISIT2001), Washington, DC, June 2001.

44. D. Baron and Y. Bresler, "Tree Source Identification with the Burrows Wheeler Transform," *Proceedings of 34th Annual Conference on Information Sciences and Systems* (CISS2000), Princeton, NJ, vol. 2, pp. FA1-10 – FA1-15, March 2000.

45. D. Baron and Y. Birk, "On the use of Multiple Working Points in Multichannel ALOHA with Deadlines," *Proceedings of 37th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, pp. 728–737, September 1999.

- **Technical Reports**

1. Y. Ma, J. Tan, N. Krishnan, and D. Baron, "Empirical Bayes and Full Bayes for Signal Estimation," *arXiv:1405.2113v1*, May 2014.

2. M. F. Duarte, S. Sarvotham, M. B. Wakin, D. Baron, and R. G. Baraniuk, "Theoretical Performace Limits for Jointly Sparse Signals via Graphical Models," *Technical Report ECE-0802*, Electrical and Computer Engineering Department, Rice University, July 2008.

3. D. Baron, M. B. Wakin, M. F. Duarte, S. Sarvotham, and R. G. Baraniuk, "Distributed Compressed Sensing," *Technical Report ECE-0612*, Electrical and Computer Engineering Department, Rice University, December 2006.

4. S. Sarvotham, D. Baron, and R. G. Baraniuk, "Compressed Sensing Reconstruction via Belief Propagation," *Technical Report ECE-0601*, Electrical and Computer Engineering Department, Rice University, July 2006.

5. S. Sarvotham, M. B. Wakin, D. Baron, M. F. Duarte, and R. G. Baraniuk, "Analysis of the DCS One-Stage Greedy Algorithm for Common Sparse Supports," *Technical Report ECE-05-03*, Electrical and Computer Engineering Department, Rice University, October 2005.

6. V. Chandrasekaran, M. Wakin, D. Baron, and R. G. Baraniuk, "Compressing Piece-wise Smooth Multidimensional Functions Using Surflets: Rate-Distortion Analysis," *Technical report*, Electrical and Computer Engineering Department, Rice University, March 2004.

7. D. Baron and Y. Birk, "Multiround Coding and Coding-Reservation for Multislot Messages in Multichannel ALOHA with Deadlines," *Technical report EE Pub 1293* (also CCIT Report 359), Electrical Engineering Department, Technion, October 2001.

8. D. Baron and Y. Bresler, "Linear Complexity MDL Universal Coding with the BWT," *Technical report UILU-ENG-01-2213*, Coordinated Science Laboratory, University of Illinois, June 2001.

9. Y. Birk and D. Baron, "Capacity Maximization in Multichannel Slotted ALOHA with Deadlines - an Overview," *Technical report EE Pub 1248* (also CCIT Report 314), Electrical Engineering Department, Technion, June 2000.

10. D. Baron and Y. Birk, "On the Merits of Impure Multi-Copy Schemes for Multi-Channel Slotted ALOHA with Deadlines," *Technical report EE Pub 1249* (also CCIT Report 315), Electrical Engineering Department, Technion, June 2000.

11. D. Baron and Y. Birk, "Coding Schemes for Multislot Messages in Multichannel ALOHA with Deadlines," *Technical report EE Pub 1241* (also CCIT Report 307), Electrical Engineering Department, Technion, February 2000.

12. D. Baron and Y. Birk, "Multiple Working Points in Multichannel ALOHA with Deadlines," *Technical report EE Pub 1240* (also CCIT Report 306), Electrical Engineering Department, Technion, January 2000.

Online Videos (December 2016; data from youtube.com)

- July 2015 [866 views]: Compressive Imaging via Approximate Message Passing.
- July 2015 [369 views]: Universal Denoising and Approximate Message Passing.
- July 2015 [218 views]: Size- and Level- Adaptive Markov Chain Monte Carlo.
- July 2015 [185 views]: Parallel Algorithms for Universal Compression.
- December 2013 [926 views]: Signal Reconstruction with Additive Error Metrics.
- February 2013 [1,238 views]: Advertisement for ITA 2013 conference talk.
- September 2010: "An MCMC Approach to Lossy Compression of Analog Sources," North Carolina State University, Raleigh, NC.
- October 2009: [28,372 views] "Compressed Sensing Meets Information Theory," *Google Tech Talk*, Google Research, Mountain View, CA.
- October 2006: [5,321 views] "Measurements vs. Bits: Compressed Sensors meets Information Theory," *Computer Systems Colloquium*, Stanford University, Stanford, CA.
- February 4, 2005: "Recent Results in Non-Asymptotic Shannon Theory," *CAM/EE Seminar Series on Network Communications and Information Processing*, University of Notre Dame, Notre Dame, IN.

Invited Workshop Talks

1. J. Zhu, P. Han, R. Niu, A. Beirami, and D. Baron, "Large-Scale Multi-Processor Approximate Message Passing with Lossy Compression," *Inf. Theory Applications Workshop*, San Diego, CA, Feb. 2016.

2. Y. Ma, J. Zhu, and D. Baron, "Universal Denoising and Approximate Message Passing," *Inf. Theory Applications workshop*, San Diego, Feb. 2015.

3. Y. Ma, J. Tan, N. Krishnan, and D. Baron, "Signal Estimation with Mixtures," *Inf. Theory Applications workshop*, San Diego, Feb. 2014.

4. D. Baron and M. Duarte, "Universal MAP Signal Estimation from Random Projections," *Inf. Theory Applications workshop*, San Diego, Feb. 2012.

5. M. F. Duarte, M. B. Waking, D. Baron, S. Sarvotham, and R. G. Baraniuk, "Ensemble Models for Multi-Signal Compressed Sensing," *1068th AMS Meeting*, Statesboro, GA, Mar. 2011.

6. D. Bickson, D. Baron, and A. Ihler, "Fault identification and compressed sensing," *Inf. Theory Applications workshop*, San Diego, CA, Feb. 2011.

7. D. Baron, "Ensemble Models for Multi-Signal Compressed Sensing," *NIMS (National Institute for Mathematical Sciences) Hot Topics Workshop on Image Processing, Computer Vision, Compressive Sensing, and Related Applications*, Seoul, South Korea, Dec. 2010.

8. I. Poltorak, D. Baron, and D. Needell, "Hybrid Dense/Sparse Matrices in Compressed Sensing Reconstruction," *Linear Programming and Message-Passing Approaches to High-Density Parity-Check Codes and High-Density Graphical Models*, Tel Aviv, Israel, Mar. 2010.

9. D. Guo, D. Baron, and S. Shamai, "Single-letter Characterization of Signal Estimation from Linear Measurements," *Inf. Theory Applications workshop*, San Diego, CA, Feb. 2010.

Invited Seminars

- 2014–2015: "Recovery from linear measurements via denoising and approximate message passing"
  University of California San Diego (May 2015), California Institute of Technology (May 2015), Harvard University (April 2015), University of Delaware (March 2015), Claremont McKenna College (February 2015), Electrical Engineering Department, Technion (December 2014)

- 2014: "Compressed Sensing Introduction"
  National Radio Astronomy Observatory (June 2014), West Virginia University (April 2014)

- 2014: "Universal Algorithms for Compressed Sensing"
  National Radio Astronomy Observatory (June 2014) [modified title], West Virginia University (April 2014)

- 2013–2014: "Universal Signal Estimation"
  Virginia Commonwealth University (Novermber 2014), University of Illinois at Urbana-Champaign (September 2014), University of Minnesota (April 2014), Electrical and Computer Engineering, Duke University (February 2014), Department of Electrical Engineering, Technion (December 2013)

- 2009–2011: "Performance Limits of Linear Measurement Systems"
  School of Electrical and Computer Engineering, Georgia Tech (March 2011); Department of Electrical and Computer Engineering, Duke University; Department of Information and Communications, Gwangju Institute of Science and Technology (GIST), Gwangju, South Korea; Eta Kapppa Nu Seminar, Department of Electrical and Computer Engineering, North Carolina State Universty, Raleigh, NC; Engineering School, Bar Ilan University, Ramat Gan, Israel; Computer Science Division, Open University, Raanana, Israel; *Signal Processing and Systems (SP&S) Seminar*, Technion, Haifa, Israel; *Computer Science Seminar*, Computer Science Department, Ben Gurion University, Beer Sheva, Israel.

- 2010: "An MCMC Approach to Lossy Compression of Continuous Sources"
  Electrical and Computer Engineering Department, North Carolina State Universty, Raleigh, NC

- 2010: Invited seminar series "Compressed Sensing Meets Information Theory" at Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

  - Talk 1: Introduction and Reconstruction
  - Talk 2: Distributed Compressed Sensing
  - Talk 3: Performance Limits of Linear Measurement Systems

- 2009: "Representation and Compression of Multi-Dimensional Piecewise Functions"
  Signal Processing and Systems (SP&S) Seminar, Technion, Haifa, Israel.

- 2009: "Sparsity vs. Entropy"
  Information Theory Seminar, Technion, Haifa, Israel.

- 2008–2010: "Compressed Sensing Meets Information Theory"
  Information Processing Systems Lab Seminar, Department of Electrical and Computer Engineering, The Ohio State University, Columbus, OH; Electrical and Computer Engineering Department, North Carolina State Universty, Raleigh, NC; Department of Photonics Engineering, Technical University of Denmark (DTU), Copenhagen, Denmark; *Theoretical Computer Science Seminar*, EECS Department, University of Michigan, Ann Arbor, MI; *Google Tech Talk*, Google Research, Mountain View, CA; *EECS Seminar*, EECS Department, Northwestern University, Evanston, IL; *Computer Science Colloquium*, Technion, Haifa, Israel; *Electrical Engineering Systems Departmental Seminar*, Tel Aviv University, Tel Aviv, Israel; Institute for Telecommunications Research, University of South Australia, Adelaide, Australia; *Pixel Club*, Computer Science Department, Technion, Haifa, Israel; Computer Science Department, Ben Gurion University, Beer Sheva, Israel; Electronic and Electrical Engineering, University College Dublin, Ireland; *Information Theory and Applications Seminar*, University of California, San Diego, CA; *Combined Applied Math & PDEs Seminar*, Department of Mathematics, University of California, Davis, CA; Department of Electrical and Computer Engineering, University of California, Santa Barbara, CA; HP Labs, Palo Alto, CA; Accenture Technology Labs, Chicago, IL.

- 2008: "Fast Parallel Algorithms for Universal Lossless Data Compression"
  Department of Computing Seminar, Imperial College, London, UK.

- 2005–2006: "Distributed Compressed Sensing"
  Computer Systems Colloquium, Stanford University, Stanford, CA; Department of Electrical and Computer Engineering, McGill University, Montreal, Canada; Department of Computing Seminar, Imperial College, London, UK; Division of Information Engineering, University of Cambridge, Cambridge, UK; Electrical and Systems Engineering Department, Washington University, St. Louis, MO; Computer Science and Engineering Department, Hebrew University, Jerusalem, Israel; Electrical and Computer Engineering Department, Colorado State University, Fort Collins, CO; Electrical and Computer Engineering Department, Boston University, Boston, MA; *Stochastic Systems Group Seminar*, Massachusetts Institute of Technology, Cambridge, MA; *Wireless Networking and Communications Seminar*, University of Texas, Austin, TX; *Electrical Engineering Systems Departmental Seminar*, Tel Aviv University, Tel Aviv, Israel; *Information Theory Workshop*, Technion, Haifa, Israel; School of Engineering, Bar-Ilan University, Ramat Gan, Israel; *ECE BGU Seminar*, Ben Gurion University, Beer Sheva, Israel; *Systems Seminar*, University of Wisconsin, Madison, WI; *CAM/EE Seminar Series on Network Communications and Information Processing*, University of Notre Dame, Notre Dame, IN; *DSP Seminar*, University of Illinois, Urbana, IL; *CNSIP Area Seminar*, Purdue University, West Lafayette, IN.

- 2005-2006: "Variable-Rate Coding with Feedback for Universal Communication Systems"
  Communications Systems Engineering Department, Ben Gurion University, Beer Sheva, Israel; *Communication Seminar*, University of Illinois, Urbana, IL.

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- 2005: "Take it to the Limit: Computational Issues and Performance Bounds of Communication Systems"
  ECE Seminar, Rice University, Houston, TX; Texas Instruments, Dallas, TX.

- 2004–2005: "Recent Results in Non-Asymptotic Shannon Theory"
  WINLAB Seminar Series, Rutgers University, Piscataway, NJ; *CAM/EE Seminar Series on Network Communications and Information Processing*, University of Notre Dame, Notre Dame, IN; *Communications and Signal Processing Seminar*, University of Michigan, Ann Arbor, MI; *Information Processing Systems Lab Seminar*, Department of Electrical and Computer Engineering, The Ohio State University, Columbus, OH; *Communication and Signal Processing Seminar*, Technion, Haifa, Israel; *Networking, Communications, and DSP Seminar*, University of California, Berkeley, CA; *Information Systems Colloquium*, Stanford University, Stanford, CA; *Wireless Networking and Communications Seminar*, University of Texas, Austin, TX.

- 2004: "Fast Parallel Algorithms for Universal Lossless Source Coding"
  Telecommunication and Signal Processing Seminar, Texas A&M University, College Station, TX; *Communication and Signal Processing Seminar*, Technion, Haifa, Israel.

- 2002–2003: "Context Tree Pruning for Universal Coding via Prefix Trees"
  ECE Seminar, Rice University, Houston, TX; *Networking, Communications, and DSP Seminar*, University of California, Berkeley, CA.

- 1999: "Coding Schemes for Multislot Messages in Multichannel ALOHA with Deadlines"
  Communication Seminar, University of Illinois, Urbana, IL.