Christoph Studer

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Curriculum Vitae

Research interests

Digital very large-scale integration (VLSI) circuits and systems; wireless communication systems; signal and image processing; convex and nonconvex optimization; machine learning for education.

Education

July 2009: Ph.D. in Information Technology and Electrical Engineering, ETH Zurich, Switzerland. Doctoral dissertation: "Iterative MIMO Decoding: Algorithm and VLSI Implementation Aspects," thesis advisors: Prof. W. Fichtner (Integrated Systems Laboratory, ETH Zurich) and Prof. H. Bölcskei (Communication Technology Laboratory, ETH Zurich).

Jan. 2006 – July 2009: Doctoral studies carried out jointly at the Integrated Systems Laboratory and the Communication Technology Laboratory, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Dec. 2005: Engineering diploma (equivalent to M.S. degree) in Information Technology and Electrical Engineering, ETH Zurich, Switzerland. Master's Thesis: "Sphere Decoding with Resource Constraints," carried out at the Information Systems Laboratory (with Prof. A. Paulraj), Department of Electrical Engineering, Stanford University, CA, USA.

Sept. 2000 – Dec. 2005: Undergraduate and graduate studies in Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Feb. 2000 – Aug. 2013: Service member of the Swiss Armed Forces in terrestrial reconnaissance.

Academic positions

Jan. 2014 – present: Assistant Professor at the School of Electrical and Computer Engineering at Cornell University, Ithaca, NY, USA.

Jan. 2014 – present: Adjunct Assistant Professor at the Department of Electrical and Computer Engineering at Rice University, Houston, TX, USA.

Sep. 2013 – Dec. 2013: Visiting Assistant Professor at the School of Electrical and Computer Engineering, Cornell University, NY, USA.

Jan. 2013 – Dec. 2013: Research Scientist in the Department of Electrical and Computer Engineering, Rice University, TX, USA.

Mar. 2011 – Dec. 2012: Postdoctoral Researcher at the Digital Signal Processing (DSP) group (with Prof. R. G. Baraniuk), Department of Electrical and Computer Engineering, Rice University, TX, USA.

Aug. 2009 – Feb. 2011: Postdoctoral Researcher at the Communication Technology Laboratory (with Prof. H. Bölcskei), Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Jan. 2006 – July 2009: Research and Teaching Assistant at the Integrated Systems Laboratory and the Communication Technology Laboratory, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Jan. 2005 – July 2005: Visiting Researcher at the Information Systems Laboratory (with Prof. A. Paulraj), Department of Electrical Engineering, Stanford University, CA, USA.

Awards

2017: Received a US NSF CAREER award from the Division of Computing and Communication Foundations (CCF) on the first attempt. The $\$606{,}661$ award supports a five-year interdisciplinary research project on hardware-accelerated Bayesian inference.

2017: Ph.D. students Emre Gonultaş and Oscar Castañeda were selected as finalists of the 2017 Qualcomm Innovation Fellowship.

2016: Michael Tien '72 Excellence in Teaching Award, Cornell University, College of Engineering.

2016: Paper with Ph.D. student Igor Labutov on "Calibrated Self-Assessment" received the Best Student Paper award at the 9th International Conference on Educational Data Mining (EDM).

2014: IEEE Wireless Communication Letters Exemplary Reviewer.

2013: Shared the Swisscom/ICTnet Innovations Award 2013 on "Design of a Wideband Analog-to-Information Converter for Cognitive Radio" with D. Bellasi, L. Bettini, and C. Benkeser.

2013: IEEE Wireless Communication Letters Exemplary Reviewer.

2013: Best Demo Award at the IEEE International Symposium on Circuits and Systems (ISCAS) for the demonstration "Real-Time Audio Restoration using Sparse Signal Recovery."

2011: Fellowship for Advanced Researchers from the Swiss National Science Foundation (SNSF).

2011: ETH Medal for the doctoral dissertation on "Iterative MIMO Decoding: Algorithms and VLSI Implementation Aspects." Research carried out at the Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

2010: Shared the Swisscom/ICTnet Innovations Award 2010 on "VLSI Implementation of Soft-Input Soft-Output MMSE Parallel Interference Cancellation" with S. Fateh and D. Seethaler.

2010: Single tree-search sphere decoding (jointly developed with with Prof. A. Burg) was explicitly cited in the Vodafone Innovations Award 2010 given to Prof. H. Bölcskei.

2008: Best Student Paper Award at the IEEE International Symposium on Circuits and Systems (IS-CAS) for the paper entitled "VLSI Architecture for Data-Reduced Steering Matrix Feedback in MIMO Systems."

2007: 1st place at the Student Paper Contest of the 41th Asilomar Conference on Signals, Systems, and Computers for the paper entitled "Matrix Decomposition Architecture for MIMO Systems: Design and Implementation Trade-Offs."

2005: ETH Medal for the M.S. Thesis on "Sphere Decoding with Resource Constraints." Research carried out at the Information Systems Laboratory (with Prof. A. Paulraj), Department of Electrical Engineering, Stanford University, CA, USA.

2005: ETH Zurich Travel Grant for travel expenses to Stanford University, CA, USA.

Academic work experience and teaching activities

Fall 2015 – 2017: ECE 5680 "Wireless Communication" graduate course at the School of ECE, Cornell University, NY, USA. (Enrollment approximately 15 students.)

Spring 2014 – 2017: ECE 4740 "Digital VLSI Design" undergraduate course at the School of ECE, Cornell University, NY, USA. (Enrollment approximately 65–75 students.)

Fall 2014: ECE 5950 "Special Topics in ECE: Sparse Signal Processing" graduate course at the School of ECE, Cornell University, NY, USA. (Enrollment 11 students.)

Oct. 2013 – Dec. 2013: Guest lecturer for ELEC 547 "Computer Vision" and ELEC 301 "Introduction to Signals and Systems" at the ECE Dept. of Rice University, TX, USA. (Enrollment approximately 20 students.)

Dec. 2011 – Dec. 2013: Supervisor of three Ph.D. Candidates on the design of a machine-learning-based personalized learning system at the ECE Dept. of Rice University, TX, USA.

Nov. 2011 – Dec. 2013: Mentor of Group Projects for ELEC 301 "Introduction to Signals and Systems" at the ECE Dept. of Rice University, TX, USA.

June 2009 – Dec. 2011: Main supervisor of Laboratory Courses for B.S. and M.S. students at the Communication Technology Laboratory, ETH Zurich, Switzerland.

Jan. 2006 – Feb. 2011: Supervisor of 14 M.S. Theses and 20 Semester Projects at the Integrated Systems Laboratory and the Communication Technology Laboratory, ETH Zurich, Switzerland; leading the specification, design, measurement, and testing of more than 15 application-specific integrated circuits (ASICs).

Jan. 2006 – June 2009: Main teaching assistant for the lecture VLSI III (Fabrication and Verification of Highly Integrated Circuits). Organization of the exercises and the supervision of testing the fabricated application specific integrated circuits (ASICs).

Jan. 2006 – June 2009: Teaching assistant for VLSI I (Architectures of Highly Integrated Circuits) and VLSI II (Design of Highly Integrated Circuits). Short lectures on specific topics in IC design, exercise preparation, and examination preparation and grading.

Aug. 2005 – July 2008: Teaching Assistant at the Integrated Systems Laboratory, ETH Zurich for the Digital Audio practical training, projects, and seminar (PPS) course. Student mentoring for hardware (PCB design) and software development of DSP-based real-time audio-processing algorithms.

Industrial work experience and consulting

May 2017: Consultant for Vernier Capital Partners LLC via Gerson Lehrman Group (GLG) in the broad area of massive MIMO for 5G wireless.

Mar. 2016 – today: Consultant for Uhnder Inc., a start-up company located Austin, TX, USA, developing products for sensing, cognition, and communication for the internet of things (IoT).

Apr. 2012 – Aug. 2012: Consultant for InView Technology Corporation, a Rice University spinoff located in Austin, TX, USA, developing compressive sensing-based imaging systems (real-time convex optimization algorithms for compressive-sensing reconstruction and assisting the design of a corresponding FPGA prototype).

Aug. 2008 – Jan. 2009: Consultant for Celestrius AG, an ETH spinoff specialized in the field of multi-antenna (MIMO) wireless communication (working on the development and silicon integration of high-performance data detection algorithms for IEEE 802.11n wireless LAN).

Sept. 2004 – Dec. 2004: Internship at Philips Semiconductors, Digital Baseband, Zurich, Switzerland. The work included the development of a company-wide system-level verification standard for cellular (GSM and EDGE) baseband system-on-chips.

Research grants and industry support

Current support

NSF CNS, Collaborative Research: "NeTS: Small: Collaborative Research: BRICK: Breaking the I/O and Computation Bottlenecks in Massive MIMO Base Stations," *principal investigator*, (PI at Rice University: Prof. J. R. Cavallaro), total funding $ 500,000, duration 9/1/2017–8/31/2020.

NSF CCF, SHF: "CAREER: Hardware Accelerated Bayesian Inference via Approximate Message Passing: A Bottom-Up Approach," *principal investigator*, total funding $ 606,661, duration 2/15/2017–1/31/2022.

NSF CCF, Collaborative Research: "AitF: EXPL: Collaborative Research: Approximate Discrete Programming for Real-Time Systems," *principal investigator* (PI at University of Maryland: Prof. T. Goldstein), total funding $ 400,000, duration 9/1/2015–8/31/2018.

NSF EECS, Collaborative Research: "BAMM: Baseband Accelerators for Massive MIMO," *principal investigator* (PI at Rice University: Prof. J. R. Cavallaro), total funding $ 331,330, duration 9/1/2014–8/31/2017 (no cost extension until 8/31/2018).

Xilinx Inc., Donation: Unrestricted gift from Xilinx Inc., total funding: $45,000 (funding of $7,500 biannually received since 5/11/2015).

Past support

Cornell CTE Faculty Grant: "Data-Collection Campaign for Machine Learning in Education," *principal investigator*, funding $ 1,500 received on 2/19/2015.

Cornell New Faculty Institute Research Stipend: Funding $ 1,000 received on 2/9/2015.

SNSF Grant PA00P2-134155: "Sparse-Signal Recovery with Statistical Models: Algorithms, Performance, and Implementation," (provided by the Swiss National Science Foundation), *principal investigator*, funding $ 102,000, duration 3/1/2011–2/28/2013.

Ph.D. students and postdocs

Current students

Emre Gönültaş: Analog-to-feature (A2F) conversion for low-power classification (Ph.D. student; start: Aug. 2016)

Oscar Castañeda: Discrete programming and semidefinite relaxation (Ph.D. student; start: Aug. 2016)

Ramina Ghods: Impairment-aware estimation and detection (Ph.D. student; start: Aug. 2014)

Charles Jeon: Data detection for massive multi-user MIMO system (Ph.D. student; start: Jan. 2014; ECE Ph.D. teaching assistant award)

Past students

Michaël Pelissier: Compressive-sensing RF receiver (postdoctoral student; Oct. 2015 to Aug. 2016; now at CEA-Leti: Laboratoire d'éctronique des technologies de l'information, Grenoble, France)

Igor Labutov: Machine learning for education (Ph.D. student; Jan. 2014 to June 2016; now postdoc with Prof. Tom Mitchell at Carnegie Mellon University, Pittsburgh, PA)

Participation in Ph.D. Thesis committees

Nicholas Preyss: "Modulation, Coding, and receiver Design for Gigabit mmWave Communication," Electrical Engineering Department (EDEE), École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, July 2016.

Michael Wu: "Efficient Detectors for LTE Uplink Systems: From Small to Large Systems," Department of Electrical and Computer Engineering, Rice University, Houston, TX, March 2016.

Schekeb Fateh: "Calibration Techniques for Digitally Assisted Nyquist-Rate ADCs," Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland, Jan. 2016.

Bei Yin: "Low-Complexity Detection and Precoding for Massive MIMO-OFDM Systems: Algorithm, Architecture, and Application," Department of Electrical and Computer Engineering, Rice University, Houston, TX, Sept. 2014.

Changhyuk Lee: "CMOS Based Lensless Imaging Systems and Support Circuits," School of Electrical and Computer Engineering, Cornell University, Ithaca, NY, Aug. 2014.

Iker S. Polancos: "Detection and Decoding Algorithms of Multi-Antenna Diversity Techniques for Terrestrial DVB Systems," Dept. Electronics and Computer Science, University of Mondragón, Arrasate, Basque Country, Spain, Nov. 2010.

Diversity and outreach activities

May 2015, 2016, and 2017: Lecturer for Math Day at Boynton Middle School, Ithaca, in which Cornell professors replace the usual math lessons for the day.

Summer 2016: Supervisor of Felipe Suárez Colmenares from the Universidad de los Andes, Bogotá, Colombia, for Cornell's CienciAmerica summer program.

July 2016: Field-session presenter for the CURIE Academy, a one-week summer residential program for rising female high school sophomores, juniors, and seniors.

Summer 2015: Supervisor of Oscar Castañeda from Universidad del Valle de Guatemala, Guatemala, for Cornell's CienciAmerica summer program.

July 2015: Field-session presenter for the CURIE Academy, a one-week summer residential program for rising female high school sophomores, juniors, and seniors.

July 2015: Field-session presenter for the CATALYST Academy, a one-week summer residential program for rising high school sophomores, juniors, and seniors.

July 2014: Field-session presenter (jointly with Prof. Zhang) for the CATALYST Academy, a one-week summer residential program for rising high school sophomores, juniors, and seniors.

Professional activities

External activities

- IEEE Senior Member since Sept. 23, 2014.

- Member of the IEEE Circuits and Systems, IEEE Solid State Circuits, IEEE Communications, IEEE Information Theory, and IEEE Signal Processing societies.

- Member of the following technical committees:

  - IEEE Signal Processing for Communications and Networking (SPCOM) Technical Committee since Jan. 1, 2017. Regional representative for the U.S. and member of the Educational Subcommittee since March 2017.
  - IEEE Design and Implementation of Signal Processing Systems (DISPS) Technical Committee since Jan. 12, 2017.
  - IEEE Circuits and Systems for Communication (CASCOM) Technical Committee since May. 24, 2016.

- Technical program committee member for the following conferences and workshops:

  - ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2014
  - Asilomar Conference on Circuits, Systems, and Computer, chair for the "Architecture and Implementation" track, 2017
  - European Signal Processing Conference (EUSIPCO), 2014 and 2017
  - European Solid State Circuit Conference (ESSCIRC), 2016
  - IEEE Global Conference on Signal and Information Processing (GlobalSIP), 2014 to 2016
  - IEEE Intl. Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2014
  - IEEE Intl. Conference on Electronic Circuits and Systems (ICECS), 2014
  - IEEE Intl. Symposium on Circuits and Systems (ISCAS), 2013 and 2015
  - IEEE Intl. Symposium on Turbo Codes & Iterative Information Processing, 2016
  - IEEE Intl. Workshop on Signal Processing Systems (SiPS), 2017
  - IEEE Vehicular Technology Conference (VTC Fall), 2014
  - IEEE Vehicular Technology Conference (VTC Spring), 2015
  - IEEE Intl. Workshop on Signal Processing Advances in Wireless Communications (SPAWC), 2017
  - IEEE International Conference on Very Large Scale Integration (VLSI-SoC), 2017
  - Signal Processing with Adaptive Sparse Structured Representations (SPARS), 2017

- Guest editor for the following journal special issues:

  - IEEE Transactions on Circuits and Systems I, 2016, on "International Symposium on Circuits and Systems Special Issue" (with Prof. E. Da Silva *et al.*)
  - EURASIP Journal on Wireless Communications, Dec. 2015, on "Recent Advances in Massive MIMO Systems" (with Prof. R. de Lamare)
  - EURASIP Journal on Wireless Communications, Dec. 2011, on "Algorithm and Implementation Aspects of Channel Codes and Iterative Receivers" (with Prof. J. R. Cavallaro and Prof. A. P. Burg)

- Reviewer of project proposals for the following agencies:

- US National Science Foundation (NSF), 2016 and 2017
- Fonds zur Förderung der Wissenschaftlicher Forschung (FWF), Vienna, Austria, 2014

- Organizer of the following workshops:

  - Neural Information Processing Systems (NIPS) Conference, Barcelona, Spain, Dec. 2016, on "Machine Learning for Education" (with Prof. R. G. Baraniuk, Dr. A. S. Lan, and Dr. J. Ngiam)
  - Intl. Conference on Machine Learning (ICML), Lille, France, July 2015, on "Machine Learning for Education" (with Prof. R. G. Baraniuk, Prof. E. Brunskill, Dr. J. Huang, Prof. M. van der Schaar, Prof. M. C. Mozer, and Dr. A. S. Lan)
  - Neural Information Processing Systems (NIPS) Conference, Quebec, Canada, Dec. 2014, on "Human Propelled Machine Learning" (with Prof. R. G. Baraniuk and Prof. M. C. Mozer)
  - IEEE Global Communications Conference (GLOBECOM), Austin, TX, Dec. 2014 on "Massive MIMO: From Theory to Practice" (with Prof. O. Edfors, Prof. L. van der Perre, and Prof. F. Rusek)

- Organizer of the following special sessions:

  - 50th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2016, on "Hardware Aspects for Compressive Sensing and Analog-to-Information Conversion" and "Algorithm and Hardware Aspects for 5G Wireless Systems"
  - 47th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2013 on "Implementation Aspects for Full Duplex and Large-Scale MIMO Wireless Systems"
  - 46th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2012, on "Compressive Sensing"
  - IEEE Intl. Symposium on Circuits and Systems (ISCAS), Rio de Janeiro, Brazil, May 2011, on "VLSI Architectures for LDPC Coding/Decoding," (with Prof. A. Burg)

- Publication chair (together with Prof. G. Durisi) for the 2017 IEEE International Symposium on Information Theory (ISIT), Aachen, Germany, June 2017.

- Committee member for the Student Paper Contest at the 45th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2011.

- Conference session chair:

  - 42nd IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Mar. 2017, New Orleans, USA, on "mmWave MIMO and Beamforming"
  - 22nd European Signal Processing Conference (EUSIPCO), Lisbon, Portugal, Sep. 2014, on "Design and Implementation of Signal Processing Systems"
  - 51st Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, Oct. 2013 on "Sparse Data Analysis"
  - IEEE Intl. Symposium on Information Theory (ISIT), Cambridge, MA, USA, July 2012, on "Compressive Sensing and Algorithms"
  - 45th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2011 on "Advances in Compressive Sensing"

- Reviewer for the following journals:

- Hindawi Mobile Information Systems
- IEEE Communications Letters
- IEEE Journal of Selected Topics in Signal Processing
- IEEE Signal Processing Letters
- IEEE Transactions on Circuits and Systems I
- IEEE Transactions on Circuits and Systems II
- IEEE Transactions on Communications
- IEEE Embedded Systems Letters
- IEEE Transactions on Information Theory
- IEEE Transactions on Signal Processing
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Very Large Scale Integration Systems
- IEEE Transactions on Wireless Communications
- IEEE Wireless Communication Letters **(exemplary reviewer award in 2013 and 2014)**
- Elsevier Applied and Computational Harmonic Analysis
- Elsevier Intl. Journal of Electronics and Communications
- Elsevier Signal Processing
- EURASIP Journal on Signal Processing
- EURASIP Journal on Advances in Signal Processing
- European Transactions on Telecommunications
- Arabian Journal for Science and Engineering
- IET Circuits, Devices and Systems
- Springer Journal of Signal Processing Systems

- Reviewer for the following conferences:
  - IEEE Intl. Symposium on Information Theory (ISIT)
  - IEEE Intl. Conference on Acoustics, Speech, and Signal Processing (ICASSP)
  - IEEE Intl. Symposium on Circuits and Systems (ISCAS)
  - IEEE Global Communications Conference (GLOBECOM)
  - IEEE Intl. Communications Conference (ICC)
  - IEEE Vehicular Technology Conference (VTC)
  - IEEE Intl. Workshop on Signal Processing Advances for Wireless Communications (SPAWC)
  - IEEE Intl. Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)
  - IEEE Intl. Symposium on Wireless Communication Systems (ISWCS)
  - IEEE Intl. Conference on Communications and Signal Processing (ICCSP)
  - IEEE Intl. Conference on Electronics, Circuits, and Systems (ICECS)
  - IEEE Intl. Symposium on Turbo Codes & Iterative Information Processing (ISTC)
  - IEEE Intl. Conference on Electrical Engineering, Computing Science and Automatic Control (CCE)
  - IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM)
  - IEEE Wireless Communications and Networking Conference (WCNC)
  - European Conference on Signal Processing (EUSIPCO)
  - Intl. ITG Conference on Systems, Communications, and Coding (SCC)
  - Intl. ITG Workshop on Smart Antennas (WSA)
  - Intl. Conference on Sampling Theory and Applications (SampTA)

Internal activities

- Chair of the Cornell ECE colloquium committee (May. 2017 – present)

- Member of the Cornell ECE graduate field since Jan. 2014

- Cornell ECE faculty search committee field since Jan. 2017

- Cornell ECE graduate committee (Jan. 2014 – present)

- Cornell ECE colloquium committee (Jan. 2015 – May. 2017)

Publications, Talks, and Patents

1. Book chapters and magazine articles

1.1 R. G. Baraniuk, T. Goldstein, A. C. Sankaranarayanan, C. Studer, A. Veeraraghavan, and M. Wakin, "Compressive Video Sensing: Algorithms, architectures, and applications," IEEE Signal Processing Magazine, Vol. 34, No. 1, pp. 52–66, Jan. 2017 **(feature article)**

1.2 C. Studer, M. Wenk, and A. Burg, "VLSI Implementation of Hard- and Soft-Output Sphere Decoding for Wide-Band MIMO Systems," VLSI-SOC: Forward-Looking Trends in IC and Systems Design, IFIP Advances in Information and Communication Technology, J. L. Ayala, D. Atienza, and R. Reis, Eds., Springer Boston, Vol. 373, pp. 128–154, 2012 **(invited)**

2. Journal publications

2.1 O. Castañeda, S. Jacobsson, G. Durisi, M. Coldrey, T. Goldstein, and C. Studer, "1-bit Massive MU-MIMO Precoding in VLSI," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, *submitted*

2.2 K. Li, R. Sharan, Y. Chen, T. Goldstein, J. R. Cavallaro, C. Studer, "Decentralized Baseband Processing for Massive MU-MIMO Systems," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, *submitted*

2.3 T. Goldstein and C. Studer, "PhaseMax: Convex Phase Retrieval via Basis Pursuit," IEEE Transactions on Information Theory, *submitted*

2.4 M. Wu, B. Yin, C. Dick, J. R. Cavallaro, and C. Studer, "Implicit vs. Explicit Approximate Matrix Inversion for Wideband Massive MU-MIMO Data Detection," IEEE Transactions on Signal Processing, *submitted*

2.5 R. Ning, A. E. Waters, C. Studer, and R. G. Baraniuk, "SPRITE: A Response Model for Multiple Choice Testing," Journal of Educational Data Mining, *submitted*

2.6 C. Studer, "Recovery of Signals with Low Density," IEEE Transactions on Information Theory, *submitted*

2.7 A. S. Lan, C. Studer, and R. G. Baraniuk, "Time-Varying learning and Content Analytics via Sparse Factor Analysis," Psychometrica, *submitted*

2.8 C. Studer, T. Goldstein, W. Yin, and R. G. Baraniuk, "Democratic Representations," Applied Computational Harmonic Analysis, *submitted*

2.9 A. S. Lan, A. E. Waters, C. Studer, and R. G. Baraniuk, " BLAh: Boolean Logic Analysis for Graded Student Response Data," IEEE Journal of Selected Topics in Signal Processing, 2017, *to appear*

2.10 M. Pelissier and C. Studer, "Non-Uniform Wavelet Sampling for RF Analog-to-Information Conversion," IEEE Transactions on Circuits and Systems I, 2017, *to appear*

2.11 S. Jacobson, G. Durisi, M. Coldrey, T. Goldstein, and C. Studer, "Quantized Precoding for Massive MU-MIMO ," IEEE Transactions on Communications, 2017, *to appear*

2.12 S. Jacobson, G. Durisi, M. Coldrey, U. Gustavsson, and C. Studer, "Throughput Analysis of Massive MIMO Uplink With Low-Resolution ADCs ," IEEE Transactions on Wireless Communications, Vol. 16, No. 6, April 2017, **(25th most accessed article in June 2017)**

2.13 H. Agrawal, R. Puhl, C. Studer, and A. Babakhani, "Ultra-Wideband Joint Spatial Coding for Secure Communication and High-Resolution Imaging," IEEE Transactions on Microwave Theory and Techniques, No. 99, Feb. 2017

2.14 *O. Castañeda, T. Goldstein, and C. Studer, "Data Detection in Large Multi-Antenna Wireless Systems via Approximate Semidefinite Relaxation," IEEE Transactions on Circuits and Systems I, Vol. 64, No. 12, Dec. 2016, **(invited; acceptance rate 3.3% of all ISCAS papers)**

2.15 *M. Wu, C. Dick, J. R. Cavallaro, and C. Studer, "High-Throughput Data Detection for Massive MU-MIMO-OFDM using Coordinate Descent," IEEE Transactions on Circuits and Systems I, Vol. 64, No. 12, Dec. 2016, **(invited paper; acceptance rate 3.3% of all ISCAS papers; IEEE Xplore 19th most downloaded paper in Dec. 2016)**

2.16 *C. Studer and G. Durisi, "Quantized MU-MIMO-OFDM Uplink," IEEE Transactions on Communications, Vol. 64, No. 6, pp. 2387-2399, Apr. 2016

2.17 A. Sankaranarayanan, L. Xu, C. Studer, Y. Li, K. F. Kelly, and R. G. Baraniuk, "Video Compressive Sensing for Spatial Multiplexing Cameras using Motion-Flow Models," SIAM Journal of Imaging Sciences, Vol. 8 No. 3, pp. 1489–1518, July 2015

2.18 M. Wu, Bei Yin, G. Wang, C. Studer, and J. R. Cavallaro, "GPU Acceleration of a Configurable N-Way MIMO Detector for Wireless Systems," Journal of Signal Processing Systems, Vol. 76, No. 2, pp. 95–108, Apr. 2014

2.19 A. S. Lan, A. E. Waters, C. Studer, and R. G. Baraniuk, "Sparse Factor Analysis for Learning and Content Analytics," Journal of Machine Learning Research, Vol. 15, pp. 1959–2008, June, 2014

2.20 *M. Wu, Bei Yin, G. Wang, C. Dick, J. R. Cavallaro, and C. Studer, "Large-Scale MIMO Detection for 3GPP LTE: Algorithm and FPGA Implementation," IEEE Journal of Selected Topics in Signal Processing, Vol. 8, No. 5, pp. 916–929, Oct. 2014

2.21 A. E. Waters, C. Studer, and R. G. Baraniuk, "Collaboration-Type Identification in Educational Datasets," Journal of Educational Data Mining, Vol. 6. No. 1, pp. 28–52, July 2014

2.22 *C. Studer and R. G. Baraniuk, "Stable Restoration and Separation of Approximately Sparse Signals," Applied and Computational Harmonic Analysis, Vol. 37, pp. 12-32, July 2014

2.23 D. Bellasi, L. Bettini, C. Benkeser, T. Burger, Q. Huang, and C. Studer, "Monolithic Compressive-Sensing Wideband Analog-to-Information Converter," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, Vol. 3, No. 4, pp. 552–565, Dec. 2013

2.24 G. Pope, A. Bracher, and C. Studer, "Probabilistic Recovery Guarantees for Sparsely Corrupted Signals," IEEE Transactions on Information Theory, Vol. 59, No. 5, pp. 3104–3116, May 2013

2.25 C. Studer and E. G. Larsson, "PAR-Aware Large-Scale Multi-User MIMO-OFDM Downlink," IEEE Journal on Selected Areas in Communications, Vol. 31, No. 2, pp. 303–313, Feb. 2013

2.26 C. Studer, S. Fateh, C. Benkeser, and Q. Huang, "Implementation Trade-offs of Soft-Input Soft-Output MAP Decoders for Convolutional Codes," IEEE Transactions on Circuits and Systems I, Vol. 59 , No. 11, pp. 2774– 2783, Nov. 2012

2.27 P. Maechler, C. Studer, D. Bellasi, A. Maleki, A. Burg, N. Felber, H. Kaeslin, and R. G. Baraniuk, "VLSI Design of Approximate Message Passing for Signal Restoration and Compressive Sensing," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, Vol. 2, No. 3, Oct. 2012 **(9th most cited article in 2016)**

2.28 C. Studer, P. Kuppinger, G. Pope, and H. Bölcskei, "Recovery of Sparsely Corrupted Signals," IEEE Transactions on Information Theory, Vol. 58, No. 5, pp. 3115–3130, May 2012

2.29 D. Seethaler, J. Jaldén, C. Studer, and H. Bölcskei, "On the Complexity Distribution of Sphere-Decoding," IEEE Transactions on Information Theory, Vol. 57, No. 9, pp. 5754–5768, Sept. 2011

2.30 C. Studer, S. Fateh, and D. Seethaler, "ASIC Implementation of Soft-Input Soft-Output MIMO Detection Using Parallel Interference Cancellation," IEEE Journal of Solid-State Circuits, Vol. 46, No. 7, pp. 1754–1765, July 2011 **(invited paper; 20th most cited article in 2016)**

2.31 C. Studer, C. Benkeser, S. Belfanti, and Q. Huang, "Design and Implementation of a Parallel Turbo-Decoder ASIC for 3GPP-LTE," IEEE Journal of Solid-State Circuits, Vol. 46, No. 1, pp. 8–17, Jan. 2011 **(invited paper; IEEE Xplore 19th most downloaded paper 2011; 25th most cited article in 2016)**

2.32 C. Studer and H. Bölcskei, "Soft-Input Soft-Output Single Tree-Search Sphere Decoding," IEEE Transactions on Information Theory, Vol. 56, No. 10, pp. 4827–4842, Oct. 2010

2.33 C. Studer, A. Burg, and H. Bölcskei, "Soft-Output Sphere Decoding: Algorithms and VLSI Implementation," IEEE Journal on Selected Areas in Communications, Vol. 26, No. 2, pp. 290–300, Feb. 2008 **(the STS-SD algorithm is part of MATLAB's Communications System Toolbox since 2012)**

3. Conference publications

3.1 T. Goldstein and C. Studer, "Convex Phase Retrieval without Lifting via PhaseMax," 24th International Conference on Machine Learning (ICML), Aug. 2017, *to appear*

3.2 Z. Xu, M. A. T. Figueiredo, X. Yuan, C. Studer, and T. Goldstein, "Adaptive Relaxed ADMM: Convergence Theory and Practical Implementation," Conference on Computer Vision and Pattern Recognition (CVPR), July 2017, *to appear*

3.3 C. Jeon, K. Li, J. R. Cavallaro, and C. Studer, "On the Achievable Rates of Decentralized Equalization in Massive MU-MIMO Systems," Proc. IEEE International Symposium on Information Theory (ISIT), June 2017, *to appear*

3.4 R. Ghods, C. Jeon, G. Mirza, A. Maleki, and C. Studer, "Optimally-Tuned Nonparametric Linear Equalization for Massive MU-MIMO Systems," Proc. IEEE International Symposium on Information Theory (ISIT), June 2017, *to appear*

3.5 O. Castañeda, T. Goldstein, and C. Studer, "FPGA Design of Low-Complexity Joint Channel Estimation and Data Detection for Large SIMO Wireless Systems," IEEE International Symposium on Circuits and Systems (ISCAS), May 2017

3.6 S. Shahabuddin, M. Juntti, and C. Studer, "ADMM-based Infinity Norm Detection for Large MU-MIMO: Algorithm and VLSI Architecture," IEEE International Symposium on Circuits and Systems (ISCAS), May 2017

3.7 O. Tirkkonen and C. Studer, "Subset-Codebook Precoding for 1-bit Massive Multiuser MIMO," Conference on Information Sciences and Systems (CISS), Mar. 2017

3.8 O. Castañeda, T. Goldstein, and C. Studer, "POKEMON: A Non-Linear Beamforming Algorithm for 1-bit Massive MIMO," IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Mar. 2017

3.9 I. Labutov and C. Studer, "JAG: Joint Assessment and Grading," 31st AAAI Conference on Artificial Intelligence, Feb. 2017

3.10 K. Li, R. Sharan, Y. Chen, T. Goldstein, J. R. Cavallaro, and C. Studer "Decentralized Beamforming for Massive MU-MIMO on a GPU Cluster," 4th IEEE Global Conference on Signal and Information Processing (GlobalSIP), Dec. 2016

3.11 S. Jacobsson, G. Durisi, M. Coldrey, T. Goldstein, and C. Studer, "Non-Linear 1-Bit Precoding for Massive MU-MIMO with Higher-Order Modulation," Asilomar Conference on Signals, Systems, and Computers, Nov. 2016 **(invited paper)**

3.12 K. Li, R. Sharan, Y. Chen, J. R. Cavallaro, and C. Studer "Decentralized Data Detection for Massive MU-MIMO on a Xeon PI," Asilomar Conference on Signals, Systems, and Computers, Nov. 2016 **(invited paper)**

3.13 S. Shah, A. Kumar, D. Jacobs, C. Studer, and T. Goldstein, "Biconvex Relaxation for Semidefinite Programming in Computer Vision," 14th European Conference on Computer Vision (ECCV), Oct. 2016

3.14 D. Vats, A. S. Lan, C. Studer, and R. G. Baraniuk, "Optimal Ranking of Test Items using the Rasch Model," Proc. 51th Annual Allerton Conference on Communication, Control, and Computing, Sep. 2016

3.15 I. Labutov, H. Lipson, and C. Studer, "Optimally Discriminative Choice Sets in Discrete Choice Models: Application to Data-Driven Test Design," 22nd ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Aug. 2016

3.16 *C. Jeon, A. Maleki, and C. Studer, "On the Performance of Mismatched Data Detection in Large MIMO Systems," Proc. IEEE International Symposium on Information Theory (ISIT), July 2016

3.17 *I. Labutov and C. Studer, "Calibrated Self Assessment," International Conference on Educational Data Mining (EDM), June 2016, **(best student paper award)**

3.18 *A. S. Lan, T. Goldstein, R. G. Baraniuk, and C. Studer, "Dealbreaker: A Nonlinear Latent Variable Model for Educational Data," International Conference on Machine Learning (ICML), Jun. 2016

3.19 S. Shah, T. Goldstein, and C. Studer "Estimating Sparse Signals with Smooth Support via Convex Programming and Block Sparsity," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 2016

3.20 M. Wu, C. Dick, J. R. Cavallaro, and C. Studer, "FPGA Design of a Coordinate Descent Data Detector for Large-Scale MU-MIMO," IEEE International Symposium on Circuits and Systems (ISCAS), May 2016

3.21 O. Castañeda, T. Goldstein, and C. Studer, "FPGA Design of Approximate Semidefinite Relaxation for Data Detection in Large MIMO Wireless Systems," IEEE International Symposium on Circuits and Systems (ISCAS), May 2016

3.22 I. Labutov, K. Luu, H. Lipson, and C. Studer, "Optimally Discriminative Choice Sets in Discrete Choice Models: Application to Data-Driven Test Design," L@S: Third Annual ACM Conference on Learning at Scale, Apr. 2016

3.23 N. E. Tunali, M. Wu, C. Dick, and C. Studer, "Linear Large-Scale MIMO Data Detection for 5G Multi-Carrier Waveform Candidates," Asilomar Conference on Signals, Systems, and Computers, Nov. 2015 **(invited paper)**

3.24 K. Li, B. Yin, M. Wu, J. R. Cavallaro, and C. Studer, "Accelerating Massive MIMO Uplink Detection on GPU for SDR Systems," IEEE Dallas Circuits and Systems Conference, Oct. 2015

3.25 *R. Ghods, C. Jeon, A. Maleki, and C. Studer, "Optimal Large-MIMO Data Detection with Transmit Impairments," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Sep. 2015

3.26 C. Jeon, R. Ghods, A. Maleki, and C. Studer, "Optimality of Large MIMO Detection via Approximate Message Passing," Proc. IEEE International Symposium on Information Theory (ISIT), June 2015

3.27 S. Jacobson, G. Durisi, M. Coldrey, U. Gustavsson, and C. Studer, "One-Bit Massive MIMO: Channel Estimation and High-Order Modulations," Proc. IEEE International Conference on Communications (ICC), June 2015

3.28 B. Yin, M. Wu, J. R. Cavallaro, and C. Studer, "VLSI design of large-scale soft-output MIMO detection using conjugate gradients," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), May 2015

3.29 C. Roth, C. Studer, G. Karakonstantis, and A. Burg, "Statistical Data Correction for Unreliable Memories," Proc. Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2014

3.30 B. Yin, M. Wu, J. R. Cavallaro, and C. Studer, "Conjugate Gradient-based Soft-Output Detection and Precoding in Massive MIMO Systems," Proc. IEEE Global Communications Conference (GLOBECOM), Dec. 2014

3.31 M. Wu, C. Dick, J. R. Cavallaro, and C. Studer, "Iterative Detection and Decoding in 3GPP LTE-based Massive MIMO Systems," 22nd European Signal Processing Conference (EU-SIPCO), Sept. 2014 **(invited paper)**

3.32 D. Bellasi, L. Bettini, C. Benkeser, T. Burger, Q. Huang, and C. Studer, "Compressive Sensing Spectrum Recovery from Quantized Measurements in 28 nm SOI CMOS," 22nd European Signal Processing Conference (EUSIPCO), Sep. 2014

3.33 D. Bellasi, L. Bettini, C. Benkeser, T. Burger, Q. Huang, and C. Studer, "A 1.9 GS/s 4-bit Sub-Nyquist Flash ADC for 3.8 GHz Compressive Spectrum Sensing in 28 nm CMOS," Midwest Symposium on Circuits and Systems (MWSCAS), Aug. 2014

3.34 A. S. Lan, C. Studer, and R. G. Baraniuk, "Time-Varying Learning and Content Analytics via Sparse Factor Analysis," 20th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Aug. 2014

3.35 A. S. Lan, C. Studer, and R. G. Baraniuk, "Quantized Matrix Completion for Personalized Learning," Proc. 7th International Conference on Educational Data Mining (EDM), July 2014

3.36 B. Yin, M. Wu, G. Wang, C. Dick, J. R. Cavallaro, and C. Studer, "A 3.8 Gb/s Large-Scale MIMO Detector for 3GPP LTE-Advanced," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014

3.37 A. S. Lan, C. Studer, and R. G. Baraniuk, "Matrix Recovery from Quantized and Corrupted Measurements," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014

3.38 A. E. Waters, C. Studer, and R. G. Baraniuk, "Bayesian Pairwise Collaboration Detection in Educational Datasets," 1st IEEE Global Conference on Signal and Information Processing (GlobalSIP), Austin, TX, USA, Dec. 2013 **(invited paper)**

3.39 B. Yin, M. Wu, C. Studer, and J. R. Cavallaro, "Full-Duplex in Large-Scale Wireless Systems," Proc. Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2013

3.40 M. Wu, G. Wang, B. Yin, C. Studer, and J. R. Cavallaro, "HSPA+/LTE-A Turbo Decoder on GPU and Multicore CPU," Proc. Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2013

3.41 E. L. Dyer, C. Studer, J. T. Robinson, and R. G. Baraniuk, "A Robust and Efficient Method to Recover Neural Events from Noisy and Corrupted Data," Proc. 6th International IEEE EMBS Neural Engineering Conference, San Diego, CA, Nov., 2013

3.42 C. Studer, G. Pope, P. Navarro, and R. G. Baraniuk, "Recovering Sparse Low-rank Blocks in Tandem Mass Spectrometry," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, Oct. 2013

3.43 D. Vats, C. Studer, A. S. Lan, L. Carin, and R. G. Baraniuk, "Test-size Reduction for Concept Estimation," Proc. 6th International Conference on Educational Data Mining (EDM), Memphis, TN, July 2013

3.44 A. S. Lan, C. Studer, A. E. Waters, and R. G. Baraniuk, "Joint Topic Modeling and Factor Analysis of Textual Information and Graded Response Data," Proc. 6th International Conference on Educational Data Mining (EDM), Memphis, TN, July 2013

3.45 A. S. Lan, C. Studer, A. E. Waters, and R. G. Baraniuk, "Tag-Aware Ordinal Sparse Factor Analysis for Learning and Content Analytics," Proc. 6th International Conference on Educational Data Mining (EDM), Memphis, TN, July 2013

3.46 D. Vats, C. Studer, and R. G. Baraniuk, "Test-size Reduction Using Sparse Factor Analysis," Proc. 10th International Conference on Sampling Theory and Applications (SampTA), Bremen, Germany, July 2013

3.47 G. Pope, C. Aubel, and C. Studer, "Learning Phase-Invariant Dictionaries," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.48 E. L. Dyer, C. Studer, and R. G. Baraniuk, "Subspace Clustering with Dense Representations," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.49 B. Yin, M. Wu, C. Studer, J. R. Cavallaro, and C. Dick, "Implementation Trade-offs for Linear Detection in Large-Scale MIMO Systems," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.50 G. Pope, M. Lerjen, S. Müllener, S. Schläpfer, T. Walti, J. Widmer, and C. Studer, "Light Curtain Localization via Compressive Sensing," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.51 A. Lan, A. E. Waters, and C. Studer, "Sparse Probit Factor Analysis for Learning Analytics," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013, **(invited paper)**

3.52 L. Xu, A. Sankaranarayanan, C. Studer, Y. Li, R. G. Baraniuk, and K. F. Kelly, "Multi-Scale Compressive Video Acquisition," Proc. Computational Optical Sensing and Imaging, Arlington VA, June 2013

3.53 M. Wu, Bei Yin, A. Vosoughi, C. Studer, and J. Cavallaro, "Approximate Matrix Inversion for High-Throughput Data Detection in the Large-Scale MIMO Uplink," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Beijing, China, May 2013

3.54 P. Maechler, D. Bellasi, A. Burg, N. Felber, H. Kaeslin, and C. Studer, "Sparsity-Based Real-Time Audio Restoration," Proc. Conference on Design & Architectures for Signal & Image Processing (DASIP), Karlsruhe, Germany, Oct. 2012

3.55 N. Preyss, A. Burg, and C. Studer "Layered Detection and Decoding in MIMO Wireless Systems", Proc. Conference on Design & Architectures for Signal & Image Processing (DASIP), Karlsruhe, Germany, Oct. 2012 **(invited paper)**

3.56 C. Studer, W. Yin, and R. G. Baraniuk, "Signal Representations with Minimum ℓ_∞-Norm," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, Oct. 2012

3.57 C. Roth, C. Benkeser, C. Studer, G. Karakonstantis, and A. Burg, "Data Mapping for Unreliable Memories," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, Oct. 2012 **(invited paper)**

3.58 A. Bracher, G. Pope, and C. Studer, "Coherence-Based Probabilistic Recovery Guarantees for Sparsely Corrupted Signals," IEEE Information Theory Workshop (ITW), Lausanne, Switzerland, Sep. 2012

3.59 C. Studer and E. G. Larsson, "PAR-Aware Multi-user Pre-coder for the Large-Scale MIMO-OFDM Downlink," Proc. IEEE 9th International Symposium on Wireless Communication Systems (ISWCS), Paris, France, Aug. 2012 **(invited paper)**

3.60 C. Aubel, C. Studer, G. Pope, and H. Bölcskei, "Separation of Signals Sparsified by Morphologically Different Redundant Transforms," Proc. IEEE International Symposium on Information Theory, Cambridge, MA, USA, July. 2012

3.61 A. Sankaranarayanan, C. Studer, and R. G. Baraniuk, "CS-MUVI: Video Compressive Sensing for Spatial-Multiplexing Cameras," Proc. IEEE International Conference on Computational Photography (ICCP), Seattle, WA, USA, Apr. 2012

3.62 C. Studer and R. G. Baraniuk, "Dictionary Learning from Sparsely Corrupted or Compressed Signals," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Kyoto, Japan, Mar. 2012

3.63 G. Pope, C. Studer, and M. Baes, "Coherence-based Recovery Guarantees for Generalized Basis-Pursuit De-Quantizing," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Kyoto, Japan, Mar. 2012

3.64 G. Pope, M. Baumann, C. Studer, and G. Durisi, "Real-Time Principal Component Pursuit," Proc. 45th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2011

3.65 C. Studer and R. G. Baraniuk, "Recovery Guarantees for Restoration and Separation of Approximately Sparse Signals," Proc. 49th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, pp. 736–743, Sept. 2011

3.66 C. Studer, P. Kuppinger, G. Pope, and H. Bölcskei, "Sparse Signal Recovery from Sparsely Corrupted Measurements," Proc. IEEE International Symposium on Information Theory, St. Petersburg, Russia, pp. 1422–1426, Aug. 2011

3.67 C. Studer, M. Wenk, and A. Burg, "System-Level Implications of Residual Transmit-RF Impairments in MIMO Systems," Proc. IEEE 4th European Conference on Antennas and Propagation (EUCAP), Rome, Italy, pp. 2686–2689, Apr. 2011 **(invited paper)**

3.68 C. Roth, A. Cevrero, C. Studer, Y. Leblebici, and A. Burg, "Area, Throughput, and Energy-Efficiency Trade-offs in the VLSI Implementation of LDPC Decoders," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Rio de Janeiro, Brazil, pp. 1772–1775, May 2011 **(invited paper)**

3.69 C. Roth, P. Meinerzhagen, C. Studer, and A. Burg, "A 15.8 pJ/bit/iter Quasi-Cyclic LDPC Decoder for IEEE 802.11n in 90 nm CMOS," Proc. IEEE Asian Solid-State Circuit Conference (A-SSCC), Beijing, China, pp. 1–4, Nov. 2010

3.70 C. Novak, C. Studer, A. Burg, and G. Matz, "The Effect of Unreliable LLR Storage on the Performance of MIMO-BICM," Proc. 44th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 736–740, Sept. 2010

3.71 M. Wenk, L. Bruderer, A. Burg, and C. Studer, "Area- and Throughput-Optimized VLSI Architecture of Sphere Decoding," Proc. IEEE/IFIP International Conference on VLSI and System-on-Chip (VLSI-SoC), Madrid, Spain, pp. 189–194, Sept. 2010

3.72 C. Studer, S. Fateh, and D. Seethaler, "A 757 Mb/s 1.5 mm^2 90 nm CMOS Soft-Input Soft-Output MIMO Detector for IEEE 802.11n," Proc. IEEE European Solid State Circuits Conference (ESSCIRC), Seville, Spain, pp. 520–533, Sept. 2010

3.73 L. Bruderer, C. Studer, M. Wenk, D. Seethaler, and A. Burg, "VLSI Implementation of a Low-Complexity LLL Lattice Reduction Algorithm for MIMO Detection," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Paris, France, pp. 3745–3748, May 2010

3.74 B. Zimmermann and C. Studer, "FPGA-based Real-Time Acoustic Camera Prototype," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Paris, France, pp. 1419-1421, May 2010

3.75 C. Studer, M. Wenk, and A. Burg, "MIMO Transmission with Residual Transmit-RF Impairments," Proc. International ITG Workshop on Smart Antennas (WSA), Bremen, Germany, pp. 189–196, Feb. 2010

3.76 C. Studer, C. Benkeser, S. Belfanti, and Q. Huang, "A 390 Mb/s 3.57 mm^2 3GPP-LTE Turbo Decoder ASIC in 0.13 µm CMOS," Dig. Techn. Papers, IEEE International Solid-State Circuits Conference (ISSCC), San Francisco, CA, USA, pp. 274–275, Feb. 2010

3.77 D. Seethaler, J. Jaldén, C. Studer and H. Bölcskei, "Tail Behavior of Sphere-Decoding Complexity in Random Lattices," Proc. IEEE International Symposium on Information Theory (ISIT), Seoul, Korea, pp. 729–733, June 2009

3.78 C. Studer, D. Seethaler, and H. Bölcskei, "Finite Lattice-Size Effects in MIMO Detection," Proc. 42th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 2032–2037, Oct. 2008 **(invited paper)**

3.79 C. Studer, N. Preyss, C. Roth, and A. Burg, "Configurable High-Throughput Decoder Architecture for Quasi-Cyclic LDPC Codes," Proc. 42th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 1137–1142, Oct. 2008 **(invited paper)**

3.80 P. Luethi, C. Studer, S. Duetsch, E. Zgraggen, H. Kaeslin, N. Felber, and W. Fichtner, "Gram-Schmidt-Based QR Decomposition for MIMO Detection: VLSI Implementation and Comparison," Proc. IEEE Asia Pacific Conference on Circuits and Systems (APCCAS), Macao, China, pp. 830–833, Nov. 2008

3.81 C. Studer and H. Bölcskei, "Soft-Input Soft-Output Sphere Decoding," Proc. IEEE International Symposium on Information Theory (ISIT), Toronto, Canada, pp. 2007–2011, July 2008

3.82 C. Studer, P. Luethi, and W. Fichtner, "VLSI Architecture for Data-Reduced Steering Matrix Feedback in MIMO Systems," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Seattle, WA, USA, pp. 300–303, May 2008 **(best student paper award)**

3.83 C. Senning, C. Studer, P. Luethi, and W. Fichtner, "Hardware-Efficient Steering Matrix Computation Architecture for MIMO Communication Systems," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Seattle, WA, USA, pp. 304–307, May 2008

3.84 C. Studer, P. Blösch, P. Friedli, and A. Burg, "Matrix Decomposition Architecture for MIMO Systems: Design and Implementation Trade-Offs," Proc. 41th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 1986–1990, Nov. 2007 **(invited paper; 1st place at student paper contest)**

3.85 D. Perels, C. Studer, and W. Fichtner, "Implementation of a Low-Complexity Frame-Start Detection Algorithm for MIMO Systems," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), New Orleans, LA, USA, pp. 1903-1906, May 2007

3.86 C. Hess, M. Wenk, A. Burg, P. Luethi, C. Studer, N. Felber, and W. Fichtner, "Reduced-Complexity MIMO Detector with Close-to ML Error Rate Performance," Proc. ACM Great Lakes Symposium on VLSI, Stresa, Italy, pp. 200–203, Mar. 2007

3.87 M. Wenk, A. Burg, M. Zellweger, C. Studer, and W. Fichtner, "VLSI Implementation of the List Sphere Algorithm," Proc. 24th NORCHIP Conference, Linköping, Sweden, pp. 107–110, Nov. 2006

3.88 C. Studer, M. Wenk, A. Burg, and H. Bölcskei, "Soft-Output Sphere Decoding: Performance and Implementation Aspects," Proc. 40th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 2071–2076, Oct. 2006 **(invited paper)**

3.89 C. Studer, A. Burg, and W. Fichtner, "A Unification of ML-Optimal Tree-Search Decoders," Proc. 40th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 2185–2189, Oct. 2006

3.90 A. Burg, M. Borgmann, M. Wenk, C. Studer, and H. Bölcskei, "Advanced Receiver Algorithms for MIMO Wireless Communications," Proc. Design Automation and Test Europe Conference (DATE), pp. 593–598, Mar. 2006 **(invited paper)**

4. Theses

4.1 C. Studer, "Iterative MIMO Decoding: Algorithm and VLSI Implementation Aspects," Ph.D. dissertation, Department of Information Technology and Electrical Engineering, ETH Zurich, Zurich, Switzerland, Series in Microelectronics, Vol. 202, Hartung-Gorre Verlag Konstanz, July 2009 **(ETH Medal for doctoral dissertation)**

4.2 C. Studer, "Sphere Decoding with Resource Constraints," M.S. Thesis, Department of Information Technology and Electrical Engineering, ETH Zurich, Zurich, Switzerland, Oct. 2005 **(ETH Medal for M.S. Thesis)**

5. Press

5.1 Inside R&D Alert, "Algorithms Recover Damaged Signals," Frost & Sullivan, Oct. 2014

5.2 Projects Magazine on Science, Technology, and Innovation, "Sparse Signal Recovery: Novel ways of restoring damaged signals," Insight Publishers Ltd, No. 31, Apr. 2013

6. Live demonstrations, workshop papers, and extended abstracts

6.1 H. Li, S. De, Z. Xu, C. Studer, and T. Goldstein "Towards a Deeper Understanding of Training Quantized Neural Networks," ICML 2017 Workshop on Principled Approaches to Deep Learning (PADL), July 2017

6.2 M. Pelissier and C. Studer, "NUWBS: Non-Uniform Wavelet Bandpass Sampling for Compressive RF Feature Acquisition," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, June 2017

6.3 T. Goldstein and C. Studer, "PhaseMax: Convex Phase Retrieval Without Lifting," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, June 2017

6.4 Z. Xu, S. De, M. A. T. Figueiredo, C. Studer, and T. Goldstein, "An Empirical Study of ADMM for Nonconvex Problems," Neural Information Processing Systems (NIPS), in Workshop on Nonconvex Optimization for Machine Learning: Theory and Practice, Barcelona, Spain, Dec. 2016

6.5 I. Labutov and C. Studer, "Work-in-progress: Simultaneous Generation and Assessment of Content," 4th AAAI Conference on Human Computation and Crowdsourcing (HCOMP), Oct. 2016

6.6 I. Labutov and C. Studer, "Joint Assessment and Grading," International Conference on Machine Learning (ICML), Machine Learning for Digital Education Workshop, June 2016

6.7 A. S. Lan, T. Goldstein, C. Studer, and R. G. Baraniuk, "Modeling Student Responses Using the Dealbreaker Model," International Conference on Machine Learning (ICML) Workshop on Machine Learning for Education, July 2015

6.8 C. Studer, T. Goldstein, W. Yin, and R. G. Baraniuk, "Efficient Algorithms for ℓ_∞-Norm Minimization," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2015

6.9 C. Studer,"Nullspace Condition, Uncertainty Relation, and Recovery Guarantee for Signals with Low Density," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2015

6.10 A. S. Lan, C. Studer, and R. G. Baraniuk, "Self-Expressive Clustering of Binary Data via Group Sparsity," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2015

6.11 T. Goldstein, C. Studer, and R. G. Baraniuk, "Forward-Backward Splitting Made FASTA," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2015

6.12 E. Dyer, C. Studer, and R. G. Baraniuk, "Subspace Clustering Reloaded: Sparse vs. Dense Representations," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2013

6.13 A. Taeb, A. Maleki, C. Studer, and R. G. Baraniuk, "Maximin Analysis of Message Passing Algorithms for Recovering Block Sparse Signals," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2013

6.14 G. Pope, C. Studer, P. Navarro, and R. G. Baraniuk, "Recovering Sparse Low-rank Blocks in Mass Spectrometry," Signal Processing with Adaptive Sparse Structured Representations (SPARS) workshop, July 2013

6.15 D. Bellasi, P. Maechler, A. Burg, N. Felber, and C. Studer, "Real-Time Audio Restoration using Compressive Sensing," IEEE International Symposium on Circuits and Systems (ISCAS), Beijing, China, May 2013 **(best demo award)**

6.16 A. Lan, A. E. Waters, C. Studer, and R. G. Baraniuk, "Learning Analytics via Sparse Factor Analysis," Neural Information Processing Systems (NIPS), in Personalizing Education with Machine Learning Workshop, Lake Tahoe, NV, Dec. 2012

6.17 A. E. Waters, A. Lan, C. Studer, and R. G. Baraniuk, "Sparse Factor Analysis for Learning Analytics," Neural Information Processing Systems (NIPS), in Deep Learning & Feature Extraction Workshop, Lake Tahoe, NV, Dec. 2012

6.18 J. V. Shi, A. Sankaranarayanan, C. Studer, and R. G. Baraniuk, "Video Compressive Sensing for Dynamic MRI," 21st Annual Computational Neuroscience Meeting (CNS), Atlanta, GA, USA, July 2012

6.19 A. E. Waters, A. Lan, C. Studer, and R. G. Baraniuk, "Sparse Factor Analysis for Cognitive Tutoring," The Learning Workshop, Snowbird, UT, USA, April. 2012

6.20 B. Zimmermann and C. Studer, "FPGA-based Real-Time Acoustic Camera Prototype," IEEE International Symposium on Circuits and Systems (ISCAS), Paris, France, May 2010

7. Invited talks and poster presentations

7.1 C. Studer, "Massive MU-MIMO for 5G: Practical Challenges and Solutions," talk at Huawei's Strategy and Technology Workshop (STW), Shenzhen, China, May 2017

7.2 C. Studer, "Fast Low-PAR Precoding for Massive MU-MIMO-OFDM (and something else)," talk at Ericsson AB, Göteborg, Sweden, Dec. 2016

7.3 M. Pelissier and C. Studer, "Adaptive Compressive Sensing for Radio-Frequency Receivers," Asilomar Conference on Signals, Systems, and Computers, Nov. 2016

7.4 C. Studer, "Quantized Precoding for Massive MU-MIMO," talk at Syracuse University, Syracuse, NY, Aug. 2016

7.5 C. Studer, "Compressive Sensing Techniques for Massive MIMO," talk at the US Global Strategy Meeting, Huawei, Bridgewater, NJ, June. 2016.

7.6 C. Studer, "Hardware-Aware Data Detection and Precoding in Massive MIMO Systems," talk at Ericsson AB, Göteborg, Sweden, Aug. 2015.

7.7 C. Studer, "Hardware-Aware Data in Massive MIMO Systems," talk at Princeton University, Princeton, NJ, May 2015.

7.8 C. Studer, "Hardware-Aware Data Detection and Precoding in Massive MIMO Systems," talk at Xilinx Inc., San Jose, CA, Nov. 2014.

7.9 C. Studer, "Analog-to-Information Converters: From Applications to Circuits," talk at Qualcomm, San Diego, CA, Nov. 2014.

7.10 C. Studer, "Hardware-Aware Data Detection and Precoding in Massive MIMO Systems," talk at Qualcomm, San Diego, CA, Nov. 2014.

7.11 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at Rambus Inc., Sunnyvale, CA, Oct. 2014.

7.12 C. Studer, "Analog-to-Information Converters: From Applications to Circuits," talk at University of Massachusetts Amherst, Amherst, Oct. 2014.

7.13 C. Studer, "Analog-to-Information Converters: From Applications to Circuits," talk for the Cornell Electron Devices Society (EDS), Cornell University, Ithaca, Sept. 2014.

7.14 C. Studer, "Analog-to-Information Converters: From Applications to Circuits," plenary talk at GdR ISIS and SoC-SiP workshop on "Acquisition/Echantillonnage comprimé: quelled réalitations/applications pratiques?" at the Télécom ParisTech, Paris, France, Sept. 2014.

7.15 C. Studer, "Landing a Faculty Position," talk for the Women Excel network, ECE Department at Rice University, TX, USA, Oct. 2013

7.16 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at Washington University of St. Louis, MO, USA, Mar. 2013

7.17 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at University of Pennsylvania, PA, USA, Mar. 2013

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7.20 C. Studer, "Wideband Compressive Sensing: From Theory to VLSI Circuits," talk at University California Los Angeles, CA, USA, Feb. 2013

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7.28 C. Studer, "ASIC Implementation of Soft-Input Soft-Output MIMO Detection Using MMSE Parallel Interference Cancellation," talk at Department of Electrical and Computer Engineering, Rice University, TX, USA, May 2011

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