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Forty-Ninth Asilomar Conference on Signals, Systems and Computers

November 8–11, 2015
Asilomar Hotel and
Conference Grounds

Technical Co-sponsor

IEEE
Signal Processing Society ®

FORTY-NINTH ASILOMAR CONFERENCE ON SIGNALS, SYSTEMS AND COMPUTERS

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General Chair
Erik G. Larsson
Department of Electrical Engineering
Linköping University
SE-581 83 Linköping, Sweden
Email: erik.g.larsson@liu.se

Technical Program Chair
Tim Davidson
Department of Electrical and Computer Engineering)
McMaster University
1280 Main Street West
Hamilton, Ontario, L8S 4K1, Canada
Email: davidson@mcmaster.ca

Conference Coordinator
Monique P. Fargues
Department of Electrical & Computer Engineering
Naval Postgraduate School
Monterey, CA 93943
E-mail: fargues@asilomarssc.org

Publication Chair
Michael Matthews
Orbital ATK
10 Ragsdale Drive, Suite 201
Monterey, CA 93940
E-mail:
michael.matthews@orbitalatk.com

Publicity Chair
Linda S. DeBrunner
Department of Electrical & Computer Engineering
Florida State University
Tallahassee, FL 32310-6046
E-mail:
Linda.debrunner@eng.fsu.edu

Finance Chair
Ric Romero
Department of Electrical & Computer Engineering
Naval Postgraduate School
Monterey, CA 93943-5121
E-mail: treasurer@asilomarssc.org

Electronic Media Chair
Marios Pattichis
Department of Electrical & Computer Engineering
MSC01 1100, 1
University of New Mexico
Albuquerque, NM 87131-0001

Student Paper Contest Chair
TBD

Welcome from the General Chairman

Prof. Erik G. Larsson
Linköping University, Sweden

Welcome to the 49th Asilomar Conference on Signals, Systems, and Computers!

It is a privilege for me to serve as General Chair of the Asilomar conference this year. Asilomar is a unique conference and I believe what makes it so special is the combination of an exceptional quality of the technical presentations and papers, the congenial atmosphere that forms around the social events, and the opportunity for long outdoor walks along the California coast. For me personally, Asilomar stands out as the one conference that I have tried, and am trying to consistently attend since I first participated fifteen years ago.

We are looking forward to an exciting technical program that spans two and a half days. All credit for preparing the technical program goes to the Technical Chair, Prof. Timothy Davidson and his team of area chairs: Wei Yu, David Love, Randall Berry, Bhaskar Rao, Gerald Matz, Aleksandar Jeremic, Warren Gross, Shahram Shirani and Keshab Parhi (vice chair). I would like to thank Tim and his team for assembling the program, which this year consists of 363 papers, of which 158 are invited. Among these papers, 78 were submitted to the student paper contest and a list of finalists have been selected. The finalists in the student contest will present their contributions as posters to a committee of judges on Sunday afternoon and of course, everyone is invited to attend. The top-three ranked papers will then be awarded prizes at the Monday plenary session.

The plenary talk this year will be given by Prof. Frank R. Kschischang from the University of Toronto. Frank is an authority in information theory and coding with applications to wireline, wireless as well as optical communications. The topic of his talk is applications of the nonlinear Fourier transform, a signal analysis technique first introduced by mathematicians and physicists in the 1970s and now used to analyze optical communication links, where nonlinearities are present. I am greatly excited about this talk and the opportunity for us all to learn from a world-renowned expert about this advanced and useful tool.

It has been an honor to serve as General Chair, and I hope that you will all enjoy the conference.

Erik G. Larsson
Linköping University, Sweden, July 2015

Conference Steering Committee

PROF. MONIQUE P. FARGUES
President & Chair
Electrical & Computer Eng. Dept.
Code EC/Fa
Naval Postgraduate School
Monterey, CA 93943-5121
fargues@asilomarssc.org

PROF. VICTOR DEBRUNNER
Vice Chair/President
Electrical & Computer Eng. Dept.
Florida State University
2525 Pottsdamer Street, Room A-341-A
Tallahassee, FL 32310-6046
victor.debrunner@eng.fsu.edu

PROF. SHERIF MICHAEL
Secretary
Electrical & Computer Eng. Dept.
Code EC/Mi
Naval Postgraduate School
Monterey, CA 93943-5121
michael@nps.edu

PROF. RIC ROMERO
Treasurer
Electrical & Computer Eng. Dept.
Code EC/Rr
Naval Postgraduate School
Monterey, CA 93943-5121
treasurer@asilomarssc.org

PROF. SCOTT ACTON
Electrical & Computer Eng. Dept.
University of Virginia
P.O. Box 400743
Charlottesville, VA 22904-4743
acton@virginia.edu

PROF. MAITE BRANDT-PEARCE
Electrical & Computer Eng. Dept.
University of Virginia
P.O. Box 400743
Charlottesville, VA 22904
mb-p@virginia.edu

PROF. LINDA DEBRUNNER
Publicity Chair
Electrical & Computer Eng. Dept.
Florida State University
2525 Pottsdamer Street, Room A-341-A
Tallahassee, FL 32310-6046
linda.debrunner@eng.fsu.edu

PROF. MILOS ERCEGOVAC
Computer Science Dept.
University of California at Los Angeles
Los Angeles, CA 90095

PROF. BENJAMIN FRIEDLANDER
Computer Eng. Dept.
University of California
1156 High Street, MS:SOE2
Santa Cruz, CA 95064
Benjamin.friedlander@gmail.com

PROF. FREDRIC J. HARRIS
Electrical Eng. Dept.
San Diego State University
San Diego, CA 92182
fred.harris@sdsu.edu

DR. RALPH D. HIPPENSTIEL
San Diego, CA 92126
rhippenstiel@yahoo.com

PROF. W. KENNETH JENKINS
Electrical Eng. Dept.
The Pennsylvania State University
209C Electrical Engineering West
University Park, PA 16802-2705
jenkins@engr.psu.edu

PROF. FRANK KRAGH
Electrical & Computer Eng. Dept.
Code EC/Kr
Naval Postgraduate School
Monterey, CA 93943-5121
frank.kragh@ieee.org

DR. MICHAEL B. MATTHEWS
Publications Chair
Orbital ATK
10 Ragsdale Drive, Suite 201
Monterey, CA 93940
michael.matthews@orbitalatk.com

DR. MARIOS PATTICHIS
Electronic Media Chair
Electrical & Computer Eng. Dept.
MSC01 1100
1 University of New Mexico
ECE Bldg., Room: 229A
Albuquerque, NM 87131-000
Pattichis@ece.unm.edu

PROF. JAMES A. RITCEY
Nominating Committee Chair
Electrical Eng. Dept.
Box 352500
University of Washington
Seattle, Washington 98195
ritcey@ee.washington.edu

DR. MICHAEL SCHULTE
AMD Research
7171 Southwest Parkway
Austin, TX 78739
Michael.schulte@amd.com

PROF. EARL E. SWARTZLANDER, JR.
Electrical & Computer Eng. Dept.
University of Texas at Austin
Austin, TX 78712
eswartzla@aol.com

PROF. KEITH A. TEAGUE
School Electrical & Computer
Engineering / 202ES
Oklahoma State University
Stillwater, OK 74078
Keith.teague@okstate.edu

PROF. ROGER WOODS
General Program Chair (ex officio)
Year 2014
EECS School
Queen's University, Belfast
BT3 9DT, Belfast, UK
r.woods@qub.ac.uk

PROF. ERIK G. LARSSON
General Program Chair (ex officio)
Year 2015
Dept. of Electrical Engineering
Linköping University
SE-581 83 Linköping, Sweden
erik.g.larsson@liu.se

PROF. PHIL SCHNITER
General Program Chair (ex officio)
Year 2016
ECE Department
Ohio State University
616 Dreese Laboratories
2015 Neil Ave
Columbus, OH 43210
schniter.1@osu.edu

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Technical Chair
Prof. Timothy Davidson
McMaster University

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TRACK C: NETWORKS
Randall Berry
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TRACK D: SIGNAL PROCESSING AND ADAPTIVE SYSTEMS
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2015 Asilomar Conference Session Schedule

Sunday Afternoon, November 8, 2015

3:00–7:00 PM Registration — Merrill Hall
4:00–6:30 PM Student Paper Contest — Heather
7:00–9:00 PM Welcoming Dessert Reception — Merrill Hall

Monday Morning, November 9, 2015

7:30–9:00 AM Breakfast – Crocker Dining Hall
8:00 AM–6:00 PM Registration
8:15–9:45 AM MA1a — Conference Welcome and Plenary Session — Chapel
9:45–10:15 AM Coffee Social

10:15–11:55 AM MORNING SESSIONS
MA1b FANTASTIC-5G on MTC
MA2b Interference Management: New Techniques and Emerging Challenges
MA3b Optimization of Wireless Networks
MA4b Bayesian Methods for Compressed Sensing
MA5b Radar Signal Processing
MA6b Large Data Sets
MA7b Biological Communication
MA8b1 Cognitive Radio (Poster)
MA8b2 Parallel Processing (Poster)
MA8b3 Adaptive Filtering (Poster)
MA8b4 Synchronization and Localization (Poster)

12:00–1:00 PM Lunch – Crocker Dining Hall

Monday Afternoon, November 9, 2015

1:30–5:10 PM AFTERNOON SESSIONS
MP1a Underwater Acoustic Communications and Signal Processing
MP1b Physical Layer Security
MP2 Distributed Coherent Communication Systems)
MP3 5G Cellular Networks
MP4a Distributed Signal Processing
MP4b Designing Sparse Sensing Structures
MP5a Co-Prime Arrays
MP5b MIMO Radar
MP6 Signal Processing and Optimization Methods for Big Data Analytics
MP7a Signal Processing in Biology: Theoretical Advances and Open Problems
MP7b ECG and EEG Signal Processing
MP8a1 Implementation of Digital Signal Processing Algorithms (Poster)
MP8a2 Sparsity and Compressed Sensing (Poster)
MP8a3 Applications of Adaptive Signal Processing (Poster)
MP8a4 Wireless and Sensor Networks (Poster)

Monday Evening, November 9, 2015

6:00–9:30 PM Conference Cocktail/Social — Merrill Hall
The Cocktail/Social takes the place of Monday's dinner. No charge for conference attendees and a guest.

2015 Asilomar Conference Session Schedule
(continued)

Tuesday Morning, November 10, 2015

7:30–9:00 AM Breakfast — Crocker Dining Hall
8:00 AM–5:00 PM Registration

8:15–11:55 AM MORNING SESSIONS
TA1a Topics in Communications
TA1b Coding and Signal Processing for Modern Memories
TA2a All About Spectrum
TA2b Methodologies for Signal Processing on Random Graphs
TA3a Estimation
TA3b Wearable and Body Area Networks
TA4 Special Session
TA5a Smart Grid
TA5b Energy Management
TA6a Massive MIMO
TA7 Arithmetic
TA8a1 Biomedical Signal Processing I (Poster)
TA8a2 Relayed Communications I (Poster)
TA8b1 Sampling, Sensing and Detection (Poster)
TA8b2 Biomedical Signal Processing II (Poster)
TA8b3 Relayed Communications II (Poster)

12:00–1:00 PM Lunch – Crocker Dining Hall

Tuesday Afternoon, November 10, 2015

1:30–5:35 PM AFTERNOON SESSIONS
TP1 Coherent Optical Communications
TP2 Enabling Technologies for Future Wireless Networks
TP3a Social Networks
TP3b Caching in Wireless Networks
TP4 Special Session
TP5a Interference Channels
TP5b Interference in Networks
TP6a Multi-Agent Systems and Optimization
TP6b Epidemic Control in Networks
TP7a Algorithm and Hardware Aspects for 5G Wireless Systems
TP7b VLSI Signal Processing
TP8a1 Multicarrier and DFE (Poster)
TP8a2 Speech and Image Processing (Poster)
TP8a3 Communication Techniques for the Downlink (Poster)
TP8a4 Estimation and Learning (Poster)
TP8b1 Radar Co-existence and Satellite Communications (Poster)
TP8b2 Video Processing (Poster)
TP8b3 MIMO Links and Uplink (Poster)

Tuesday Evening Open Evening — Enjoy the Monterey Peninsula

2015 Asilomar Conference Session Schedule
(continued)

Wednesday Morning, November 11, 2015

7:30–9:00 AM	Breakfast — Crocker Dining Hall
8:00 AM–12:00 PM	Registration — Copyright forms must be turned in before the registration closes at 12:00 noon.

8:15 AM–11:55 PM MORNING SESSIONS

WA1a	Communications with Low-Precision Analog-to-Digital Converters
WA1b	Broadband Access Evolution
WA2a	Cooperative Communications
WA2b	5G and mmWave
WA3	Sparsity in Signal Processing
WA4	Statistical Signal Processing for Social and Information Networks
WA5a	Sparse Estimation
WA5b	Compressive Beamforming and Sparsity-Based Techniques
WA6a	Tracking
WA6b	Structure in Adaptive Signal Processing Algorithms
WA7a	Image Processing
WA7b	Graph Signal Processing
WA8a1	Coding and Decoding (Poster)
WA8a2	Implementation of Communication Systems (Poster)
WA8a3	Array Signal Processing (Poster)
WA8a4	Parameter and Waveform Estimation (Poster)
WA8a5	Adaptive Signal Processing Techniques (Poster)

12:00–1:00 PM Lunch — This meal is not included in the registration.

Student Paper Contest

Heather - Sunday, November 8, 2015, 4:00–6:30 PM

TBD

2015 Asilomar Conference Session Schedule

Coffee breaks will be at 9:55 AM and 3:10 PM. (except Monday morning when refreshments will be served outside Merrill Hall from 9:45–10:15 AM)

Monday, November 9, 2015

CONFERENCE WELCOME AND PLENARY SESSION 8:15–9:45 AM

1. Welcome from the General Chair

Prof. Erik G. Larsson
Linköping University, Sweden

2. Session MA1a Distinguished Lecture for the 2015 Asilomar Conference

Fiber-Optic Communication via the Nonlinear Fourier Transform

Frank R. Kschischang
University of Toronto, Canada

Abstract
In this work we explore some of the potential fiber-optic data transmission applications of the nonlinear Fourier transform (NFT), a signal analysis technique introduced by mathematicians and physicists in the 1970s. Just as the usual Fourier transform converts linear convolution to multiplication, the NFT transforms the action of the ideal (noiseless, lossless) nonlinear Schrödinger equation (and other integrable evolution equations) to the action of a multiplicative filter in the nonlinear frequency domain. One potential application is a nonlinear analogue of linear frequency-division multiplexing that, unlike many other fiber-optic transmission strategies, deals with both dispersion and nonlinearity unconditionally, without the need for dispersion or nonlinearity compensation methods.

(Joint work with Mansoor I. Yousefi and Siddarth Hari.)

Biography
Frank R. Kschischang is the Distinguished Professor of Digital Communication in the Department of Electrical and Computer Engineering at the University of Toronto, where he has been a faculty member since 1991. He received the B.A.Sc. degree (with honors) from the University of British Columbia, Vancouver, BC, Canada, in 1985 and the M.A.Sc. and Ph.D. degrees from the University of Toronto, Toronto, ON, Canada, in 1988 and 1991, respectively, all in electrical engineering. During 1997-98, he was a visiting scientist at MIT, Cambridge, MA; in 2005 he was a visiting professor at the ETH, Zurich, and in 2011 and again in 2012-13 he was a visiting Hans Fischer Senior Fellow at the Institute for Advanced Study at the Technical University of Munich.

His research interests are focused primarily on the area of channel coding techniques, applied to wireline, wireless and optical communication systems and networks. In 1999 he was a recipient of the Ontario Premier's Excellence Research Award and in 2001 (renewed in 2008) he was awarded the Tier I Canada Research Chair in Communication Algorithms at the University of Toronto. In 2010 he was awarded the Killam Research Fellowship by the Canada Council for the Arts. Jointly with Ralf Koetter he received the 2010 Communications Society and Information Theory Society Joint Paper Award. He is a recipient of the 2012 Canadian Award in Telecommunications Research. He is a Fellow of IEEE, of the Engineering Institute of Canada, and of the Royal Society of Canada.

During 1997-2000, he served as an Associate Editor for Coding Theory for the IEEE TRANSACTIONS ON INFORMATION THEORY, and since January 2014, he serves as this journal's Editor-in-Chief. He also served as technical program co-chair for the 2004 IEEE International Symposium on Information Theory (ISIT), Chicago, and as general co-chair for ISIT 2008, Toronto. He served as the 2010 President of the IEEE Information Theory Society.

Program of the
2015 Asilomar Conference on
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Technical Program Chairman
Prof. Timothy Davidson
McMaster University

Session MA1b FANTASTIC-5G on MTC

Chair: *Gerhard Wunder, Fraunhofer Heinrich-Hertz-Institut*

MA1b-1 FBMC Based Asynchronous Uplink Access 10:15 AM
Zhao Zhao, Qi Wang, Xitao Gong, Malte Schellmann, Martin Schubert, Huawei European Research Center, Germany

MA1b-2 Radio Access Protocols and Preamble Design for Machine-Type Communications in 5G 10:40 AM
Stephan Saur, Andreas Weber, Gerhard Schreiber, Alcatel-Lucent, Germany

MA1b-3 Compressive Coded Random Access for Massive MTC Traffic in 5G Systems 11:05 AM
Gerhard Wunder, Heinrich Hertz Institut, Germany; Cedomir Stefanovic, Petar Popovski, Aalborg University, Denmark

MA1b-4 A Potential Solution for MTC: Multi-Carrier Compressive Sensing Multi-User Detection 11:30 AM
Fabian Monsees, Matthias Woltering, Carsten Bockelmann, Armin Dekorsy, University of Bremen, Germany

Session MA2b Interference Management: New Techniques and Emerging Challenges

Chair: *Salman Avestimehr, University of Southern California*

MA2b-1 Interference Surge in Full-Duplex Wireless Systems 10:15 AM
Ratheesh K. Mungara, Angel Lozano, Universitat Pompeu Fabra, Spain

MA2b-2 Interference Mitigation Utilizing Antenna Mutual Coupling 10:40 AM
Wonseok Jeon, Sae-Young Chung, KAIST, Republic of Korea

MA2b-3 Optimality of Treating Interference As Noise in the IRC: A GDOF Perspective 11:05 AM
Soheil Gherekhloo, Aydin Sezgin, Ruhr-University Bochum, Germany

MA2b-4 Secure Degrees of Freedom of the Gaussian MIMO Interference Channel 11:30 AM
Karim Banawan, Sennur Ulukus, University of Maryland, United States

Session MA3b Optimization of Wireless Networks

Chair: *TBD*

MA3b-1 Frameless ALOHA with Multiple Base Stations 10:15 AM
Shun Ogata, Koji Ishibashi, The University of Electro-Communications, Japan

MA3b-2 On the Delay Optimal User Association in Heterogeneous Wireless Networks 10:40 AM
Narayan Prasad, NEC Labs America, United States; Vaibhav Singh, University of Maryland, United States; Sampath Rangarajan, NEC Labs America, United States

MA3b-3 Scheduling for Compute and Forward Networks 11:05 AM
David Ramirez, Behnaam Aazhang, Rice University, United States

MA3b-4 Carriers Allocation in Mobile Bacteria Network 11:30 AM
Wei-Kang Hsu, Mark Bell, Xiaojun Lin, Purdue University, United States

Session MA4b Bayesian Methods for Compressed Sensing

Chair: *Philip Schniter, The Ohio State University*

MA4b-1 Hierarchical Bayesian Formulation of Sparse Signal Recovery Algorithms using Scale Mixture Priors 10:15 AM
Ritwik Giri, Bhaskar D. Rao, University of California, San Diego, United States

MA4b-2 Understanding the MMSE of Compressed Sensing One Measurement at a Time 10:40 AM
Galen Reeves, Henry Pfister, Duke University, United States

MA4b-3 Connecting Bayesian and Denoising-Based Approximate Message Passing 11:05 AM
Christopher Metzler, Rice University, United States; Arian Maleki, Columbia University, United States; Richard Baraniuk, Rice University, United States

MA4b-4 On Robust Approximate Message Passing 11:30 AM
Philip Schniter, The Ohio State University, United States; Henry Pfister, Duke University, United States

Session MA5b Radar Signal Processing

Chair: *Hongbin Li, Stevens Institute of Technology*

MA5b-1 On Waveform Conditions and Range Compression in MIMO Radars using Matrix Completion 10:15 AM
Shunqiao Sun, Athina Petropulu, Rutgers, The State University of New Jersey, United States

MA5b-2 Detection of Low-Signature Targets in Rough Surface Terrain for Forward-Looking Ground Penetrating Radar Imaging 10:40 AM
Davide Comite, Fauzia Ahmad, Moeness Amin, Villanova University, United States; Traian Dogaru, US Army Research Lab, United States

MA5b-3 SQR: Successive QCQP Refinement for MIMO Radar Waveform Design under Practical Constraints 11:05 AM
Omar Aldayel, Vishal Monga, Pennsylvania State University, United States; Muralidhar Rangaswamy, Air Force Research Laboratory, United States

MA5b-4 A Sparsity Based GLRT for Moving Target Detection in Distributed MIMO Radar on Moving Platforms 11:30 AM
Zhe Wang, Hongbin Li, Stevens Institute of Technology, United States; Braham Himed, Air Force Research Laboratory/RYMD, United States

Session MA6b Large Data Sets

Chair: *TBD*

MA6b-1 Big Data Sketching with Model Mismatch 10:15 AM
Sundeep Prabhakar Chepuri, Delft University of Technology, Netherlands; Yu Zhang, University of Minnesota, United States; Geert Leus, Delft University of Technology, Netherlands; Georgios B. Giannakis, University of Minnesota, United States

MA6b-2 Change-Point Detection of High-Dimensional Streaming Data via Sketching 10:40 AM
Yuejie Chi, The Ohio State University, United States; Yihong Wu, University of Illinois at Urbana-Champaign, United States

MA6b-3 Large-Scale Subspace Clustering using Random Sketching and Validation 11:05 AM
Panagiotis Traganitis, Konstantinos Slavakis, Georgios B. Giannakis, University of Minnesota, United States

MA6b-4 Improving Multiset Canonical Correlation Analysis in High Dimensional Sample Deficient Settings 11:30 AM
Nicholas Asendorf, Raj Rao Nadakuditi, University of Michigan, United States

Session MA7b Biological Communication

Chair: *Joerg Kliewer, New Jersey Institute of Technology*

MA7b-1 Information Theory of Intercellular Signal Transduction 10:15 AM
Andrew Eckford, York University, Canada; Peter Thomas, Case Western Reserve University, United States

MA7b-2 A Stochastic Queuing Model of Quorum Sensing in Microbial Communities 10:40 AM
Nicolo Michelusi, James Boedicker, Moh El-Naggar, Urbashi Mitra, University of Southern California, United States

MA7b-3 Molecular Communication and Signaling in Human Cells 11:05 AM
Iman Habibi, Ali Abdi, New Jersey Institute of Technology, United States; Effat Emamian, Advanced Technologies for Novel Therapeutics, United States

MA7b-4 Directed Information Measures for Assessing Perceived Audio Quality using EEG 11:30 AM
Ketan Mehta, New Mexico State Univeristy, United States; Joerg Kliewer, New Jersey Institute of Technology, United States

Session MA8b1 Cognitive Radio

Chair: *TBD*

10:15 AM–11:55 AM

MA8b1-1 Efficient Wideband Spectrum Sensing using Random Projection
Soumendu Majee, Purdue University, United States; Priyadip Ray, Indian Institute of Technology Kharagpur, United States; Qi Cheng, Oklahoma State University, United States

MA8b1-2 An Agile Wideband Interferers Identification Algorithm for Spectrum Sensing
Han Yan, Danijela Cabric, University of California, Los Angeles, United States

MA8b1-3 Identifying the Presence and Footprints of Multiple Incumbent Transmitters
Mihir Laghate, Danijela Cabric, University of California, Los Angeles, United States

MA8b1-4 Sequential Detection of Number of Primary Users in Cognitive Radio Networks
Liping Du, University of Science and Technology Beijing, China; Chun-Hao Liu, Mihir Laghate, Danijela Cabric, University of California, Los Angeles, United States

MA8b1-5 Determining User Specific Spectrum Usage via Sparse Channel Characteristics
Dennis Wieruch, Fraunhofer HHI, Germany; Peter Jung, Technische Universität Berlin, Germany; Thomas Wirth, Fraunhofer HHI, Germany

MA8b1-6 Recognizing FM, BPSK and 16-QAM using Supervised and Unsupervised Learning Techniques
Mohammad Bari, George Washington University, United States; Awais Khawar, Virginia Tech, United States; Milos Doroslovacki, George Washington University, United States; Charles Clancy, Virginia Tech, United States

MA8b1-7 Design of Spectrally Shaped Binary Sequences via Randomized Convex Relaxations
Dian Mo, Marco Duarte, University of Massachusetts, United States

MA8b1-8 Dynamic Scheduling for Delay Guarantees for Heterogeneous Cognitive Radio Users
Ahmed Ewaisha, Cihan Tepedelenlioglu, Arizona State University, United States

Session MA8b2 Parallel Processing

Chair: *TBD*

10:15 AM–11:55 AM

MA8b2-1 Implementing a Streaming Application on a Processor Array: A Case Study on the Epiphany Architecture
Jerry Linström, Stefan Nannesson, Jorn W. Janneck, Lund University, Sweden

MA8b2-2 Extreme Multi-Core, Multi-Network Java Dataflow Machine (JavaFlow)
Robert Ascott, Earl E. Swartzlander, Jr., University of Texas at Austin, United States

MA8b2-3 Data-Parallel Implementation of Reconfigurable Digital Predistortion on a Mobile GPU
Amanullah Ghazi, Jani Boutellier, Markku Juntti, University of Oulu, Finland; Lauri Anttila, Mikko Valkama, Tampere University of Technology, Finland

MA8b2-4 A Software LDPC Decoder Implemented on a Many-Core Array of Programmable Processors
Brent Bohnenstiehl, Bevan Baas, University of California, Davis, United States

Session MA8b3 Adaptive Filtering

Chair: *TBD*

10:15 AM–11:55 AM

MA8b3-1 Transform Domain LMF Algorithm for Sparse System Identification under Low SNR
Murwan Bashir, Azzedine Zerguine, KFUPM, Saudi Arabia

MA8b3-2 A Variable Step-Size Sparseness-Estimated PNLMS Algorithm
Junghsi Lee, Yi-Ting Cheng, Jheng-Ting Wu, Yuan-Ze University, Taiwan

MA8b3-3 Incorporating Signal History Into Transfer Logic for Two-Path Echo Cancelers
Jacob H. Gunther, Todd K. Moon, Utah State University, United States

MA8b3-4 Performance Comparisons of Three IIR Structures for Adaptive System Identification Based on Genetic Algorithms (GA)
Xin Shao, Guoxin Sun, William Jenkins, Pennsylvania State University, United States

Session MA8b4 Synchronization and Localization

Chair: *TBD*

10:15 AM–11:55 AM

MA8b4-1 Greedy Node Localization in Mobile Sensor Networks using Doppler Frequency Shift
Sudhir Kumar, Shriman Tiwari, Rajesh Hegde, Indian Institute of Technology, Kanpur, India, India

MA8b4-2 Compressed Temporal Synchronization with Opportunistic Signals
Mohamed Ibrahim, Florian Roemer, Technische Universität Ilmenau, Germany; Niels Hadaschik, Fraunhofer Institute for Integrated Circuits IIS, Germany; Hans-Martin Tröger, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany; Benjamin Sackenreuter, Norbert Franke, Fraunhofer Institute for Integrated Circuits IIS, Germany; Joerg Robert, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany; Giovanni Del Galdo, Fraunhofer Institute for Integrated Circuits IIS, Germany

MA8b4-3 Synchronization and Delay Estimation with Sub-Tick Resolution
Bernhard Etzlinger, Nino Palaoro, Andreas Springer, Johannes Kepler University, Linz, Austria, Austria

MA8b4-4 Single-Anchor Localization in Inductively Coupled Sensor Networks using Passive Relays and Load Switching
Eric Slottke, Armin Wittneben, ETH Zurich, Switzerland

Session MP1a Underwater Acoustic Communications and Signal Processing

Chair: *Milica Stojanovic, Northeastern University*

MP1a-1 Challenges and Analysis of Adaptive Multichannel Equalization for Large-N Arrays 1:30 PM
James Preisig, JPAnalytics LLC, United States

MP1a-2 Noise Variance Estimation for Signal and Noise Subspace Models 1:55 PM
Magnus Nordenvaad, Swedish Defence Research Agency (FOI), Sweden

MP1a-3 Experimental Results with HFModem for High Bandwidth Applications 2:20 PM
Thomas Riedl, Andrew Bean, James Younce, OceanComm, Incorporated, United States; Toros Arikan, Andrew Singer, University of Illinois at Urbana Champaign, United States

MP1a-4 Structured Compressive Methods for Wideband Signal Localization 2:45 PM
Sajjad Beygi, Urbashi Mitra, University of Southern California, United States

Session MP1b Physical Layer Security

Chair: *Rafael Schaefer, Princeton University*

MP1b-1 Can Linear Minimum Storage Regenerating Codes Be Universally Secure? 3:30 PM
Sreechakra Goparaju, University of California, San Diego, United States; Salim El Rouayheb, Illinois Institute of Technology, United States; Robert Calderbank, Duke University, United States

MP1b-2 Secure Degrees of Freedom of the Gaussian MIMO Multiple Access Wiretap Channel 3:55 PM
Pritam Mukherjee, Sennur Ulukus, University of Maryland, United States

MP1b-3 Strong Secrecy for Interference Channels from Channel Resolvability 4:20 PM
Zhao Wang, Royal Institute of Technology (KTH), Sweden; Rafael F. Schaefer, Princeton University, United States; Mikael Skoglund, Royal Institute of Technology (KTH), Sweden; H. Vincent Poor, Princeton University, United States; Ming Xiao, Royal Institute of Technology (KTH), Sweden

MP1b-4 The Multiple-Access Channel with an External Eavesdropper: Trusted vs. Untrusted Users 4:45 PM
Mario Goldenbaum, Technische Universität Berlin, Germany; Rafael F. Schaefer, H. Vincent Poor, Princeton University, United States

Session MP2 Distributed Coherent Communication Systems)

Co-Chairs: *D. Richard Brown III, Worcester Polytechnic Institute and Daniel Bliss, Arizona State University*

MP2-1 An Approach to Kalman Filtering for Oscillator Tracking 1:30 PM
Sairam Goguri, Soura Dasgupta, University of Iowa, United States

MP2-2 Rate Adaptive Distributed Source Coding for Wireless Applications 1:55 PM
Nicholas Chang, Anthony Triolo, Joseph Liberti, Applied Communication Sciences, United States

MP2-3 Wideband Retrodirective Distributed Transmit Beamforming with Endogenous Relative Calibration 2:20 PM
Raghuraman Mudumbai, University of Iowa, United States; Patrick Bidigare, Raytheon BBN Technologies, United States; D. Richard Brown III, Worcester Polytechnic Institute, United States; Upamanyu Madhow, University of California, Santa Barbara, United States; Soura Dasgupta, Amy Kumar, Ben Peiffer, University of Iowa, United States

MP2-4 Algorithms and Protocols for Wideband DMIMO 2:45 PM
Muhammed Faruk Gencel, Maryam Eslami Rasekh, Upamanyu Madhow, University of California, Santa Barbara, United States

BREAK 3:10 PM

MP2-5 Bounds on the Information Capacity of a Broadcast Channel with Quantizing Receivers 3:30 PM
Christian Chapman, Arizona State University, United States; Adam Margetts, MIT Lincoln Laboratory, United States; Daniel Bliss, Arizona State University, United States

MP2-6 Achieving Large Multiplexing Gain in Distributed Antenna Systems via Cooperation with pCell Technology 3:55 PM
Antonio Forenza, Stephen Perlman, Fadi Saibi, Mario Di Dio, Roger Van Der Laan, Artemis Networks, United States; Giuseppe Caire, Technische Universität Berlin, Germany

MP2-7 Coded Distributed Diversity with Physical Layer Network Coding 4:20 PM
Andrew Marcum, David Love, James Krogmeier, Purdue University, United States

MP2-8 Distributed Nonlinear Filtering of Partially Observed Markov Chains over WSNs: Truncating the ADMM 4:45 PM
Dionysios Kalogerias, Athina Petropulu, Rutgers, The State University of New Jersey, United States

Session MP3 5G Cellular Networks

Co-Chairs: *Matthew Valenti, West Virginia University and Jeffrey Andrews, University of Texas, Austin*

MP3-1 Directional Initial Access for Millimeter Wave Cellular Systems 1:30 PM
C. Nicolas Barati, S. Amir Hosseini, Marco Mezzavilla, Parisa Amir-Eliasi, Sundeep Rangan, NYU Polytechnic School of Engineering, United States; Michele Zorzi, University of Padova, Italy; Thanasis Korakis, Shivendra S. Panwar, NYU Polytechnic School of Engineering, United States

MP3-2 Multiplexing-Diversity Tradeoffs in Single-Shot Noncoherent Wideband Massive MIMO Systems 1:55 PM
Mainak Chowdhury, Alexandros Manolakos, Andrea Goldsmith, Stanford University, United States

MP3-3 Spatial Modeling of Device-To-Device Networks: Poisson Cluster Process Meets Poisson Hole Process 2:20 PM
Mehrnaz Afshang, Harpreet Dhillon, Virginia Tech, United States

MP3-4 FDD Massive MIMO with Analog CSI Feedback 2:45 PM
Kien Truong, Posts and Telecommunications Institute of Technologies, Viet Nam; Hosein Nikopour, Huawei Technologies Co., Ltd., Canada; Robert W. Heath Jr., University of Texas at Austin, United States

BREAK 3:10 PM

MP3-5 A Tractable Model for Per User Rate in Multiuser Millimeter Wave Cellular Networks 3:30 PM
Mandar Kulkarni, Ahmed Alkhateeb, Jeffrey Andrews, University of Texas at Austin, United States

MP3-6 Frequency Hopping on a 5G Millimeter Wave Uplink 3:55 PM
Salvatore Talarico, Matthew Valenti, West Virginia University, United States

MP3-7 Towards a P2P Mobile Contents Trading 4:20 PM
Sameh Hosny, Faisal Alotaibi, Hesham El Gamal, Atilla Eryilmaz, The Ohio State University, United States

MP3-8 Cell-Free Massive MIMO Versus Small Cells 4:45 PM
Hien Ngo, Linköping University, Sweden; Alexei Ashikhmin, Hong Yang, Bell Labs, United States; Erik G. Larsson, Linköping University, Sweden; Thomas L. Marzetta, Bell Laboratories, Alcatel-Lucent, United States

Session MP4a Distributed Signal Processing

Chair: *Cihan Tepedelenlioglu, Arizona State University*

MP4a-1 Budgeted Kalman Filtering and Smoothing for Economical Tracking with Big Distributed Data 1:30 PM
Dimitris Berberidis, Georgios B. Giannakis, University of Minnesota, United States

MP4a-2 Detection of Data Injection Attacks in Decentralized Learning 1:55 PM
Reinhard Gentz, Hoi-To Wai, Anna Scaglione, Arizona State University, United States; Amir Leshem, Bar-Ilan University, Israel

MP4a-3 Distributed Clustering Based on Message Passing 2:20 PM
Songtao Lu, Zhengdao Wang, Iowa State University, United States

MP4a-4 Distributed Node Counting in Wireless Sensor Networks 2:45 PM
Sai Zhang, Cihan Tepedelenlioglu, Andreas Spanias, Arizona State University, United States; Mahesh Banavar, Clarkson University, United States

Session MP4b Designing Sparse Sensing Structures

Chair: *Geert Leus, Delft University of Technology*

MP4b-1 On Optimal Sensor Collaboration for Distributed Estimation with Individual Power Constraints 3:30 PM
Sijia Liu, Syracuse University, United States; Swarnendu Kar, Intel Corporation, United States; Makan Fardad, Pramod Varshney, Syracuse University, United States

MP4b-2 Optimal Sensor and Actuator Selection for Large-Scale Dynamical Systems 3:55 PM
Neil Dhingra, Mihailo Jovanovic, Zhi-Quan Luo, University of Minnesota, United States

MP4b-3 Information Discovery in Heterogeneous Sensor Networks via Regularized Canonical Correlations 4:20 PM
Jia Chen, Ioannis Schizas, University of Texas at Arlington, United States

MP4b-4 Sparse Sensing for Estimation with Correlated Observations 4:45 PM
Sundeep Prabhakar Chepuri, Geert Leus, Delft University of Technology, Netherlands

Session MP5a Co-Prime Arrays

Chair: *TBD*

MP5a-1 Performance Breakdown in Parameter Estimation using Co-Prime Arrays 1:30 PM
Pooria Pakrooh, Louis Scharf, Ali Pezeshki, Colorado State University, United States

MP5a-2 Detecting Gaussian Signals in the Presence of Interferers using the Coprime Sensor Arrays with the Min Processor 1:55 PM
Yang Liu, John Buck, University of Massachusetts Dartmouth, United States

MP5a-3 Multitapered Power Spectral Density Estimation for Co-Prime Sensor Arrays 2:20 PM
Ian Rooney, John Buck, University of Massachusetts Dartmouth, United States

MP5a-4 Co-Prime Array Processing with Sum and Difference Co-Array 2:45 PM
Xiaomeng Wang, Xin Wang, Stony Brook University, United States; Xuehong Lin, Beijing University of Posts and Telecomm., China

Session MP5b MIMO Radar

Chair: *TBD*

MP5b-1 Reducing the Effects of Training Data Heterogeneity in Multistatic MIMO Radar 3:30 PM
Tariq Qureshi, Muralidhar Rangaswamy, Air Force Research Laboratory, United States; Kristine Bell, Metron Inc., United States

MP5b-3 Coherent MIMO Radar with Sparse Recovery: Joint vs. Separate Range and Azimuth Estimation 4:20 PM
Lorenz Weiland, Thomas Wiese, Wolfgang Utschick, Technische Universität München, Germany

MP5b-4 Three Dimensional Compressive Sensing in MIMO Radar 4:45 PM
Yaqi Liu, Jun Tang, Ning Zhang, Wei Zhu, Tsinghua University, China

Session MP6 Signal Processing and Optimization Methods for Big Data Analytics

Chair: *Gesualdo Scutari, Purdue University*

MP6-1 Fitting Graph Models to Big Data 1:30 PM
Jonathan Mei, José M.F. Moura, Carnegie Mellon University, United States

MP6-2 Robust Low-Rank Optimization for Large Scale Problems 1:55 PM
Licheng Zhao, Prabhu Babu, Daniel P. Palomar, Hong Kong University of Science and Technology, China

MP6-3 Solvetime Complexity for Parallel Optimization 2:20 PM
Peter Richtarik, University of Edinburgh, United Kingdom; Martin Takac, Lehigh University, United States

MP6-4 A Distributed Strategy for Computing Proximity Operators 2:45 PM
Feriel Abboud, Emilie Chouzenoux, Jean-Christophe Pesquet, Universite Paris-Est Marne-la-Vallee, France; Jean-Hugues Chenot, Louis Laborelli, Institut national de l'audiovisuel, France

BREAK 3:10 PM

MP6-5 Max-Min Feasible Point Pursuit for Nonconvex QCQP 3:30 PM
Charilaos Kanatsoulis, Nicholas Sidiropoulos, University of Minnesota, United States

MP6-6 A Family of Friendly Proximals 3:55 PM
Michael Friedlander, Gabriel Goh, University of California, Davis, United States

MP6-7 Decentralized Double Stochastic Averaging Gradient 4:20 PM
Aryan Mokhtari, Alejandro Ribeiro, University of Pennsylvania, United States

MP6-8 Nonconvex Distributed Optimization over Graphs 4:45 PM
Paolo Di Lorenzo, "Sapienza" University of Rome, Italy; Gesualdo Scutari, Purdue University, United States

Session MP7a Signal Processing in Biology: Theoretical Advances and Open Problems

Co-Chairs: *Byung-Jun Yoon, Texas A&M University and Xiaoning Qian, Texas A&M University*

MP7a-1 A Risk-Based Approach to Optimal Clustering under Random Labeled Point Processes 1:30 PM
Lori Dalton, The Ohio State University, United States

MP7a-2 Small Data Is the Problem 1:55 PM
Edward Dougherty, Texas A&M University, United States; Lori Dalton, Ohio State University, United States; Frank Alexander, Los Alamos National Laboratory, United States

MP7a-3 Infinite Vocabulary Naive Bayes Classifiers 2:20 PM
Mingyuan Zhou, University of Texas at Austin, United States

MP7a-4 Optimal Gene Regulatory Network Inference using the Boolean Kalman Filter and Multiple Model Adaptive Estimation 2:45 PM
Mahdi Imani, Ulisses Braga-Neto, Texas A&M University, United States

Session MP7b ECG and EEG Signal Processing

Chair: *TBD*

MP7b-1 Adaptive EEG Artifact Suppression using Gaussian Mixture Modeling 3:30 PM
Francisco Solis, Alexander Maurer, Jiewei Jiang, Antonia Papandreou-Suppappola, Arizona State University, United States

MP7b-2 Signal Denoising via Quadratic Semi-Infinite Programming 3:55 PM
Carlos Davila, Southern Methodist University, United States

MP7b-3 A State Space Algorithm for Non-Invasive Detection of Cardiac and Respiratory Rates from UWB Doppler Radar Measurements 4:20 PM
Krishna Naishadham, Georgia Institute of Technology, United States; Jean E. Piou, MIT, United States; Lingyun Ren, Aly Fathy, University of Tennessee at Knoxville, United States

MP7b-4 Heart Rate Estimation from Photoplethysmogram During Intensive Physical Exercise using Non-Parametric Bayesian Factor Analysis 4:45 PM
Sandeep Dsouza, Siddharth Jar, Indian Institute of Technology Kharagpur, India; Mahasweta Chakraborti, Anwesha Chatterjee, Jadavpur University, India; Priyadip Ray, Indian Institute of Technology Kharagpur, India

Session MP8a1 Implementation of Digital Signal Processing Algorithms

Chair: *TBD*

1:30 PM–3:10 PM

MP8a1-1 CRT RSA Decryption: Modular Exponentiation Based Solely on Montgomery Multiplication
Joao Carlos Neto, University of Sao Paulo, Brazil; Alexandre Tenca, Synopsys, Inc., United States; Wilson Ruggiero, University of Sao Paulo, Brazil

MP8a1-2 Low Power Design of a Word-Level Finite Field Multiplier using Reordered Normal Basis
Parham Hosseinzadeh Namin, Roberto Muscedere, Majid Ahmadi, University of Windsor, Canada

MP8a1-3 Canonic Real-Valued Radix-2^n FFT Computations
Yingjie Lao, Keshab Parhi, University of Minnesota, Twin Cities, United States

MP8a1-4 A Low Power Radix-2 FFT Accelerator for FPGA
Soumak Mookherjee, Linda DeBrunner, Victor DeBrunner, Florida State University, United States

MP8a1-5 Indoor Fall Detection using a Network of Seismic Sensors
Halil Ibrahim Sümer, Sevgi Zübeyde Gürbüz, TOBB University of Economics and Technology, Turkey

Session MP8a2 Sparsity and Compressed Sensing

Chair: *TBD*

1:30 PM–3:10 PM

MP8a2-1 RSCS: Minimum Measurement MMV Deterministic Compressed Sensing Based on Complex Reed Solomon Coding
Tobias Schnier, Carsten Bockelmann, Armin Dekorsy, Universität Bremen, Germany

MP8a2-2 Autoregressive Process Parameter Estimation from Compressed Sensing Measurements
Matteo Testa, Enrico Magli, Politecnico di Torino, Italy

MP8a2-3 An Adaptive Greedy Pursuit Algorithm for Pulse-Doppler Radar
Abdur Rahman Maud, Mark Bell, Purdue University, United States

MP8a2-4 Dictionary Learning from Quadratic Measurements in Block Sparse Models
Piya Pal, University of Maryland, College Park, United States

MP8a2-5 Signal Parameter Estimation Performance under a Sampling Rate Constraint
Andreas Lenz, Manuel Stein, Josef A. Nossek, Technische Universität München, Germany

MP8a2-6 On the Block-Sparse Solution of Single Measurement Vectors
Mohammad Shekaramiz, Todd K. Moon, Jacob H. Gunther, Utah State University, United States

MP8a2-7 Distributed Compression and Maximum Likelihood Reconstruction of Finite Autocorrelation Sequences
Aritra Konar, Nicholas Sidiropoulos, University of Minnesota, United States

MP8a2-8 A Study on the Impact of the Fourier Transform on Hirschman Uncertainty
Kirandeep Ghuman, Victor DeBrunner, Florida State University, United States

MP8a2-9 Minimal Dictionaries for Spanning Periodic Signals
Srikanth V. Tenneti, P. P. Vaidyanathan, California Institute of Technology, United States

Session MP8a3 Applications of Adaptive Signal Processing

Chair: *TBD*

1:30 PM–3:10 PM

MP8a3-1 Dithered Multi-Pulsing and Non-Parametric Statistical Inference Algorithm for Time-of-Flight Mass Spectrometry
George Moore, Keysight Technologies, United States

MP8a3-2 Correlated Maximum Likelihood Temperature/ Emissivity Separation of Hyperspectral Images
David Neal, Todd K. Moon, Jacob H. Gunther, Utah State University, United States; Gustavious Williams, Brigham Young University, United States

MP8a3-3 Probabilistic Low-Rank Matrix Recovery from Quantized Measurements: Application to Image Denoising
Sonia Bhaskar, Stanford University, United States

Session MP8a4 Wireless and Sensor Networks

Chair: *TBD*

1:30 PM–3:10 PM

MP8a4-1 Implementation of Fog Computing for Reliable E-Health Applications
Razvan Craciunescu, Albena Mihovska, Mihail Mihaylov, Sofoklis Kyriazakos, Ramjee Prasad, Aalborg University, Denmark; Simona Halunga, University Politechnica of Bucharest, Romania

MP8a4-2 Context-Aware D2D Peer Selection for Load Distribution in LTE Networks
Nima Namvar, Niloofar Bahadori, Fatemeh Afghah, North Carolina A&T State University, United States

MP8a4-3 Using Mobility for Increasing the Energy Efficiency of Multihop Communications
Fernando Rosas, Mahdi Azari, Bertold Van den Bergh, KU Leuven, Belgium; Richard Demo Souza, Federal University of Technology - Paraná (UTFPR), Brazil; Sofie Pollin, Marian Verhelst, KU Leuven, Belgium

MP8a4-4 Instantaneous Relaying for the 3-Way Relay Channel with Circular Message Exchanges
Bho Matthiesen, Eduard A. Jorswieck, Technische Universität Dresden, Germany

Session TA1a Topics in Communications

Chair: *TBD*

TA1a-1 Security Enhancement in Cellular Networks: A Device-to-Device Aided Approach 8:15 AM
Jian Ouyang, Nanjing University of Posts and Telecommunications, China; Min Lin, Southeast University, China; Wei-Ping Zhu, Concordia University, Canada; A. L. Swindlehurst, University of California, United States

TA1a-2 Covert Communication with the Help of an Uninformed Jammer Achieves Positive Rate 8:40 AM
Tamara Sobers, Boulat Bash, Dennis Goeckel, University of Massachusetts Amherst, United States; Saikat Guha, Raytheon BBN Technologies, United States; Don Towsley, University of Massachusetts Amherst, United States

TA1a-3 Cooperative Power and DoT Estimation for a Directive Source 9:05 AM
Sina Maleki, University of Luxembourg, Luxembourg; Philippe Ciblat, Telecom ParisTech, France; Symeon Chatzinotas, University of Luxembourg, Luxembourg; Dzevdan Kapetanovic, Ericsson, Sweden; Björn Ottersten, University of Luxembourg, Luxembourg

TA1a-4 BER Analysis of High Speed Links with Nonlinearity 9:30 AM
Gaurav Malhotra, Jalil Kamali, Samsung, United States

Session TA1b Coding and Signal Processing for Modern Memories

Chair: *Lara Dolecek, University of California, Los Angeles*

TA1b-1 Signal Processing Techniques for Ensuring Fidelity of Back-End Signal Transmission in Flash Memory Based Solid-State Drives — 10:15 AM
Ravi Motwani, Intel, United States

TA1b-2 Dynamic Voltage Allocation with Quantized Voltage Levels and Simplified Channel Modeling — 10:40 AM
Haobo Wang, Nathan Wong, Richard Wesel, University of California, Los Angeles, United States

TA1b-3 Compensating for Sneak Currents in Multi-Level Crossbar Resistive Memories — 11:05 AM
Tianqiong Luo, Purdue University, United States; Olgica Milenkovic, University of Illinois Urbana-Champaign, United States; Borja Peleato, Purdue University, United States

TA1b-4 Asymmetric Error Control Coding Techniques for Flash Memories: Theory and Applications — 11:30 AM
Frederic Sala, Clayton Schoeny, Ahmed Hareedy, Dariush Divsalar, Lara Dolecek, University of California, Los Angeles, United States

Session TA2a All About Spectrum

Chair: *Dongning Guo, Northwestern University*

TA2a-1 Spectrum Policy in 21st Century - Where are We Going, Why, and What are the Technology Implications? — 8:15 AM
Dennis Roberson, Illinois Institute of Technology, United States

TA2a-2 Competition and Investment in Shared Spectrum — 8:40 AM
Chang Liu, Randall Berry, Northwestern University, United States

TA2a-3 Covariance Shaping for Interference Coordination in Cellular Wireless Communication Systems — 9:05 AM
Michael Newinger, Wolfgang Utschick, Technische Universität München, Germany

TA2a-4 Optimal Resource Allocation in Ultra-Dense Networks with Many Carriers — 9:30 AM
Jialing Liu, Weimin Xiao, Huawei Technologies Co., Ltd., United States

Session TA2b Methodologies for Signal Processing on Random Graphs

Chair: *Laura Cottatellucci, EURECOM*

TA2b-1 Information Propagation in Clustered Multi-Layer Networks — 10:15 AM
Yong Zhuang, Osman Yagan, Carnegie Mellon University, United States

TA2b-2 Community Mining with Graph Wavelets for Correlation Matrices — 10:40 AM
Pierre Borgnat, Ecole normale supérieure de Lyon, CNRS, France; Paulo Gonçalves, Ecole normale supérieure de Lyon, Inria, France; Nicolas Tremblay, Ecole normale supérieure de Lyon, France

TA2b-3 An Exact Large System Analysis of Randomized Kaczmarz Methods — 11:05 AM
Chuang Wang, Yue Lu, Harvard University, United States

TA2b-4 Characterization of Random Matrix Eigenvectors for Stochastic Block Model — 11:30 AM
Konstantin Avrachenkov, Inria, France; Laura Cottatellucci, EURECOM, France; Arun Kadavankandy, Inria, France

Session TA3a Estimation

Chair: *TBD*

TA3a-1 High-Accuracy Vehicle Position Estimation using a Cooperative Algorithm with Anchors and Probe Vehicles — 8:15 AM
Ramez L. Gerges, John J. Shynk, University of California, Santa Barbara, United States; Suk-Seung Huang, Chosun University, Republic of Korea

TA3a-2 Prediction-Correction Methods for Time-Varying Convex Optimization — 8:40 AM
Andrea Simonetto, Delft University of Technology, Netherlands; Alec Koppel, Aryan Mokhtari, University of Pennsylvania, United States; Geert Leus, Delft University of Technology, Netherlands; Alejandro Ribeiro, University of Pennsylvania, United States

TA3a-3 Improving Convergence of Distributed LMS Estimation by Enabling Propagation of Good Estimates Through Bad Nodes — 9:05 AM
Kevin Wagner, Naval Research Laboratory, United States; Milos Doroslovacki, The George Washington University, United States

TA3a-4 Distributed Covariance Estimation for Compressive Signal Processing — 9:30 AM
Matteo Testa, Enrico Magli, Politecnico di Torino, Italy

Session TA3b Wearable and Body Area Networks

Co-Chairs: *Robert W. Heath, Jr., University of Texas at Austin and Angel Lozano, Universitat Pompeu Fabra*

TA3b-1 Reducing Random Access Collisions via Machine Learning — 10:15 AM
Alexander Pyattaev, Tampere University of Technology, Finland; Kerstin Johnsson, Intel, United States; Olga Galinina, Sergey Andreev, Yevgeni Koucheryavy, Tampere University of Technology, Finland

TA3b-2 Channel Dynamics in Body Area Networks: Recent Results and Challenges — 10:40 AM
Claude Oestges, UCLouvain, Belgium

TA3b-3 Analysis of Millimeter-Wave Networked Wearables in Crowded Environments 11:05 AM
Kiran Venugopal, University of Texas at Austin, United States; Matthew Valenti, University of West Virginia, United States; Robert W. Heath Jr., University of Texas at Austin, United States

TA3b-4 Characterizing Fading in Wearable Communications Channels using Composite Models 11:30 AM
Simon Cotton, Seong Ki Yoo, Queen's University Belfast, United Kingdom; Paschalis Sofotasios, Tampere University of Technology, Finland

Session TA5a Smart Grid

Chair: *Ermin Wei, Northwestern University*

TA5a-1 The Perils of Dynamic Electricity Pricing in the Presence of Retail Market Power 8:15 AM
Mahnoosh Alizadeh, Andrea Goldsmith, Stanford University, United States; Anna Scaglione, Arizona State University, United States

TA5a-2 Value of Limited Communication in Voltage Regulation of Distribution Systems 8:40 AM
Baosen Zhang, University of Washington, United States; Alejandro Dominguez-Garcia, University of Illinois at Urbana-Champaign, United States; David Tse, Stanford University, United States

TA5a-3 Learning Supply Function Equilibria in Constrained Power Networks 9:05 AM
Weixuan Lin, Eilyan Bitar, Cornell University, United States

TA5a-4 Pricing Fairness in Networked Systems 9:30 AM
Yuanzhang Xiao, Ermin Wei, Chaithanya Bandi, Northwestern University, United States

Session TA5b Energy Management

Chair: *TBD*

TA5b-1 Risk-Averse Placement and Sizing of Photovoltaic Generators in Radial Distribution Networks 10:15 AM
Mohammadhafez Bazrafshan, Nikolaos Gatsis, University of Texas at San Antonio, United States

TA5b-2 Towards Green Distributed Storage Systems 10:40 AM
Abdelrahman Ibrahim, Ahmed Zewail, Aylin Yener, The Pennsylvania State University, United States

TA5b-3 Joint Real-Time Energy and Demand-Response Management using a Hybrid Coalitional-Noncooperative Game 11:05 AM
Fulin He, Huazhong University of Science and Technology, United States; Yi Gu, Jun Hao, Jun Jason Zhang, University of Denver, United States; Jiaolong Wei, Huazhong University of Science and Technology, United States; Yingchen Zhang, National Renewable Energy Laboratory, United States

Session TA6a Massive MIMO

Chair: *TBD*

TA6a-1 Cell-Free Massive MIMO Systems 8:15 AM
Elina Nayebi, Univesity of California, San Diego, United States; Alexei Ashikhmin, Thomas L. Marzetta, Hong Yang, Bell Laboratories, Alcatel-Lucent, United States

TA6a-2 Multi-Stage Beamforming for Interference Coordination in Massive MIMO Networks 8:40 AM
Martin Kurras, Lars Thiele, Fraunhofer Institute for Telecommunications, Germany; Giuseppe Caire, Technische Universität Berlin, Germany

TA6a-3 Angle of Arrival Based Beamforming Schemes for Massive MIMO FDD Systems 9:05 AM
Xing Zhang, John Tadrous, Evan Everett, Rice University, United States; Feng Xue, Intel Corporation, United States; Ashutosh Sabharwal, Rice University, United States

TA6a-4 An Enhanced Threshold-Based Feedback Scheme for Massive MU-MIMO Downlink FDD Systems 9:30 AM
Jinsoon Kim, Wonjae Shin, Yonghee Han, Jungwoo Lee, Seoul National University, Republic of Korea

Session TA7 Arithmetic

Chair: *TBD*

TA7-1 24-Bit Significand Multiplier for FPGA Floating-Point Multiplication 8:15 AM
E. George Walters III, Penn State Erie, United States

TA7-2 Exploiting Asymmetry in Booth-Encoded Multipliers for Reduced Energy Multiplication 8:40 AM
Mike O'Connor, NVIDIA / University of Texas at Austin, United States; Earl E. Swartzlander, Jr., University of Texas at Austin, United States

TA7-3 A Parametric Error Analysis of Goldschmidt's Square Root Algorithm 9:05 AM
Peter-Michael Seidel, University of Hawai'i at Manoa, United States

TA7-4 Area Efficient Backprojection Computation with Reduced Floating-Point Word Width for SAR Image Formation 9:30 AM
Jon Pimentel, Aaron Stillmaker, Brent Bohnenstiehl, Bevan Baas, University of California, Davis, United States

BREAK 9:55 AM

TA7-5 Determining Fixed-Point Formats for a Digital Filter Implementation using the Worst-Case Peak Gain Measure 10:15 AM
Anastasia Volkova, Thibault Hilaire, Christoph Lauter, University of Pierre and Marie Curie, France

TA7-6 A Framework for the Design of Accurate Low-Area Fixed-Point Polynomials with Rational Coefficients 10:40 AM
Theo Drane, Thomas Rose, Imagination Technologies, United Kingdom; George Constantinides, Imperial College London, United Kingdom

TA7-7 Easing Development of Precision-Sensitive Applications with a Beyond-Quad-Precision Library 11:05 AM
Christoph Lauter, Sorbonne Universités, UPMC Univ Paris 06, UMR 7606, LIP6, France

TA7-8 An Error-Compensated Piecewise Linear Logarithmic Arithmetic Unit for Phong Lighting Acceleration 11:30 AM
Ching-En Lee, Milos Ercegovac, University of California, Los Angeles, United States

Session TA8a1 Biomedical Signal Processing I

Chair: *TBD*

8:15 AM–9:55 AM

TA8a1-1 Regularization Parameter Trimming for Iterative Image Reconstruction
Haoyi Liang, Daniel Weller, University of Virginia, United States

TA8a1-2 Iterative Reconstruction from Limited Angle, Limited View Projections for Cryo-Electron Tomography
Sally Wood, Santa Clara University, United States; Ernesto Fontenla, Baylor College of Medicine, United States; Chris Metzler, Rice University, United States; Wah Chiu, Baylor College of Medicine, United States; Richard Baraniuk, Rice University, United States

TA8a1-3 A Parametric Model for Heart Sounds
Roilhi Frajo Ibarra, Miguel Angel Alonso, Salvador Villarreal, Carlos Ivan Nieblas, CICESE, Mexico

TA8a1-4 Experimental Evaluations of Sequential Adaptive Processing for Fetal Electrocardiograms (ECGs)
Ziyan Yao, Yuqing Dong, William Jenkins, Pennsylvania State University, United States

TA8a1-5 Seizure Prediction using Cross-Correlation and Classification Tree
Zisheng Zhang, Thomas Henry, Keshab Parhi, Univerisity of Minnesota, United States

TA8a1-6 A New Approach for Automated Detection of Behavioral Task Onset for Patients with Parkinson's Disease using Subthalamic Nucleus Local Field Potentials
Nazanin Zaker, Jun Jason Zhang, University of Denver, United States; Sara Hanrahan, Joshua Nedrud, Adam Hebb, Colorado Neurological Institute, United States

TA8a1-7 A Joint Sparsity and Linear Regression Based Method for Customization of Median Plane HRIR
Sandeep Reddy C, Rajesh M Hegde, Indian Institute of Technology Kanpur, India

TA8a1-8 Non-Contact Heart Rate Detection via Periodic Signal Detection Methods
Gizem Tabak, Andrew Singer, University of Illinois at Urbana-Champaign, United States

Session TA8a2 Relayed Communications I

Chair: *TBD*

8:15 AM–9:55 AM

TA8a2-1 Optimal Equalization and Network Beamforming in Asynchronous Two-Way Relay Networks
Farzaneh Eshaghian Dorcheh, Shahram ShahbazPanahi, University of Ontario Institute of Technology, Canada

TA8a2-2 Symmetric Beamforming for Multi-Antenna Two-Way Relay Networks
Razgar Rahimi, Shahram ShahbazPanahi, University of Ontario Institute of Technology, Canada

TA8a2-3 Maximum Likelihood Channel Estimation for Full Duplex Relay
Xiaofeng Li, Cihan Tepedelenlioglu, Arizona State University, United States

TA8a2-4 Power Allocation for Three-Phase Two-Way Relay Networks with Simultaneous Wireless Information and Power Transfer
Shahab Farazi, D. Richard Brown III, Worcester Polytechnic Institute, United States; Andrew G. Klein, Western Washington University, United States

TA8a2-5 Online Power Control for Cooperative Relaying with Energy Harvesting
Fatemeh Amirnavaei, Min Dong, University of Ontario Institute of Technology, Canada

Session TA8b1 Sampling, Sensing and Detection

Chair: *TBD*

10:15 AM–11:55 AM

TA8b1-1 On the Convergence Between Natural Sampling and Uniform Sampling
Noyan Sevuktekin, Andrew Singer, University of Illinois at Urbana-Champaign, United States

TA8b1-2 Bayesian Interpretation of the Partial Area under the ROC with Applications to Spectrum Sensing
James Ritcey, University of Washington, United States

TA8b1-3 Order Recognition of Continuous-Phase FSK
Mohammad Bari, Milos Doroslovacki, George Washington University, United States

TA8b1-4 Separation of Signals Consisting of Amplitude and Instantaneous Frequency RRC Pulses using SNR Uniform Training
Mohammad Bari, Milos Doroslovacki, George Washington University, United States

Session TA8b2 Biomedical Signal Processing II

Chair: *TBD*

10:15 AM–11:55 AM

TA8b2-1 Causality Graph Learning on Cortical Information Flow in Parkinson's Disease Patients During Behaviour Tests
Abdulaziz Almalaq, Xiaoxiao Dai, Jun Jason Zhang, University of Denver, United States; Sara Hanrahan, Joshua Nedrud, Adam Hebb, Colorado Neurological Institute, United States

TA8b2-2 A Cortical Activity Localization Approach for Decoding Finger Movements from Human Electrocorticogram Signal
Seyede Mahya Safavi, Alireza S. Behbahani, Ahmed M. Eltawil, Zoran Nenadic, An H. Do, University of California, Irvine, United States

TA8b2-3 Momentum Measure for Quantifying Dendritic Cell Movement
Caroline Crockett, Elizabeth Orrico, University of Virginia, United States; Sara McArdle, University of California, United States; Klaus Ley, La Jolla Institute for Allergy and Immunology, United States; Scott Acton, University of Virginia, United States

TA8b2-4 Neurostimulation using Improved Focusing of Ultrasound
Ana Cruz, Pulkit Grover, Carnegie Mellon University, United States

TA8b2-5 Towards Achieving the Shannon-Capacity of EEG-Based Brain-Computer Interfaces
Pulkit Grover, Carnegie Mellon University, United States

TA8b2-6 Intra-Body Communication Model Based on Variable Biological Parameters
Ahmed Khorshid, Ahmed M. Eltawil, Fadi Kurdahi, University of California, Irvine, United States

TA8b2-7 Controller Structure for Optimized Region of Attraction of Polynomial Systems
Zohaib Khalid Qazi, Cranos Williams, North Carolina State University, United States

Session TA8b3 Relayed Communications II

Chair: *TBD*

10:15 AM–11:55 AM

TA8b3-1 Jointly Optimal Distributed Beamforming and Power Control in Asynchronous Two-Way Relay Networks
Sahar Bastanirad, Shahram ShahbazPanahi, Ali Grami, University of Ontario Institute of Technology, Canada

TA8b3-2 Sum-Rate Maximization for Asynchronous Two-Way Relay Networks
Mina Askari, Shahram ShahbazPanahi, University of Ontario Institute of Technology, Canada

TA8b3-3 Achievable Degrees of Freedom on K-user MIMO Multi-Way Relay Channel with Common and Private Messages
Mohamed Salah, Amr El-Keyi, Nile University, Egypt; Yahya Mohasseb, The Military Technical College, Egypt; Mohammed Nafie, Cairo University, Egypt

TA8b3-4 Rate Maximization in Dense Interference Networks using Non-Cooperative Passively Loaded Relays
Yahia Hassan, Bernhard Gahr, Armin Wittneben, ETH Zurich, Switzerland

TA8b3-5 Multi-User Beamforming-Aided AF Relaying: A Low-Complexity Adaptive Design Approach
Jiaxin Yang, McGill University, Canada; Yunlong Cai, Zhejiang University, China; Benoit Champagne, McGill University, Canada; Lajos Hanzo, University of Southampton, United Kingdom

Session TP1 Coherent Optical Communications

Chair: *Shiva Kumar, McMaster University*

TP1-1 Group Delay Statistics and Management in Mode-Division Multiplexing 1:30 PM
Sercan Arik, Stanford University, United States; Keang-Po Ho, SiBEAM and Silicon Image, United States; Joseph Kahn, Stanford University, United States

TP1-2 Reduction of the Performance Effects of Kerr Nonlinearity in Single Mode Optical Coherent Transmission Systems 1:55 PM
Maurice O'Sullivan, Michael Reimer, Qunbi Zhuge, Andrew Shiner, Andrzej Borowiec, Charles Laperle, Ciena incorporated, Canada

TP1-3 On the Nonlinear Shannon Limit of Optical Fibers in Networks with Reconfigurable Optical Add-Drop Multiplexers 2:20 PM
René-Jean Essiambre, Bell Labs, Alacatel-Lucent, United States

TP1-4 100G DWDM Upgrades of Legacy Undersea and Terrestrial Fiber-Optic Systems 2:45 PM
Sergey Burtsev, Do-il Chang, Wayne Pelouch, Xtera Communications, Inc., United States

BREAK 3:10 PM

TP1-5 Flexible Transceiver Design for High Capacity Elastic Coherent Transport Systems 3:30 PM
David Plant, McGill University, Canada

TP1-6 LDPC-Coded Orbital Angular Momentum Modulation Enabling Ultra-High-Speed Transmission over Free-Space Optical Links 3:55 PM
Ivan B. Djordjevic, Zhen Qu, University of Arizona, United States

TP1-7 Approaches for Nonlinear Interference Mitigation in Fiber-Optic Communication Systems 4:20 PM
Ronen Dar, Bell Laboratories, Alcatel-Lucent, United States

TP1-8 Mitigation of Fiber Linear and Nonlinear Effects in Coherent Optical Communication Systems 4:45 PM
Xiaojun Liang, Shiva Kumar, Jing Shao, McMaster University, Canada

TP1-9 QAM Quantum Noise Stream Cipher using Digital Coherent Optical Transmission 5:10 PM
Masato Yoshida, Toshihiko Hirooka, Keisuke Kasai, Masataka Nakazawa, Tohoku University, Japan

Session TP2 Enabling Technologies for Future Wireless Networks

Chair: *Lingjia Liu, University of Kansas*

TP2-1 Hardware Implementation of ADMM-Based LP Decoding 1:30 PM
Mitch Wasson, Stark Draper, University of Toronto, Canada

TP2-2 Directional Neighbor Discovery in Dual-Band Systems 1:55 PM
Daoud Burghal, Arash Saber Tehrani, Andreas Molisch, University of Southern California, United States

TP2-3 SINR and Throughput Scaling Laws in Ultra Dense Urban Cellular Networks 2:20 PM
Abhishek Gupta, University of Texas at Austin, United States; Xinchen Zhang, Qualcomm Inc., United States; Jeffrey Andrews, University of Texas at Austin, United States

TP2-4 Overview and Evaluation of Device-To-Device and Licensed Assisted Access for LTE-Advanced 2:45 PM
Thomas Novlan, Boon Ng, Jianzhong (Charlie) Zhang, Samsung, United States

BREAK 3:10 PM

TP2-5 Next Generation TDD for Future Wireless Systems 3:30 PM
Yongxing Zhou, Huawei Technologies Co., Ltd., China

TP2-6 Spectrum Management in 5G: A Tale of Two Timescales 3:55 PM
Fei Teng, Dongning Guo, Northwestern University, United States

TP2-7 A Minimax Distortion View of Differentially Private Query Release 4:20 PM
Weina Wang, Lei Ying, Junshan Zhang, Arizona State University, United States

TP2-8 Database- and Sensing-Based Distributed Spectrum Sharing 4:45 PM
Mingming Cai, J Nicholas Laneman, University of Notre Dame, United States

TP2-9 Resource Allocation for Sensing-Based D2D Networks 5:10 PM
Hao Chen, Lingjia Liu, University of Kansas, United States

Session TP3a Social Networks

Chair: *Vijay Subramanian, University of Michigan*

TP3a-1 On Rate of Learning in Social Networks 1:30 PM
Anusha Lalitha, Tara Javidi, University of California, San Diego, United States; Anand Sarwate, Rutgers University, United States

TP3a-2 Achieving Exact Cluster Recovery Threshold via Semidefinite Programming under the Stochastic Block Model 1:55 PM
Bruce Hajek, Yihong Wu, University of Illinois at Urbana-Champaign, United States; Jiaming Xu, University of Pennsylvania, United States

TP3a-3 Generalized Hegselman-Krause Opinion Dynamics from Optimization Rules 2:20 PM
Avhishek Chatterjee, University of Texas at Austin, United States; Anand Sarwate, Rutgers University, United States; Sriram Viswanath, University of Texas at Austin, United States

TP3a-4 Incentive Design for Learning in User-Recommendation Systems 2:45 PM
Deepanshu Vasal, Achilleas Anastasopoulos, Vijay Subramanian, University of Michigan, United States

Session TP3b Caching in Wireless Networks

Chair: *Edmund Yeh, Northeastern University*

TP3b-1 Caching in Combination Networks 3:30 PM
Mingyue Ji, University of Southern California, United States; Antonia Tulino, Alcatel Lucent Bell Labs, United States; Giuseppe Caire, Technische Universität Berlin, Germany

TP3b-2 Physical Layer Caching for MIMO Relay Channels 3:55 PM
Wei Han, An Liu, Vincent Lau, HKUST, Hong Kong SAR of China

TP3b-3 Throughput-Delay Tradeoffs in Content-Centric Ad Hoc and Heterogeneous Wireless Networks 4:20 PM
Milad Mahdian, Edmund Yeh, Northeastern University, United States

TP3b-4 Distributed Caching in Device-To-Device Networks: A Stochastic Geometry Perspective 4:45 PM
Shankar Krishnan, Harpreet Dhillon, Virginia Tech, United States

Session TP5a Interference Channels

Chair: *TBD*

TP5a-1 Interference Alignment-Aided Base Station Clustering using Coalition Formation 1:30 PM
Rasmus Brandt, Rami Mochaourab, Mats Bengtsson, KTH Royal Institute of Technology, Sweden

TP5a-2 Interference Alignment using Alignment Matrix 1:55 PM
Jhanak Parajuli, Giuseppe Abreu, Jacobs University Bremen, Germany

TP5a-3 Degrees of Freedom for K-user SISO Interference Channels with Blind Interference Alignment 2:20 PM
Heecheol Yang, Wonjae Shin, Jungwoo Lee, Seoul National University, Republic of Korea

TP5a-4 Interference-Floor Shaping for Liquid Coverage Zones in Coordinated 5G Networks 2:45 PM
Lars Thiele, Martin Kurras, Stephan Jaeckel, Fraunhofer HHI, Germany; Wolfgang Zirwas, Nokia, Germany

Session TP5b Interference in Networks

Chair: *Motjaba Vaezi, Princeton University*

TP5b-1 Nearly Optimal Non-Gaussian Codes for the Gaussian Interference Channel 3:30 PM
Alex Dytso, Daniela Tuninetti, Natasha Devroye, University of Illinois at Chicago, United States

TP5b-2 On Limiting Expressions for the Capacity Regions of Gaussian Interference Channels 3:55 PM
Mojtaba Vaezi, H. Vincent Poor, Princeton University, United States

TP5b-3 How Large Portion of K/2 DoF Can We Achieve at Finite SNR for the Gaussian Interference Channel? 4:20 PM
Junyoung Nam, Young-Jo Ko, Electronics and Telecommunications Research Institute (ETRI), Republic of Korea

TP5b-4 A Coordinated Uplink Scheduling and Power Control Algorithm for Multicell Networks 4:45 PM
Kaiming Shen, Wei Yu, University of Toronto, Canada

TP5b-5 ITLinQ+: An Improved Spectrum Sharing Mechanism for Device-to-Device Communications 5:10 PM
Xinping Yi, Giuseppe Caire, Technische Universität Berlin, Germany

Session TP6a Multi-Agent Systems and Optimization

Co-Chairs: *Alec Koppel, University of Pennsylvania and Alejandro Ribeiro, University of Pennsylvania*

TP6a-1 Sparsity Aware Dynamic Distributed Compressive Spectrum Sensing and Scheduling 1:30 PM
Nicolo Michelusi, Urbashi Mitra, University of Southern California, United States

TP6a-2 A Stochastic Primal-Dual Algorithm for Task-Driven Dictionary Learning in Networks 1:55 PM
Alec Koppel, University of Pennsylvania, United States; Garrett Warnell, Ethan Stump, U.S. Army Research Laboratory, United States

TP6a-3 On Asynchronous Implementations of Fictitious Play for Distributed Learning 2:20 PM
Brian Swenson, Soummya Kar, Carnegie Mellon University, United States; Joao Xavier, Instituto Superior Tecnico, Portugal

TP6a-4 Intermittent Connectivity Control in Mobile Robot Networks 2:45 PM
Yiannis Kantaros, Michael M. Zavlanos, Duke University, United States

Session TP6b Epidemic Control in Networks

Co-Chairs: *Victor Preciado, University of Pennsylvania and Cameron Nowzari, University of Pennsylvania*

TP6b-1 Numerical Investigation of Metrics for Epidemic Processes on Graphs 3:30 PM
Max Goering, Faryad Darabi Sahneh, Nathan Albin, Caterina Scoglio, Pietro Poggi-Corradini, Kansas State University, United States

TP6b-2 Sufficient Condition for Survival of the Fittest in a Bi-virus Epidemics 3:55 PM
Augusto Santos, José M.F. Moura, Carnegie Mellon University, United States; Joao Xavier, Instituto Superior Tecnico, Portugal

TP6b-3 Distributed Stopping Criteria for the Power Iteration Applied to Spreading Processes 4:20 PM
Eduardo Ramirez-Llanos, Sonia Martinez, University of California, San Diego, United States

TP6b-4 Optimal Resource Allocation for Containing Epidemics on Time-Varying Networks 4:45 PM
Cameron Nowzari, University of Pennsylvania, United States

Session TP7a Algorithm and Hardware Aspects for 5G Wireless Systems

Chair: *Christoph Studer, Cornell University*

TP7a-1 Energy-Proportional Single-Carrier Frequency Domain Equalization for mmWave Wireless Communication 1:30 PM
Nicholas Preyss, Sara Rodriguez Egea, Andreas Burg, École Polytechnique Fédérale de Lausanne, Switzerland

TP7a-2 Low Resolution Adaptive Compressed Sensing with Oversampling for Low Power mmWave MIMO Receivers 1:55 PM
Cristian Rusu, Nuria Gonzalez-Prelcic, University of Vigo, Spain; Robert W. Heath Jr., University of Texas at Austin, United States

TP7a-3 Algorithm and Hardware Aspects on Pre-Coding in Massive MIMO Systems 2:20 PM
Hemanth Prabhu, Joachim Neves Rodrigues, Liang Liu, Ove Edfors, Lund University, Sweden

TP7a-4 Large-Scale MIMO Detection for 5g Multi-Carrier Waveform Candidates 2:45 PM
Michael Wu, Engin Tunali, Chris Dick, Xilinx Incorporated, United States; Christoph Studer, Cornell University, United States

Session TP7b VLSI Signal Processing

Chair: *Keshab Parhi, University of Minnesota*

TP7b-1 Mixed-Signal Circuits for Machine Learning Applications 3:30 PM
Boris Murmann, Stanford University, United States

TP7b-2 Cross-Layer Resilience 3:55 PM
Yanjing Li, Intel, United States; Eric Cheng, Hyungmin Cho, Subhasish Mitra, Stanford University, United States

TP7b-3 List Sphere Decoding of Polar Codes 4:20 PM
Seyyed Ali Hashemi, Warren J. Gross, McGill University, Canada

TP7b-4 Architectures for Stochastic Normalized and Modified Lattice IIR Filters 4:45 PM
Yin Liu, Keshab Parhi, University of Minnesota, Twin Cities, United States

Session TP8a1 Multicarrier and DFE

Chair: *TBD*

1:30 PM–3:10 PM

TP8a1-1 A Low Complexity Algorithm for Successive Interference Cancellation in Large-Scale MIMO OFDM using Quadratic Programming Formulation
Ali Elghariani, Michael Zoltowski, Purdue University, United States

TP8a1-2 CFO Mitigation using Adaptive Frequency-Domain Decision Feedback Equalization for Uplink SC-FDMA
Naveed Iqbal, Azzedine Zerguine, KFUPM, Saudi Arabia; Naofal Al-Dhahir, University of Texas at Dallas, United States

TP8a1-3 OFDM Channel Estimation via Phase Retrieval
Philipp Walk, Henning Becker, Technische Universität München, Germany; Peter Jung, Technische Universität Berlin, Germany

TP8a1-4 Estimation of the Clipping Level in OFDM Systems
Ehsan Olfat, Mats Bengtsson, KTH Royal Institute of Technology, Sweden

TP8a1-5 A Novel M-FSK Modem Architecture Based on Perfect Reconstruction NMDFBs
fred harris, Elettra Venosa, Xiaofei Chaen, San Diego State University, United States

TP8a1-6 Sub-Band Digital Predistortion for Noncontiguous Transmissions: Algorithm Development and Real-Time Prototype Implementation
Mahmoud Abdelaziz, Tampere University of Technology, Finland; Chance Tarver, Kaipeng Li, Rice University, United States; Lauri Anttila, Mikko Valkama, Tampere University of Technology, Finland; Joseph R. Cavallaro, Rice University, United States

Session TP8a2 Speech and Image Processing

Chair: *TBD*

1:30 PM–3:10 PM

TP8a2-1 Estimating Speaking Rate in Spontaneous Discourse
Yishan Jiao, Visar Berisha, Ming Tu, Julie Liss, Arizona State University, United States

TP8a2-2 Image Interpolation Based on Weighting Function of Gaussian
Takuro Yamaguchi, Masaaki Ikehara, Yasuhiro Nakajima, Keio Univercity, Japan

TP8a2-3 Conjointly Well Localized Modulated Lapped Orthogonal Transforms
Peter Tay, Yanjun Yan, Western Carolina University, United States

TP8a2-4 Screen Content Image Segmentation using Sparse-Smooth Decomposition
Shervin Minaee, Amirali Abdolrashidi, New York University, United States

Session TP8a3 Communication Techniques for the Downlink

Chair: *TBD*

1:30 PM–3:10 PM

TP8a3-1 Successive Convex Approximation for Simultaneous Linear TX/RX Design in MIMO BC
Jarkko Kaleva, Antti Tölli, Markku Juntti, University of Oulu, Finland

TP8a3-2 Per-User Outage-Constrained Power Loading Technique for Robust MISO Downlink
Mostafa Medra, Timothy Davidson, McMaster University, Canada

TP8a3-3 Pilot Length Optimization for Spatially Correlated Multi-User MIMO Channel Estimation
Beatrice Tomasi, Maxime Guillaud, Huawei Technologies Co., Ltd., France

TP8a3-4 Overcoming Conjugate Beamforming Limitations with Side-Channel Cooperative Decoders
Andrew Kwong, Ashutosh Sabharwal, Rice University, United States

TP8a3-5 Minimum Probability of Error Multiuser Transmit Beamforming
Majid Bavand, Steven Blostein, Queen's University, Canada

TP8a3-6 MIMO Power Minimization with Imperfect CSIT and Prescribed Outage
Samip Malla, Giuseppe Abreu, Jacobs University Bremen, Germany

TP8a3-7 Downlink Transceiver Beamforming and Admission Control for Massive MIMO Cognitive Radio Networks
Shailesh Chaudhari, Danijela Cabric, University of California, Los Angeles, United States

TP8a3-8 Optimal Feedback Rate Selection for Energy Harvesting with Distributed Transmit Beamforming
Rui Wang, D. Richard Brown III, Worcester Polytechnic Institute, United States

Session TP8a4 Estimation and Learning

Chair: *TBD*

1:30 PM–3:10 PM

TP8a4-1 Causal Graph Inference
Simona Poilinca, Giuseppe Abreu, Jacobs University Bremen, Germany

TP8a4-2 A Real-Time Implementation of Precise Timestamp-Free Network Synchronization
Stefan Gvozdenovic, Alexander Ryan, Max Li, Radu David, D. Richard Brown III, Worcester Polytechnic Institute, United States; Andrew Klein, Western Washington University, United States

TP8a4-3 Diffusion Distance for Signals Supported on Networks
Weiyu Huang, Santiago Segarra, Alejandro Ribeiro, University of Pennsylvania, United States

Session TP8b1 Radar Co-existence and Satellite Communications

Chair: *TBD*

3:30 PM–5:10 PM

TP8b1-1 Digital Full-Band Linearization of Wideband Direct-Conversion Receiver for Radar and Communications Applications
Markus Allén, Jaakko Marttila, Mikko Valkama, Tampere University of Technology, Finland; Simran Singh, Michael Epp, Wolfgang Schlecker, Airbus Group, Germany

TP8b1-2 Performance of Joint Radar-Communication System in Doubly-Selective Channels
Andrew D. Harper, Georgia Institute of Technology, United States; Jeremy T. Reed, Jonathan L. Odom, Georgia Tech Research Institute, United States; Aaron D. Lanterman, Georgia Institute of Technology, United States

TP8b1-3 On the Capacity of Multiple Antenna Hybrid Satellite-Terrestrial Relay Network in the Presence of Co-Channel Interference
Min Lin, Southeast University, China; Kang An, Tao Liang, Nanjing Telecommunication Technology Institute, China; Jun-Bo Wang, Southeast University, China; Jian Ouyang, Nanjing University of Posts and Telecommunications, China

TP8b1-4 Constant Information Radar for Dynamic Shared Spectrum Access
Bryan Paul, Daniel Bliss, Arizona State University, United States

TP8b1-5 Effect of Clutter on Joint Radar-Communications System Performance Inner Bounds
Alex Chiriyath, Daniel Bliss, Arizona State University, United States

Session TP8b2 Video Processing

Chair: *TBD*

3:30 PM–5:10 PM

TP8b2-1 Object Recognition in Complex Video Scenes for Advertising Applications
Edward Ratner, Lyrical Labs, United States; Schuyler Cullen, Samsung, United States; James Quigley, Gener8 Inc., United States

TP8b2-2 Fractal-Based Analysis for Foreground Detection
Daniel Raburn, Edward Ratner, Lyrical Labs, United States

TP8b2-3 Unsupervised Uncertainty Analysis for Video Saliency Detection
Tariq Alshawi, Zhiling Long, Ghassan AlRegib, Georgia Institue of Technology, United States

TP8b2-4 Jitter Invariant Incremental Principal Component Pursuit for Video Background Modeling on the TK1
Paul Rodriguez, Pontifical Catholic University of Rio de Janeiro, Peru

TP8b2-5 Robust and Reliable Counting of Footsteps by Mobile Phone Cameras
Koray Ozcan, Anvith Mahabalagiri, Senem Velipasalar, Syracuse University, United States

Session TP8b3 MIMO Links and Uplink

Chair: *TBD*

3:30 PM–5:10 PM

TP8b3-1 Performance of MIMO Enhanced Spatial Modulation under Imperfect Channel Information
Michael Carosino, James Ritcey, University of Washington, United States

TP8b3-2 Distributed Uplink CoMP for Small-Cell Networks
Shirish Nagaraj, M. R. Raghavendra, Chris Schmidt, Phil Rasky, Deepak Nayak, Xiaoyong Yu, Nokia, United States; Michael Honig, Northwestern University, United States

Session WA1a Communications with Low-Precision Analog-to-Digital Converters

Chair: *Philip Schniter, The Ohio State University*

WA1a-1 Hardware-Constrained Signal Processing for mm-wave LoS MIMO Links — 8:15 AM
Babak Mamandipoor, University of California, Santa Barbara, United States; Mahmoud Sawaby, Amin Arbabian, Stanford University, United States; Upamanyu Madhow, University of California, Santa Barbara, United States

WA1a-2 Limited Feedback in Multiple-Antenna Systems with One-Bit Quantization — 8:40 AM
Jianhua Mo, Robert W. Heath Jr., University of Texas at Austin, United States

WA1a-3 Spectral Shaping with Low Resolution Signals — 9:05 AM
Amine Mezghani, Hela Jedda, Josef A. Nossek, Technische Universität München, Germany

WA1a-4 Detection of Communication Signals using Stochastic Quantization — 9:30 AM
Ryan Corey, Andrew Singer, University of Illinois at Urbana-Champaign, United States

Session WA1b Broadband Access Evolution

Chair: *George Ginis, ASSIA, Inc.*

WA1b-1 Signal Processing for G.fast+ — 10:15 AM
Mehdi Mohseni, Ken Kerpez, ASSIA, Inc., United States

WA1b-2 A New Approach to Traffic-Aware Real-Time Dynamic Spectrum Management — 10:40 AM
Chano Gomez, Marvell Semiconductor Inc, United States

WA1b-3 Maintaining Harmony in the Vectoring xDSL Family by Spectral Coordination — 11:05 AM
Martin Wolkerstorfer, Driton Statovci, Sanda Drakulic, The Telecommunications Research Center Vienna, Austria

WA1b-4 Improved Polling Strategies for Efficient Flow Control for Buffer Reduction in PON/xDSL Hybrid Access Networks — 11:30 AM
Anu Mercian, Arizona State University, United States; Elliott Gurrola, Michael McGarry, University of Texas, El Paso, United States; Martin Reisslein, Arizona State University, United States

Session WA2a Cooperative Communications

Co-Chairs: *Tony Quek, Singapore University of Technology and Design and Shi Jin, Southeast University*

WA2a-1 Massive MIMO Feedback Methods under Limited CSI with User Cooperation — 8:15 AM
Haifan Yin, Laura Cottatellucci, David Gesbert, Eurecom, France

WA2a-2 Coordinated Multicell Multiuser Precoding for Maximizing Resource Efficiency — 8:40 AM
Shiwen He, Ying Lu, Yongming Huang, Shi Jin, Wei Xu, Haiming Wang, Southeast University, China

WA2a-3 Can Interference Alignment Impact Network Utility Maximization? — 9:05 AM
Gokul Sridharan, Wei Yu, University of Toronto, Canada

WA2a-4 Towards System Cost Minimization in Cloud Radio Access Network — 9:30 AM
Jianhua Tang, Wee Peng Tay, Nanyang Technological University, Singapore; Tony Q. S. Quek, Singapore University of Technology and Design, Singapore; Ben Liang, University of Toronto, Canada

Session WA2b 5G and mmWave

Chair: *TBD*

WA2b-1 A Comparison of Waveform Candidates for 5G Millimeter Wave Systems — 10:15 AM
Christian Ibars, Utsaw Kumar, Huaning Niu, Hyejung Jung, Sameer Pawar, INTEL Corporation, United States

WA2b-2 Ping-Pong Beam Training for Reciprocal Channels with Delay Spread — 10:40 AM
Elisabeth De Carvalho, Jørgen Bach Andersen, Aalborg University, Denmark

WA2b-3 On Detection of Pilot Contamination Attack in Multiple Antenna Systems — 11:05 AM
Jitendra Tugnait, Auburn University, United States

WA2b-4 Cell Detection in High Frequency Band Small Cell Networks — 11:30 AM
Hyejung Jung, Qinghua Li, Pingping Zong, Intel Corporation, United States

Session WA3 Sparsity in Signal Processing

Chair: *TBD*

WA3-1 Fundamental Limits of Singular Value Based Signal Detection from Randomly Compressed Signal-Plus-Noise Matrices — 8:15 AM
Nicholas Asendorf, Raj Rao Nadakuditi, University of Michigan, United States

WA3-2 Joint Sparsity Pattern Recovery with 1-bit Compressive Sensing in Sensor Networks — 8:40 AM
Vipul Gupta, Indian Institute of Technology Kanpur, India; Bhavya Kailkhura, Thakshila Wimalajeewa, Pramod Varshney, Syracuse University, United States

WA3-3 A Mismatched Greedy Pursuit Algorithm for Sparse Spike Deconvolution — 9:05 AM
Abdur Rahman Maud, Mark Bell, Purdue University, United States

WA3-4 Joint Dictionary Learning and Recovery Algorithms in a Jointly Sparse Framework — 9:30 AM
Yacong Ding, Bhaskar D. Rao, University of California, San Diego, United States

BREAK 9:55 AM

WA3-5 Distribution of the Fisher Information Loss Due to Random Compressed Sensing 10:15 AM
Pooria Pakrooh, Ali Pezeshki, Louis Scharf, Colorado State University, United States; Douglas Cochran, Arizona State University, United States; Stephen D. Howard, Defence Science and Technology Organisation, Australia

WA3-6 Nesterov's Proximal-Gradient Signal Recovery from Compressive Poisson Measurements 10:40 AM
Renliang Gu, Aleksandar Dogandžic, Iowa State University, United States

WA3-7 Exact Bayesian Test for a Common Rank-One Component in White Noise 11:05 AM
Songsri Sirianunpiboon, Stephen D. Howard, Defence Science and Technology Organisation, Australia; Douglas Cochran, Arizona State University, United States

WA3-8 Rank Deficiency and Sparsity in Partially Observed Multiple Measurement Vector Models 11:30 AM
Ali Koochakzadeh, Piya Pal, University of Maryland, College Park, United States

Session WA4 Statistical Signal Processing for Social and Information Networks

Co-Chairs: *Nadya Bliss, Arizona State University and Benjamin Miller, MIT Lincoln Laboratory*

WA4-1 Counting Triangles in Real-World Graph Streams: Dealing with Repeated Edges and Time Windows 8:15 AM
Madhav Jha, Zenefits, United States; C. Seshadhri, University of California, Santa Cruz, United States; Ali Pinar, Sandia National Laboratories, United States

WA4-2 Inside the Atoms: Mining a Network of Networks and Beyond 8:40 AM
Hanghang Tong, Arizona State University, United States

WA4-3 Sampling and Filtering Operations on Big Data 9:05 AM
Vijay Gadepally, Lauren Edwards, Luke Johnson, Maja Milosavljevic, Benjamin Miller, Massachusetts Institute of Technology, United States

WA4-4 Improved Hidden Clique Detection by Optimal Linear Fusion of Multiple Adjacency Matrices 9:30 AM
Himanshu Nayar, University of Michigan, United States; Rajmonda Caceres, Kelly Geyer, Benjamin Miller, Steven Smith, MIT Lincoln Laboratory, United States; Raj Rao Nadakuditi, University of Michigan, United States

BREAK 9:55 AM

WA4-5 Robust Kriged Kalman Filtering 10:15 AM
Brian Baingana, University of Minnesota, United States; Emiliano Dall'Anese, National Renewable Energy Laboratory, United States; Gonzalo Mateos, University of Rochester, United States; Georgios B. Giannakis, University of Minnesota, United States

WA4-6 Residuals-Based Subgraph Detection with Cue Vertices 10:40 AM
Benjamin Miller, Stephen Kelley, Rajmonda Caceres, Steven Smith, Massachusetts Institute of Technology, United States

WA4-7 Defining and Detecting Signatures of Innovation in Collaboration Networks 11:05 AM
Nadya Bliss, Manfred Laubichler, Arizona State University, United States

WA4-8 Diffusion Dynamics in Social Networks of Arbitrary Structure 11:30 AM
June Zhang, José M.F. Moura, Carnegie Mellon University, United States

Session WA5a Sparse Estimation

Chair: *Vitor Nascimento, University of Sao Paulo*

WA5a-1 Convex Cardinal Shape Composition and Object Recognition in Computer Vision 8:15 AM
Alireza Aghasi, Justin Romberg, Georgia Institute of Technology, United States

WA5a-2 An Optimized Proportionate Adaptive Algorithm for Sparse System Identification 8:40 AM
Silviu Ciochina, Constantin Paleologu, University Politehnica of Bucharest, Romania; Jacob Benesty, University of Quebec, Canada; Steven Grant, Missouri University of Science and Technology, United States

WA5a-3 Adaptive Sparse Logistic Regression with Application to Neuronal Plasticity Analysis 9:05 AM
Alireza Sheikhattar, Jonathan Fritz, Shihab Shamma, Behtash Babadi, University of Maryland, United States

WA5a-4 Distributed Sparsity-Aware Diffusion Conjugate Gradient Algorithms for Sensor Networks 9:30 AM
Tamara Miller, Rodrigo de Lamare, Pontifical Catholic University of Rio de Janeiro, Brazil; Vitor Nascimento, University of São Paulo, Brazil; Yuriy Zakharov, University of York, United Kingdom

Session WA5b Compressive Beamforming and Sparsity-Based Techniques

Chair: *TBD*

WA5b-1 Adaptive Measurement Matrix Design for Compressed DoA Estimation with Sensor Arrays — 10:15 AM
Berk Özer, Bilkent University, Turkey; Anastasia Lavrenko, Technische Universität Ilmenau, Germany; Sinan Gezici, Bilkent University, Turkey; Florian Römer, Giovanni Del Galdo, Technische Universität Ilmenau, Germany; Orhan Arikan, Bilkent University, Turkey

WA5b-2 Multiple Snapshot Compressive Beamforming — 10:40 AM
Peter Gerstoft, Angeliki Xenaki, University of California, San Diego, United States; Christoph Mecklenbrauker, Erich Zoechmann, Technische Universität Wien, Austria

WA5b-3 Blind Super-Resolution of Sparse Spike Signals — 11:05 AM
Yuejie Chi, The Ohio State University, United States

WA5b-4 Tensor MUSIC in Multidimensional Sparse Arrays — 11:30 AM
Chun-Lin Liu, P. P. Vaidyanathan, California Institute of Technology, United States

Session WA6a Tracking

Chair: *TBD*

WA6a-1 Supervised Online Subspace Tracking — 8:15 AM
Yao Xie, Qingbin Li, Sebastian Pokutta, Georgia Institute of Technology, United States

WA6a-2 Algorithms for Tracking with a Foveal Sensor — 8:40 AM
Gregory Spell, Douglas Cochran, Arizona State University, United States

WA6a-3 Period Estimation and Tracking: Filter Bank Design using Truth Tables of Logic — 9:05 AM
Srikanth V. Tenneti, P. P. Vaidyanathan, California Institute of Technology, United States

WA6a-4 Vehicle Track Detection in CCD Imagery via Conditional Random Field — 9:30 AM
Rebecca Malinas, Tu-Thach Quach, Mark Koch, Sandia National Laboratories, United States

Session WA6b Structure in Adaptive Signal Processing Algorithms

Chair: *TBD*

WA6b-1 Fundamentals of Multirate Graph Signal Processing — 10:15 AM
Oguzhan Teke, P. P. Vaidyanathan, California Institute of Technology, United States

WA6b-2 Randomized Subspace Learning Approach for High Dimensional Low Rank Plus Sparse Matrix Decomposition — 10:40 AM
Mostafa Rahmani, George Atia, University of Central Florida, United States

WA6b-3 Social Media Data Assisted Inference with Application to Stock Prediction — 11:05 AM
Hao He, Arun Subramanian, Sora Choi, Pramod Varshney, Syracuse University, United States; Thyagaraju Damarla, US Army Research Lab, United States

WA6b-4 Improved Estimation of Canonical Vectors in Canonical Correlation Analysis — 11:30 AM
Nicholas Asendorf, Raj Rao Nadakuditi, University of Michigan, United States

Session WA7a Image Processing

Chair: *TBD*

WA7a-1 No-Reference Synthetic Image Quality Assessment using Scene Statistics — 8:15 AM
Debarati Kundu, Brian Evans, University of Texas at Austin, United States

WA7a-2 Speckle Removal by Statistically-Driven Anisotropic Diffusion of SAR Temporal Stacks — 8:40 AM
Nazia Tabassum, Andrea Vaccari, Scott Acton, University of Virginia, United States

WA7a-3 Oil-Spill Forensics using Two-Dimensional Gas Chromatography: Differentiating Highly Correlated Petroleum Sources using Peak Manifold Clusters — 9:05 AM
Hamidreza Ghasemi Damavandi, Ananya Sen Gupta, University of Iowa, United States; Christopher Reddy, Robert Nelson, Woods Hole Oceanographic Institution, United States

WA7a-4 On the Power of Joint Wavelet-DCT Features for Multispectral Palmprint Recognition — 9:30 AM
Shervin Minaee, Amirali Abdolrashidi, New York University, United States

Session WA7b Graph Signal Processing

Chair: *Antonio Marques, Universidad Rey Juan Carlos*

WA7b-1 Uncertainty Principle and Sampling of Signals Defined on Graphs — 10:15 AM
Mikhail Tsitsvero, Sergio Barbarossa, Paolo Di Lorenzo, Sapienza University of Rome, Italy

WA7b-2 Sampling of Graph Signals: Successive Local Aggregations at a Single Node — 10:40 AM
Santiago Segarra, University of Pennsylvania, United States; Antonio Marques, King Juan Carlos University, Spain; Geert Leus, Delft University of Technology, Netherlands; Alejandro Ribeiro, University of Pennsylvania, United States

WA7b-3 Joint Filtering of Graph and Graph-Signals — 11:05 AM
Nicolas Tremblay, Pierre Borgnat, Ecole normale superieure de Lyon, CNRS, France

WA7b-4 Taxi Data in New York City: A Network Perspective — 11:30 AM
Joya A. Deri, Carnegie Mellon University, United States; José M.F. Moura, Carnegie Mellon University; New York University (Visiting), United States

Session WA8a1 Coding and Decoding

Chair: *TBD*

8:15 AM–9:55 AM

WA8a1-1 Trapping Sets in Stochastic LDPC Decoders
Kuo-Lun Huang, Northeastern University, United States; Vincent Gaudet, University of Waterloo, Canada; Masoud Salehi, Northeastern University, United States

WA8a1-2 Quantized Message Passing for LDPC Codes
Michael Meidlinger, Vienna University of Technology, Austria; Alexios Balatsoukas-Stimming, Andreas Burg, EPFL, Switzerland; Gerald Matz, Vienna University of Technology, Austria

WA8a1-3 Partial Parallel Belief Propagation for Memory Reduction in Polar Code Decoding
Jingwei Xu, Tiben Che, Gwan Choi, Texas A&M University, United States

WA8a1-4 Reduced Complexity Detection for Network-Coded Slotted ALOHA using Sphere Decoding
Terry Ferrett, Matthew Valenti, West Virginia University, United States

Session WA8a2 Implementation of Communication Systems

Chair: *TBD*

8:15 AM–9:55 AM

WA8a2-1 Parallel Processing Intensive Digital Front-End for IEEE 802.11ac Receiver
Mona AghababaeeTafreshi, Juha Yli-Kaakinen, Toni Levanen, Ville Korhonen, Pekka Jääskelainen, Markku Renfors, Mikko Valkama, Jarmo Takala, Tampere University of Technology, Finland

WA8a2-2 The Impact of Faulty Memory Bit Cells on the Decoding of Spatially-Coupled LDPC Codes
Jiandong Mu, Aida Vosoughi, Rice University, United States; Joao Andrade, University of Coimbra, Portugal; Alexios Balatsoukas-Stimming, École Polytechnique Fédérale de Lausanne, Switzerland; Georgios Karakonstantis, Queen's University, United Kingdom; Andreas Burg, École Polytechnique Fédérale de Lausanne, Switzerland; Gabriel Falcao, Vitor Silva, University of Coimbra, Portugal; Joseph R. Cavallaro, Rice University, United States

WA8a2-3 ASIC Implementation and Performance Comparison of Adaptive Detection for MIMO–OFDM System
Essi Suikkanen, Markku Juntti, University of Oulu, Finland

WA8a2-4 Implementation of MU-MIMO Schedulers on SoC
Ganesh Venkatraman, Janne Janhunen, Markku Juntti, University of Oulu, Finland

WA8a2-5 Transmission Power Optimization for Energy Harvesting Wireless Nodes
Remun Koirala, Stefano Severi, Giuseppe Abreu, Jacobs University Bremen, Germany

Session WA8a3 Array Signal Processing

Chair: *TBD*

8:15 AM–9:55 AM

WA8a3-1 Multi-Frequency Array Self-Calibration
Benjamin Friedlander, University of California, Santa Cruz, United States

WA8a3-2 Iterative Thresholding for Blind Block Partitioned Tensor Decomposition
Christopher Mueller-Smith, Predrag Spasojevic, Rutgers University, United States

WA8a3-3 Passive Localization and Synchronization in the Presence of Affine Clocks
Bernhard Etzlinger, Christoph Pimminger, Stefan Fischereder, Andreas Springer, Johannes Kepler University, Linz, Austria, Austria

WA8a3-4 Lucky Ranging in Underwater Acoustic Environments Subject to Spatial Coherence Loss
Hongya Ge, New Jersey Institute of Technology, United States; Ivars P. Kirsteins, Naval Undersea Warfare Center, United States

WA8a3-5 Unmanned Aerial Vehicle Based Passive Radar Agile Sensing for Computerized Ionospheric Tomography
Yishi Lee, Jun Jason Zhang, University of Denver, United States; Matthew Zettergren, Embry-Riddle Aeronautical University, United States; Kimon P. Valavanis, University of Denver, United States

WA8a3-6 Clutter Suppression in Synthetic Aperture Radar Targets using the DFRFT and Subspace Methods with Rank Reduction
Balu Santhanam, Jelili Adebello, University of New Mexico, United States

WA8a3-7 Multipath Effects on Nested Array Processing
Peter Vouras, Naval Research Lab, United States

WA8a3-8 Joint Frequency and DOA Estimation using Fourier Coefficient Interpolation
Songsri Sirianunpiboon, Stephen D. Elton, Stephen D. Howard, Defence Science and Technology Organisation, Australia

Session WA8a4 Parameter and Waveform Estimation

Chair: *TBD*

8:15 AM–9:55 AM

WA8a4-1 PRIME: Phase Retrieval via Majorization-Minimization Technique
Tianyu Qiu, Prabhu Babu, Daniel Palomar, Hong Kong University of Science and Technology, Hong Kong SAR of China

WA8a4-2 Fast Sparse Compressive Phase Retrieval
Aditya Viswanathan, Mark Iwen, Michigan State University, United States

WA8a4-3 Asymptotically Efficient Estimators for Multidimensional Harmonic Retrieval Based on the Geometry of the Stiefel Manifold
Thomas Palka, Richard Vaccaro, University of Rhode Island, United States

WA8a4-4 Waveform Extraction from Reference Channels of Passive Multistatic Radar Systems
Pawan Setlur, Sandeep Gogineni, Wright State Research Institute, United States; Muralidhar Rangaswamy, Air Force Research Laboratory, United States

WA8a4-5 Methods and Bounds for Waveform Parameter Estimation with a Misspecified Model
Peter Parker, Los Alamos National Laboratory, United States

Session WA8a5 Adaptive Signal Processing Techniques

Chair: *TBD*

8:15 AM–9:55 AM

WA8a5-1 On Sample Generation and Weight Calculation in Importance Sampling
Victor Elvira, Universidad Carlos III de Madrid, Spain; Luca Martino, University of Helsinki, Finland; David Luengo, Universidad Politecnica de Madrid, Spain; Monica Bugallo, Stony Brook University, United States

WA8a5-2 Multichannel Spectral Factorization Algorithm using Polynomial Matrix Eigenvalue Decomposition
Zeliang Wang, John G. McWhirter, Cardiff University, United Kingdom; Stephan Weiss, University of Strathclyde, United Kingdom

WA8a5-3 Excision of a Discontinuous-Frequency Interference Signal with Harmonic Structure
Todd K. Moon, Jacob H. Gunther, McKay Bonham, Utah State University, United States; Gus William, Brigham Young University, United States

WA8a5-4 Characterization of Sonar Target Data using Gabor Wavelet Features
Daniel Schupp, Ananya Sen Gupta, University of Iowa, United States; Ivars Kirsteins, Naval Undersea Warfare Center, United States

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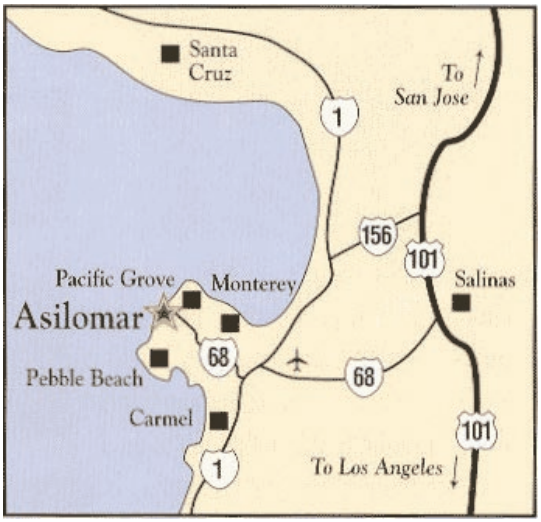
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